Design Course

Indian Toy Design

Biomimicry-inspired toys

by
Prof. Vijay Bapat
IDC, IIT Bombay

Source:
https://dsource.in/course/indian-toy-design

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https://www.dsource.in/course/indian-toy-design/introduction

Introduction

The course on designing kids' products for play environments using a biomimetic approach offers a unique and innovative perspective on product design. Under the guidance of Professor Bapat from IDC School of Design, IIT Bombay, the course challenges students to draw inspiration from nature to create toys and playground equipment that are not only functional and enjoyable but also sustainable, educational, and user-friendly. Biomimicry, the practice of solving human challenges by emulating the designs, processes, and systems found in nature, serves as the core framework for the course. Students are encouraged to explore the biomechanics, physiology, and movement patterns of animals and birds, applying these observations to the design process.

Throughout the course, students are split into two groups, each tasked with designing one of two types of products: push toys or ride-on toys and playground equipment. These designs must incorporate biomimetic principles by analyzing natural movements, structures, and systems, and then translating these ideas into innovative play products. The course emphasizes a hands-on, iterative approach to design, with stages that include user research, market analysis, ideation, prototyping, and final concept presentation.

The course also involved a great deal of iteration, from concept evaluation and form exploration to the detailing of graphics, branding, and promotional materials. Students were challenged to refine their designs and present their final concepts in a professional manner, showcasing the biomimetic inspiration behind each toy while ensuring that each design was easy for children to use and enjoy.

Through this process, students gained valuable insights into how biomimicry can inspire innovative, user-centered solutions in the field of children's product design, all under the expert guidance of Professor Bapat.

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Theme of the Course

The theme of the course revolves around designing innovative, user-centered kids' products for play environments using a biomimetic approach. A key aspect of the course was the emphasis on a user-centric design approach, ensuring that the toys and equipment were not only functional and enjoyable for children but also safe, accessible, and aligned with their developmental needs. As part of their design process, students visited local toy shops and playgrounds to observe firsthand how children interact with various products and play structures. These visits provided valuable insights into the types of toys that engaged children and those that promoted movement, exploration, and creativity. In the toy shops, students closely examined existing designs, considering factors such as usability, safety features, and the appeal of each product. Similarly, by observing children at play in real-world playground settings, they gained a deeper understanding of how play environments can inspire imagination and physical activity.

Back in class, these observations were discussed and analyzed in group sessions, where students shared their findings and brainstormed ways to incorporate those insights into their biomimetic designs. The class discussions provided a platform for students to exchange ideas, critique each other's concepts, and refine their approaches, ensuring that their final products were both innovative and practical for children's needs.

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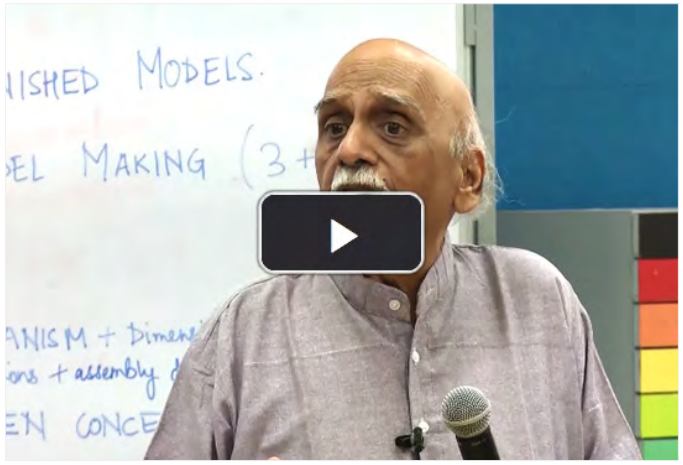
Difference Between Idea and Concept

As the course progressed, Professor Bapat guided the students through a critical distinction: the difference between an idea and a concept. This distinction became a key turning point in the design process, helping students refine their thinking and advance their projects with greater clarity and focus.

After the first stage of the presentation, Professor Bapat explained that concepts are often combinations of ideas or the result of synthesizing and refining ideas. Concepts are actionable - they are manufacturable and have specific dimensions, material considerations, and user interactions. He emphasized that a concept goes beyond just the initial inspiration, turning it into something that can be developed into a real product. He illustrated this with example sketches created by students during Stage 1, showing how initial ideas could evolve into more structured and executable concepts.

Concept selection is a crucial step in the design process. It involves analyzing ideas, testing their feasibility, and determining which one has the potential to become a successful and practical product.

Additionally, Professor Bapat introduced the idea of biomimicry. When drawing inspiration from nature - such as birds or animals, it's not about simply copying what you see but rather transforming that inspiration into something new and exciting. Biomimicry involves developing concepts that evoke creativity and fantasy, rather than just replicating nature's designs. It's about understanding the underlying principles behind nature's solutions and applying them in a way that is functional, playful, and engaging for children.



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Product Design Insights

The project concludes with a comprehensive final presentation that showcases the students' design process and outcomes. This presentation typically includes functional or conceptual models, meticulously crafted design drawings, and a well-organized written report that documents the development and rationale behind the proposed solution.

Throughout the course, students engage in a series of in-depth discussions and practical exercises that explore each phase of the design process. Emphasis is placed on integrating systematic approaches with creative thinking to foster innovative and well-rounded solutions. To reinforce these concepts, students complete a variety of targeted assignments. These cover a wide range of topics, including creativity-enhancing techniques (such as brainstorming and synectics), identifying and framing design opportunities, problem analysis, visual idea generation through sketching, the creation of exploratory mock-ups, and methods for evaluating and refining design concepts.

Collectively, these activities are designed to guide students toward developing solutions that are not only functional and innovative but also thoughtful and visually compelling.

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Understanding Toy Mechanism

Understanding toy mechanisms involves examining how toys work—from simple motion to more complex interactive features. At its core, this exploration reveals the principles of mechanical design, physics, and user interaction, all wrapped in a playful and accessible form.

A toy mechanism is the inside part of a toy that makes it move, spin, jump, talk, or do cool tricks. Think of it like the "muscles and bones" of the toy that help it move and interact with you.

Have you ever wondered how a toy moves, makes sounds, or lights up when you press a button or turn a crank? That's all thanks to something called toy mechanisms! Let's break it down and learn how toys come to life.

Toys use simple parts to do fun things. Here are some common ones:

Levers - Like seesaws, they help parts go up and down.

Gears - These are little wheels with teeth that turn each other. It help to move things in different ways and in different manner.

Ratchets - It allows the movement only in one direction. It can be used for making noise in different toys.

Pulleys - It is like gear but it has connecting member like thread. Transmission is through thread or belt. They give same direction rotation.

Cams - Special shapes that make parts go up and down when they turn.

Cranks - It is like a rotating wheel helping one element to move in straight line.

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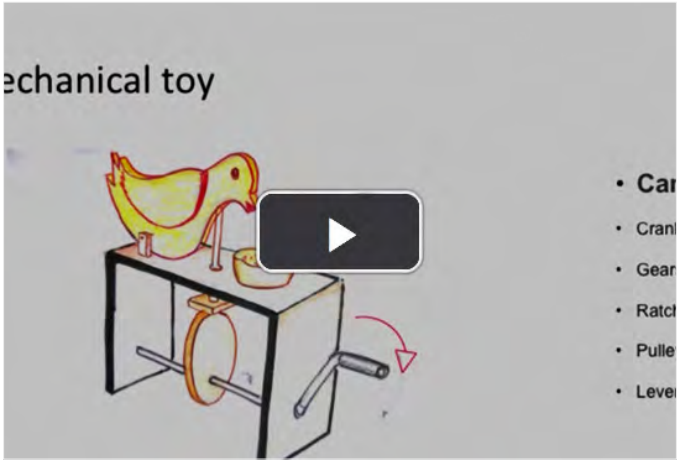

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Students Presentations

Throughout the course, students were divided into two groups, each responsible for designing one of two types of products: push toys or ride-on toys. The designs were required to incorporate biomimetic principles, drawing inspiration from natural movements, structures, and systems. Students translated these natural observations into creative, functional play products. The course emphasized a hands-on, iterative approach, with stages including user research, market analysis, ideation, prototyping, and the final concept presentation.

The next phase focused on concept evaluation, form exploration, and detailing. Students assessed each design's functionality, aesthetic appeal, and safety features, ensuring that the toys met children's developmental needs. These toys were intended not only to encourage physical activity and imaginative play but also to provide children with an engaging way to learn about nature and the environment through the integration of biomimetic principles. In the final stages, students worked on creating professional graphics, branding, and posters to present their toys. These promotional materials highlighted the biomimetic inspiration behind each design and aimed to demonstrate how the toys could positively influence children's learning and play experiences, making the connection between fun and education clear and impactful.

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Push Toy - Group A

Ride-on Toy - Group B

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Push Toy - Group A

The exercise was assigned as part of the Product Design Module during the second semester of the Junior M. Des. Industrial Design course at IDC, IIT Bombay, under the guidance of Prof. Vijay Bapat. The class of 14 students was split into two groups of 7 each. Group A was tasked with designing a push toy for 9-15-month-olds, while Group B was tasked with designing a ride-on toy for 6-12-year-olds. Group A had the additional constraint of using only wood or processed wood as their material. The duration of the module was three weeks.

Group A choose to design push toy. Design Insights followed by Group A.....

Catchy
by Anushree Banerjee

Pakhi by Minal Agarwal

Totter by Nikita Fatarpekar

Toto by Rajat

Roxy by Hari

Rollerpede by Mridul Jain

Waliz by Nirmal P J

Chani by Aamod Narkar

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Rolly by Ashuj Chawda

Chef Olie by Athira E

Sting Ray by Infant Bibin I

Akira
by Mohammed Hazique Kola

Buzz by Mugdha Dengle

Tooti by Naiga Catherine

Go Bananas by Parth Rathod

Buba
by Prathmesh Pedamkar

Pambo by Sagar D Dabherao

Muro by Shivani M

Cunth by Snehal Gaikwad

Taco by Susovan Gupta

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Hooti
by Uppili Nithin Soorya B

Piku by Vaibhav Watile

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Catchy by Anushree Banerjee

Anushree wants to create a push toy for children aged 9 to 15 months that uses nature-inspired design (biomimicry). The toy should help kids recognize colors and patterns through its movement and feedback. It should also surprise them in a fun way.

She is drawing inspiration from chameleons or hummingbirds. Safety is crucial, so the toy's shapes, materials, and size of pieces must be child-friendly and durable. It should keep the child engaged for a long time.

One idea is 'Catchy the Chameleon,' a toy that kids can push or play with. The main action is its mouth opening to catch a 'fly' with its tongue. It also features rotating color disks for interactive play while sitting. The toy aims to improve fine motor skills and cognitive learning by teaching color and pattern recognition."

Stage 1 Presentation

Case Study - Slide Show

Poster

Video

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Stage 1 Presentation

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• Catchy_Stage 1 Presentation_by Anushree Banerjee.....

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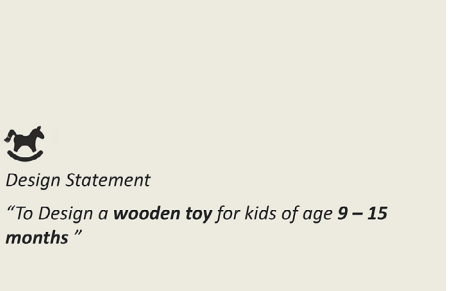
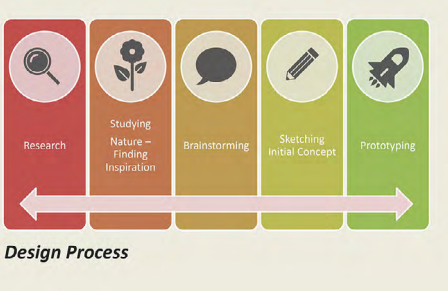
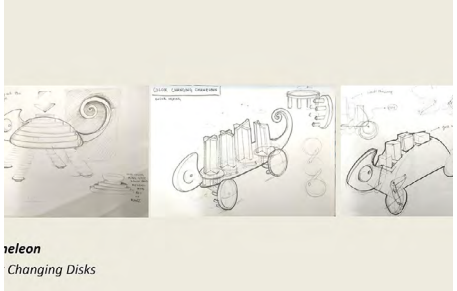
Case Study - Slide Show

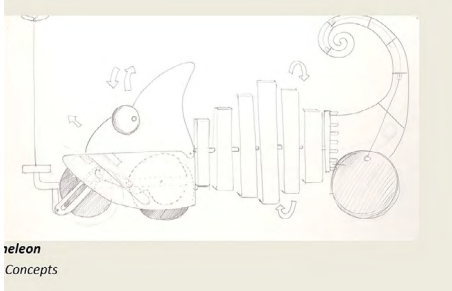
Case Study Download:

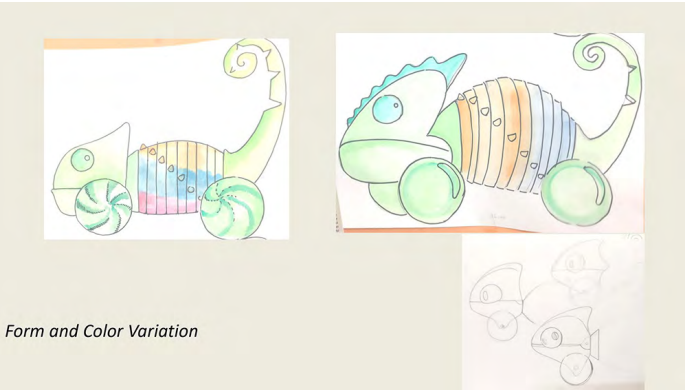
• Catchy_by Anushree Banerjee.....

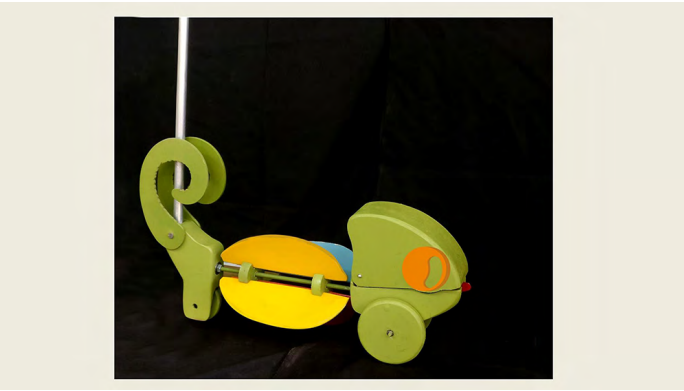












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Video

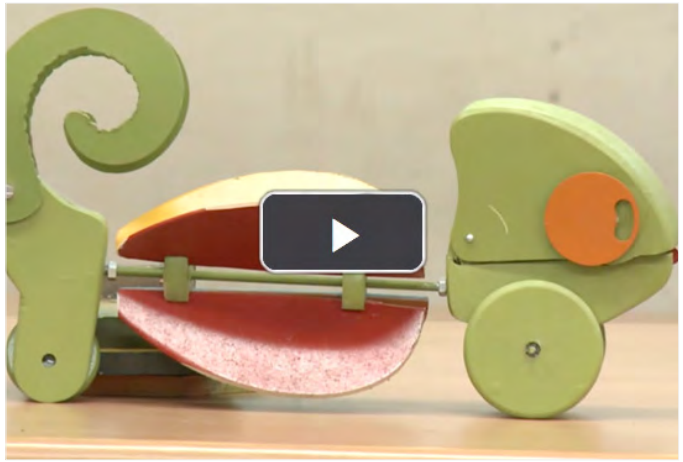
Presentation Stage 1 by Anushree Banerjee

YouTube Video Link.....

Toy Design Mechanism by Anushree Banerjee

YouTube Video Link.....

Catchy by Anushree Banerjee



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Roxy by Hari

Hari aims to create a push toy catering to children aged 9-15 months, drawing inspiration from nature through Bionics and Biomimetic principles. This approach involves analyzing animal movements and physiology to integrate them into the toy's final design. The design objectives include ensuring the toy is suitable for mass production at an affordable cost. It must be age-appropriate, child-safe (using non-toxic materials), well-crafted (free of sharp edges and paint that may peel), easy to operate, and visually appealing. Moreover, durability is a key consideration to withstand everyday wear and tear.

It is the ROXY® philosophy that 'good quality play' enriches a child's life and lays the foundation for later adult life. We believe that play is a key element in children's growth and development and stimulates the imagination and the emergence of ideas and creative expression. All ROXY products are based on this underlying philosophy of making your child's life a beautiful experience.

Stage 1 Presentation

Case Study - Slide Show

Poster

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Stage 1 Presentation

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- Roxy_Stage 1 Presentation_by P Sri Hari.....

DE 608:PRODUCT DESIGN – 2

TOY DESIGN

P SRI HAR

76130008

PROBLEM STATEMENT:

Design a push toy for children of age 9-15 months. The design must take inspiration from nature by using **Bionic** and **Biomimetic** principles to analyse the movements physiology of animals and incorporate them in fina design.

Literature Review:

The following are **physical, cognitive, social** and **emotional** changes that occur in children of 9-15 months.

Figure 1: Interesting Facts about Child Development. Accessed on 10 April, 2018 <https://www.factretriever.com/child-development-facts>

Physical Changes:

- Confident **walker**
- Adjusts **posture** as he/she moves
- Follows your **gaze**
- **Dexterity** in hands

Cognitive changes:

- Deliberate **exploration**
- **Entertaining** him/herself
- Understanding **language**
- Using deliberate **gestures**

Social and emotional changes:

- Shows **affection** (Hugs, smiles, kisses etc..,)
- **Mimics** Actions
- **Recognizes** familiar faces
- **Babbles** with inflections of actual languages

Design Inspiration:

Dogs are animals, but they have a special place in the hearts of many adults and children. If appropriately trained and supervised, dogs can provide many valuable lessons and other benefits to children.

Figure 2: Relation between babies and dogs. Accessed on 10 April, 2018 <https://www.boredpanda.com/kids-dogs-friendship/>

DOGS MOOD ANALYSIS:

Observing the "whole dog" at a distance can give you a quick and general idea of the dog's mood.

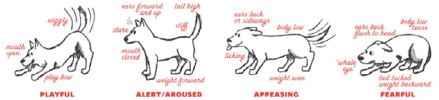

Figure 3: Mood analysis of dogs. Accessed on 10 April, 2018 <http://www.beautifulbeasties.com/learning-to-speak-dog-part-4-reading-a-dogs-body/>

Once you have a general idea after observing the dog as a whole, you can zoom in on individual body parts that will often give you key clues on the dog's emotional state.

EARS:

Figure 4: Mood analysis of dogs based on ears. Accessed on 10 April, 2018 <http://www.beautifulbeasties.com/learning-to-speak-dog-part-4-reading-a-dogs-b/>

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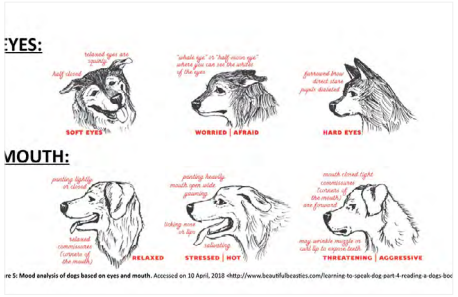

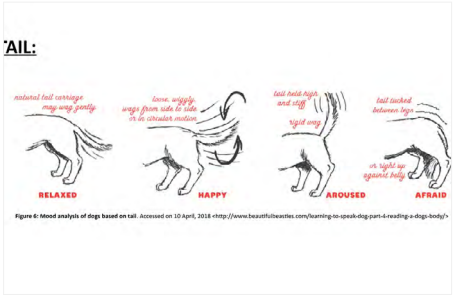

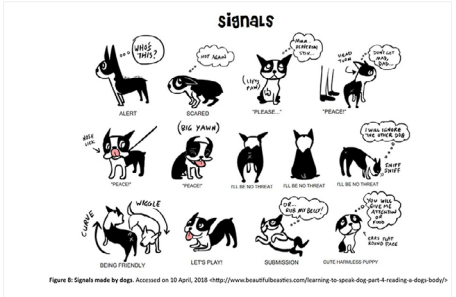

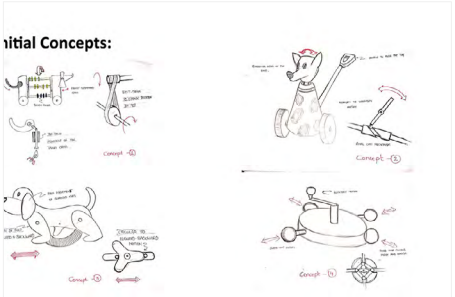

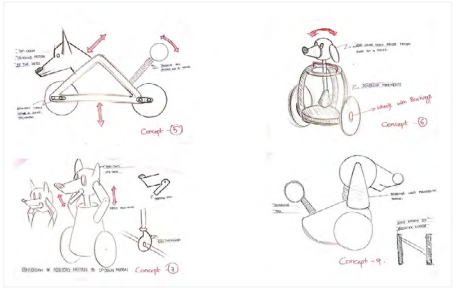

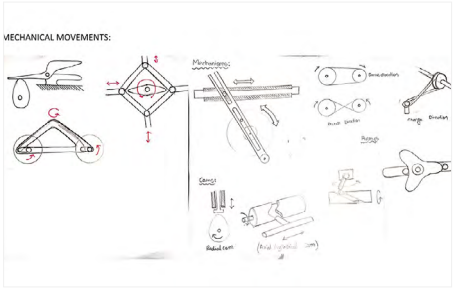

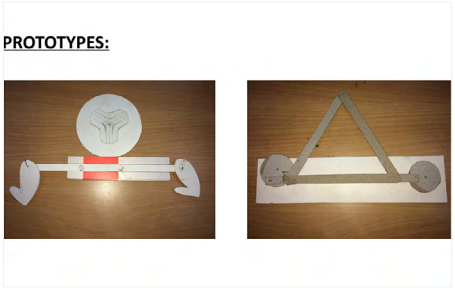

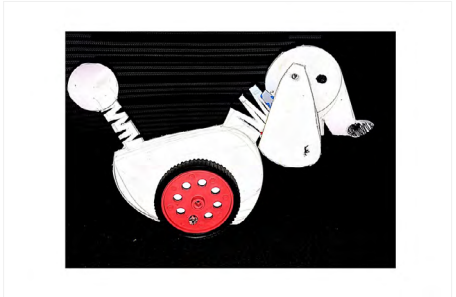

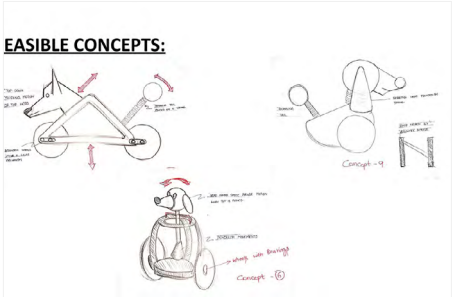

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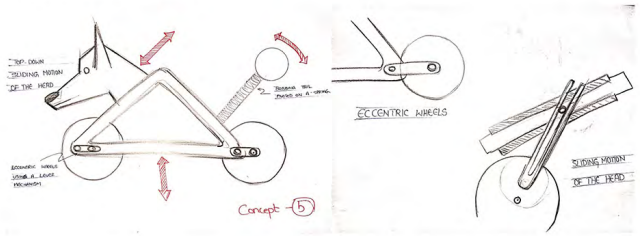
FINAL CONCEPT:



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Case Study - Slide Show

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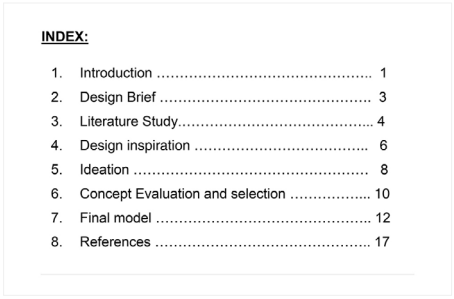

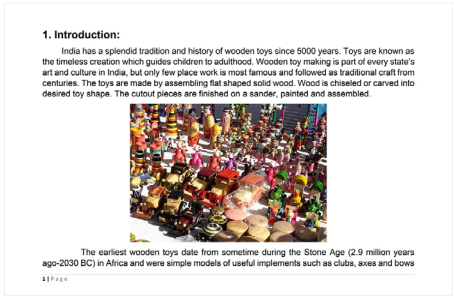

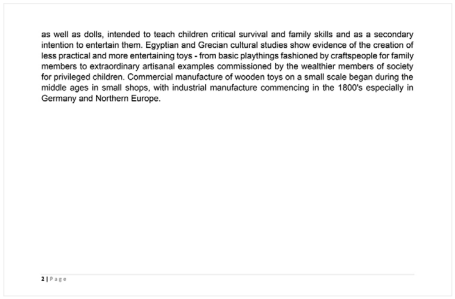

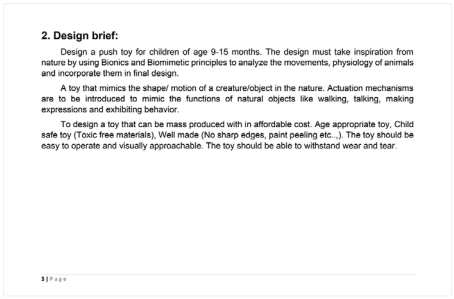

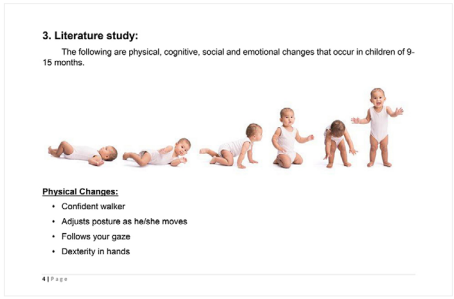

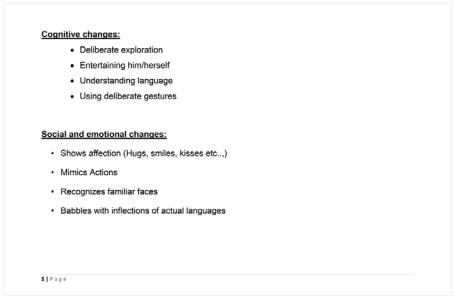

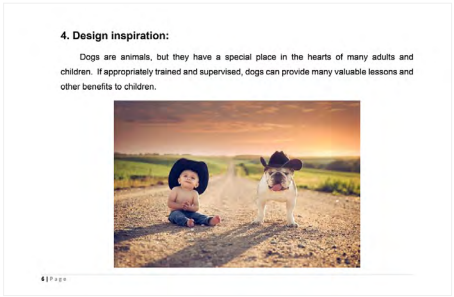

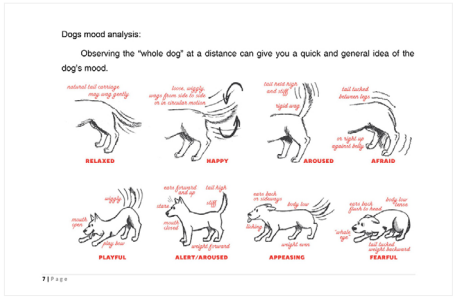

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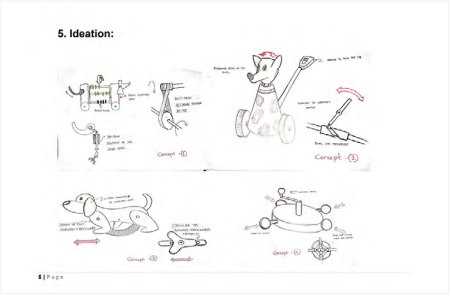

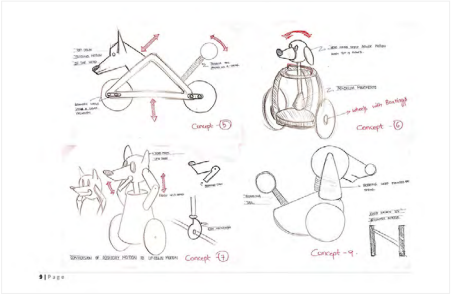

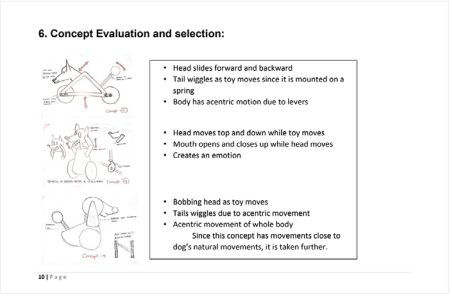

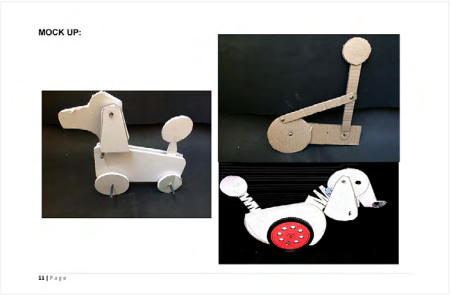

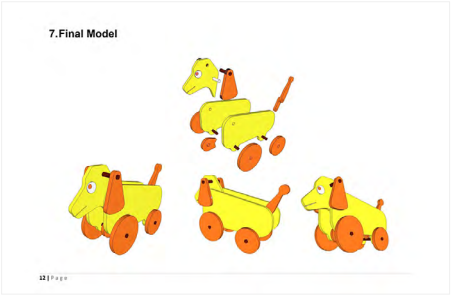

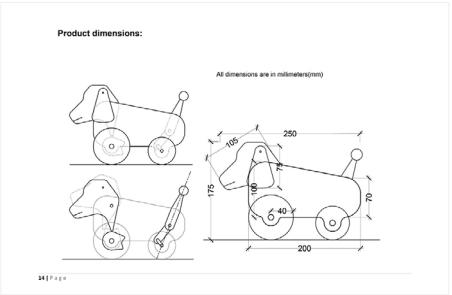

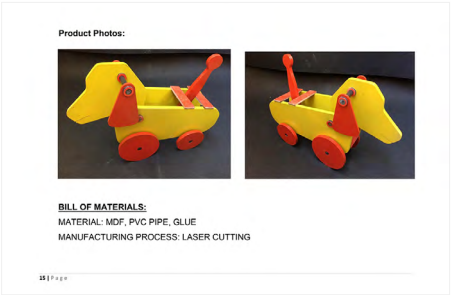

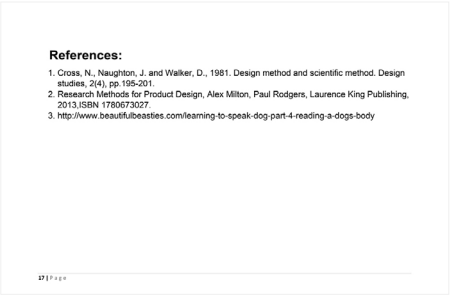

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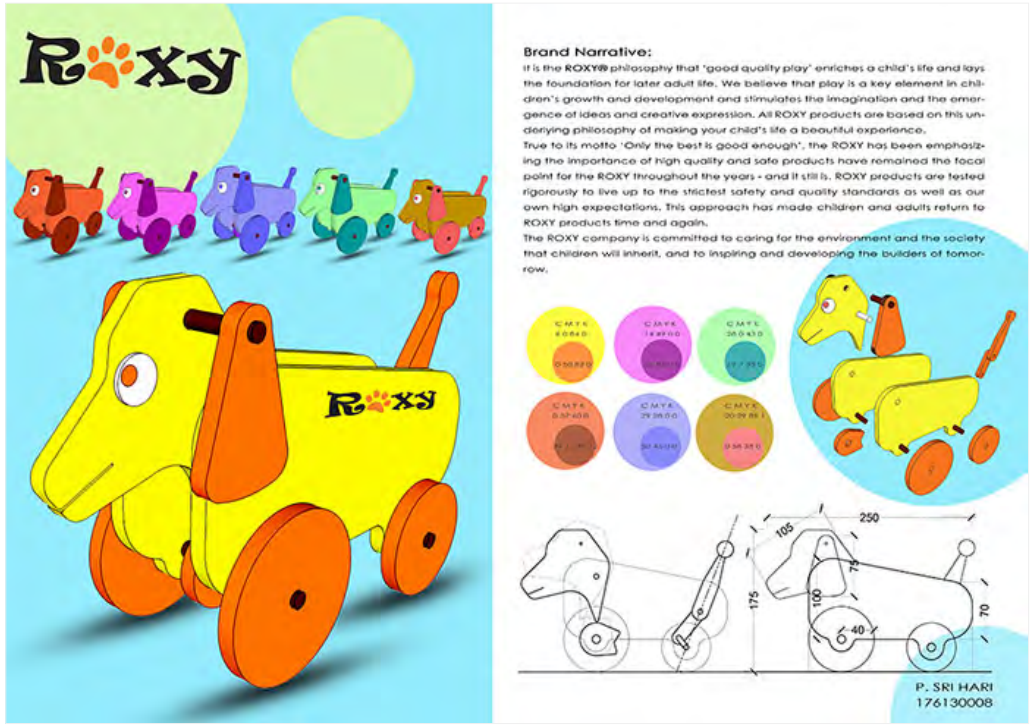

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Video

Presentation Stage 1 by Hari

YouTube Video Link.....

Final Presentation by Hari

YouTube Video Link.....

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Pakhi by Minal Agarwal

Minal aims to design a wooden push toy targeting children aged 9-15 months. The toy must stimulate curiosity, prioritize safety in use, and excel in form, function, and materials to ensure durability against wear and tear. Additionally, it should be visually engaging and accessible.

The toy should be versatile, offering multiple usage options or transformable features. It should encourage physical development through the child's movement during play and incorporate an element of unpredictability.

Drawing insights from user studies, market research, and bionic inspirations, our ideation process began. Initial concepts drew inspiration from interactive animal tails such as those of monkeys, squirrels, raccoons, and scorpions, as well as observations of animals like the glass frog and the red bird of paradise. Ultimately, the concept of a bird emerged as the chosen design direction.

Stage 1 Presentation

Case Study - Slide Show

Poster

Video

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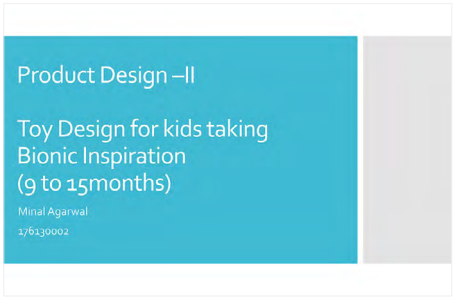
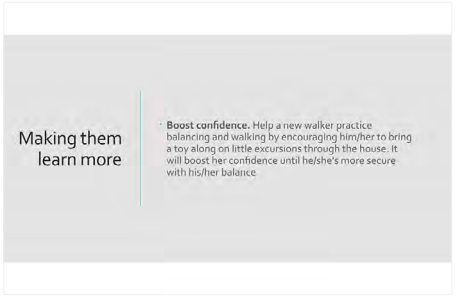
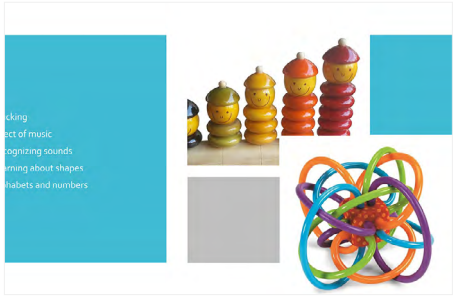
Stage 1 Presentation

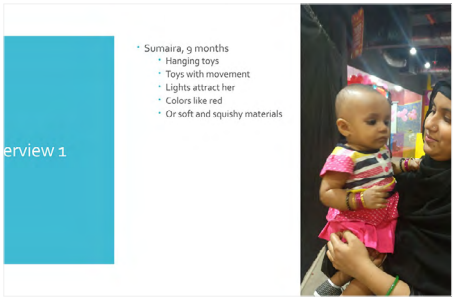
Download:

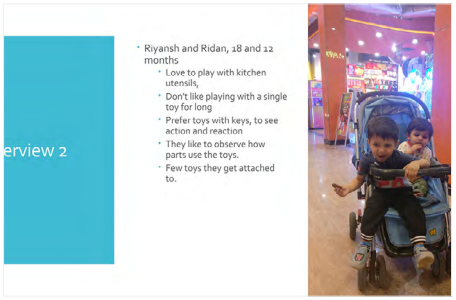
• Pakhi_Stage 1 Presentation_by Minal Agarwal.....

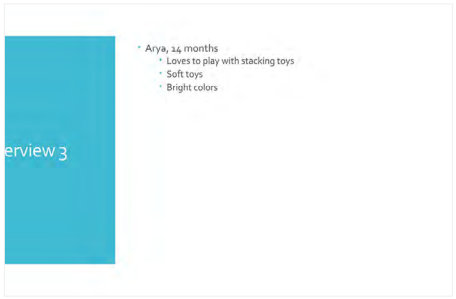












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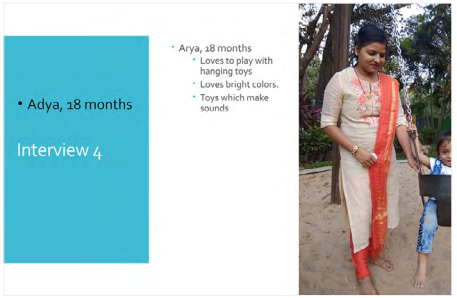

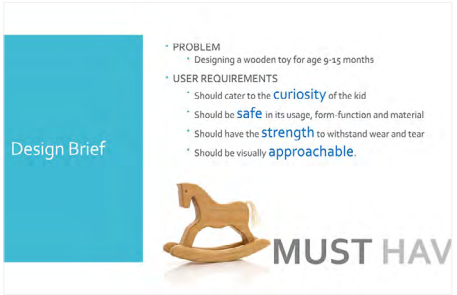

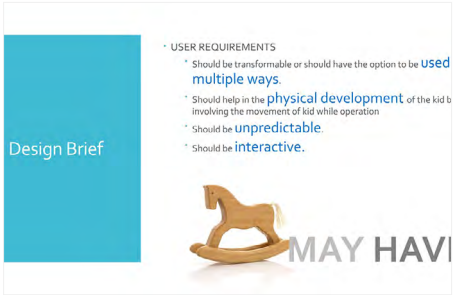

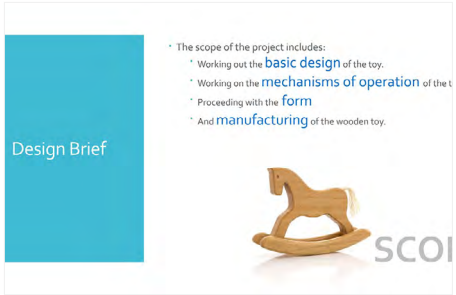

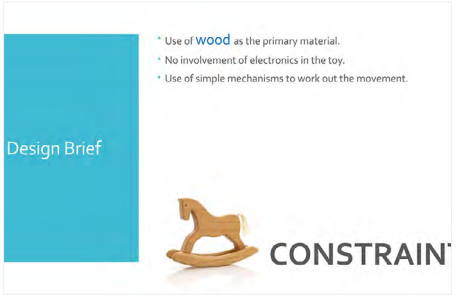

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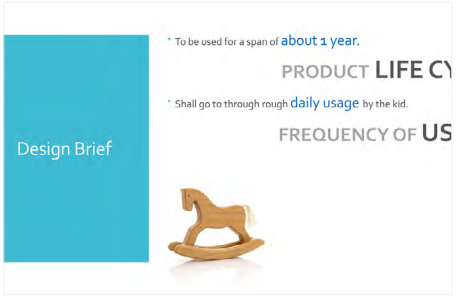

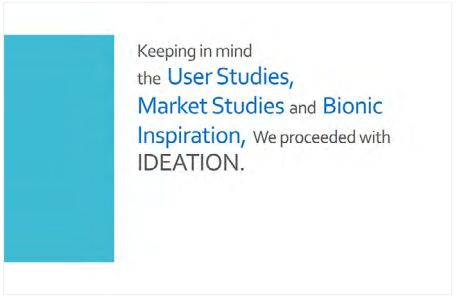

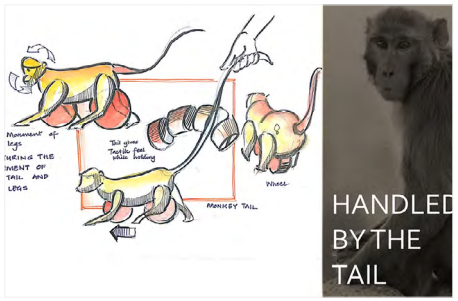

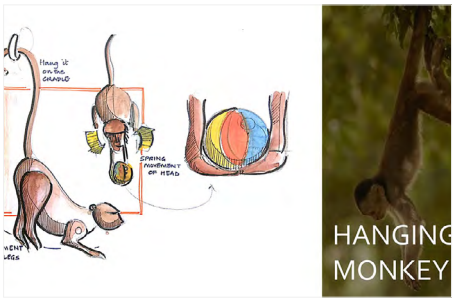

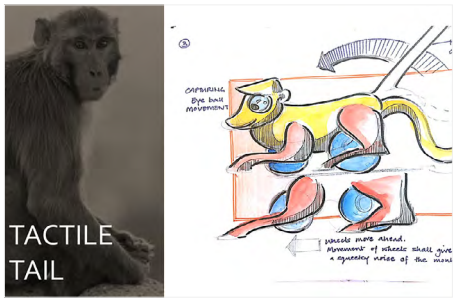

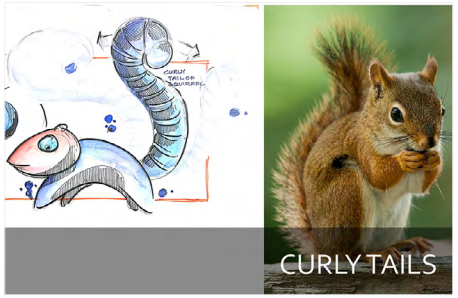

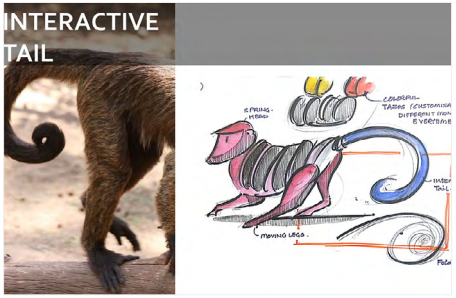

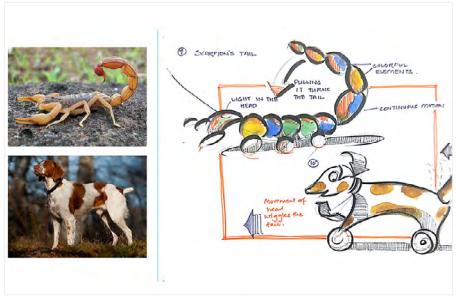

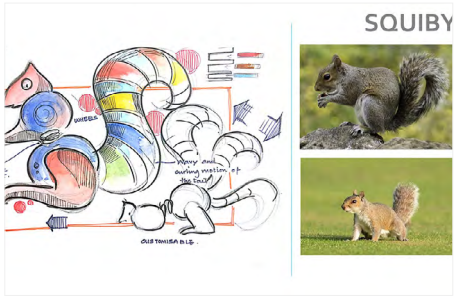

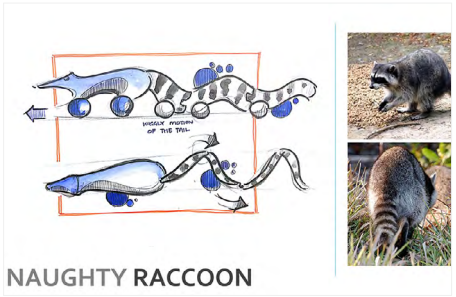

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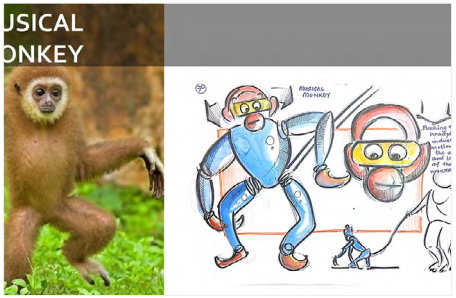

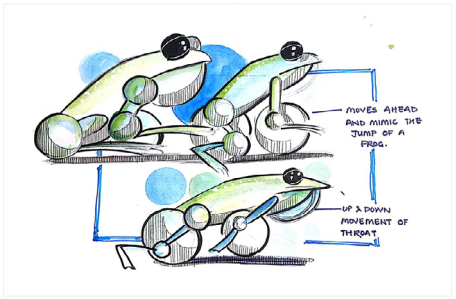

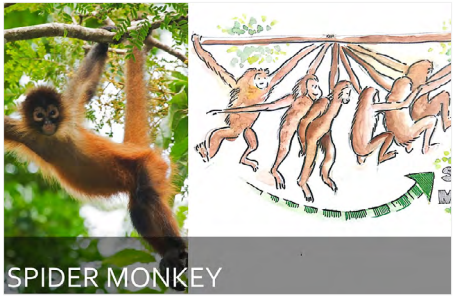

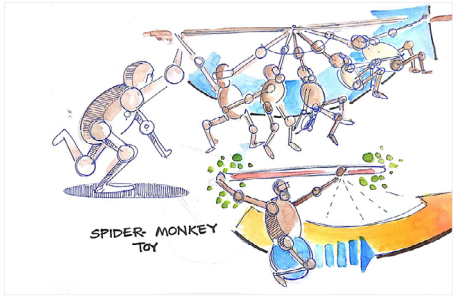

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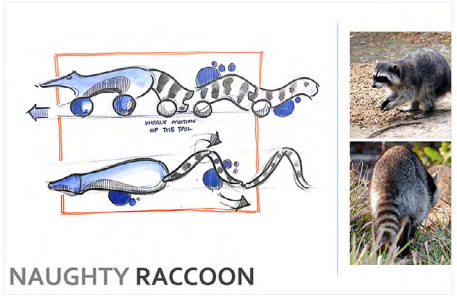

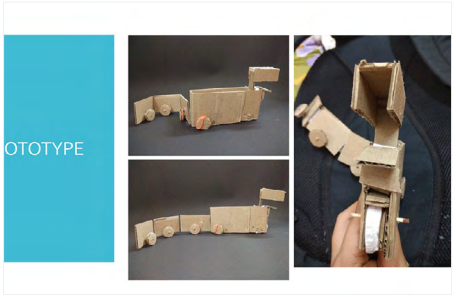

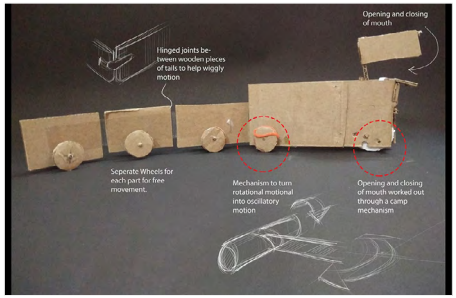

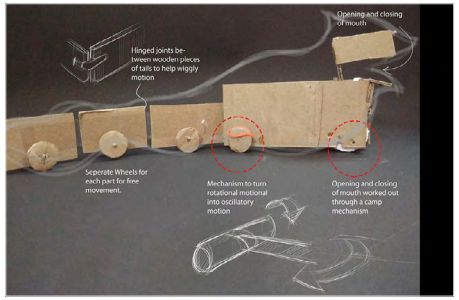

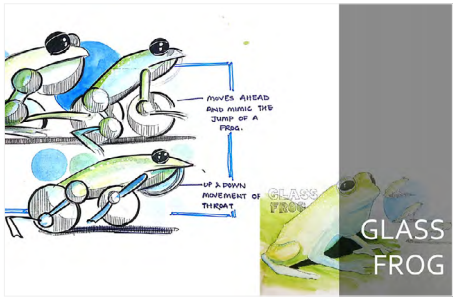

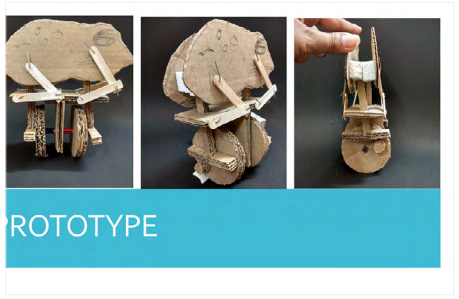

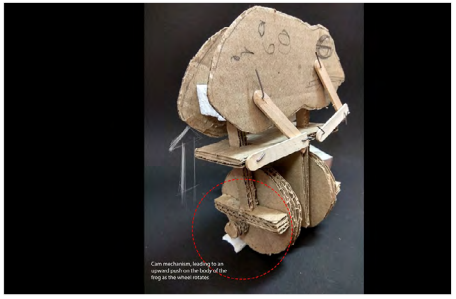

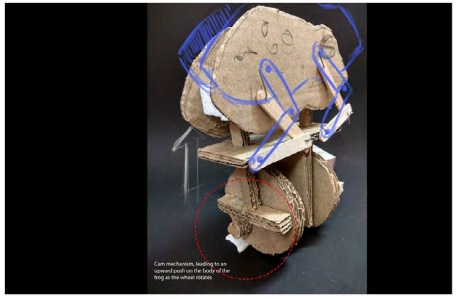

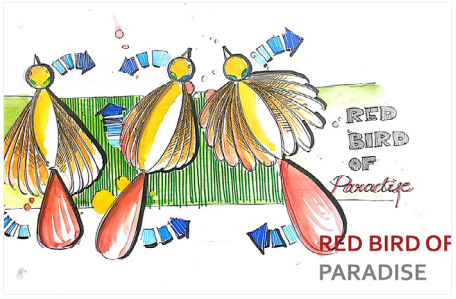

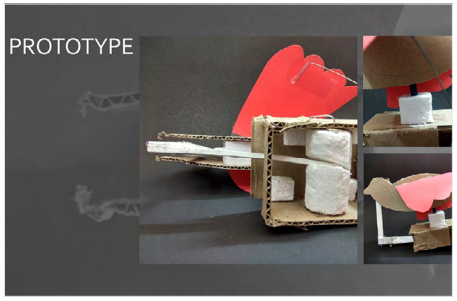

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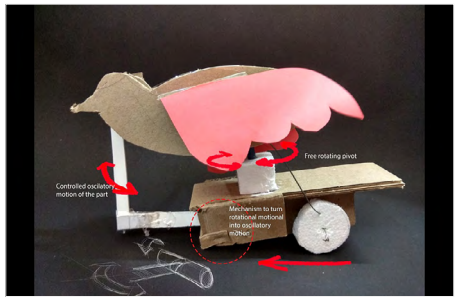

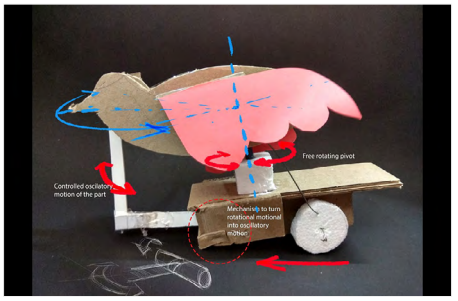

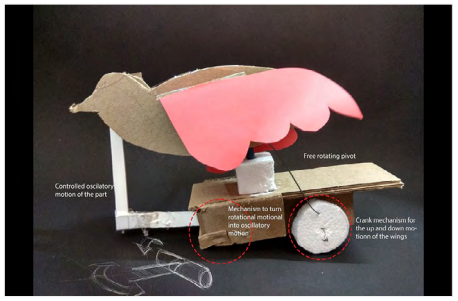

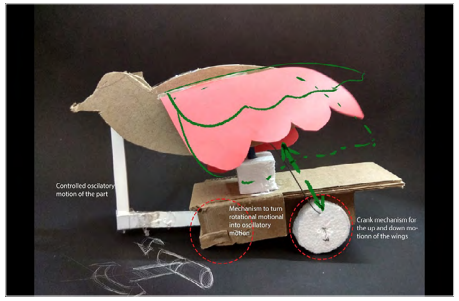

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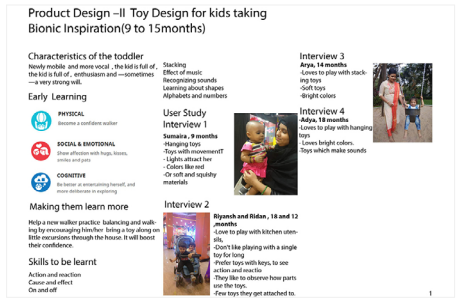
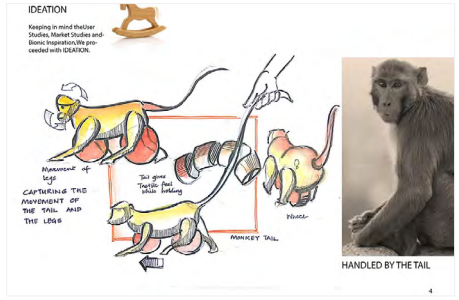
https://dsource.in/course/indian-toy-design/students-presentations/push-toy-group/pakhi-minal-agarwal/case-study-slide

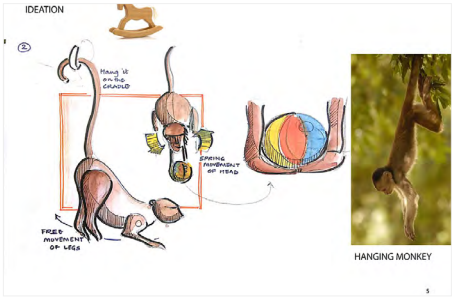
Case Study - Slide Show

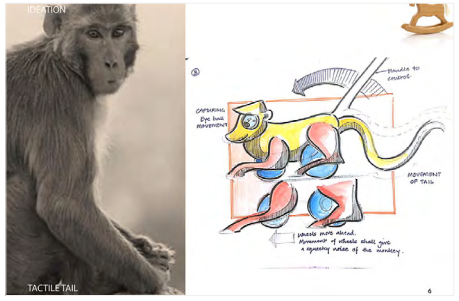
Case Study Download:

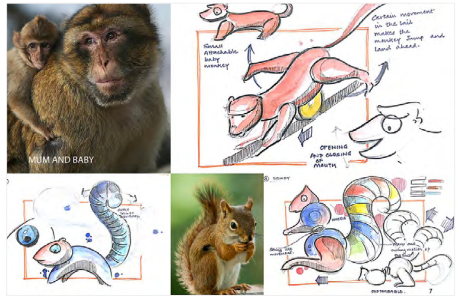
- Pakhi_by Minal Agarwal.....
- Pakhi_by Minal Agarwal_Report.....

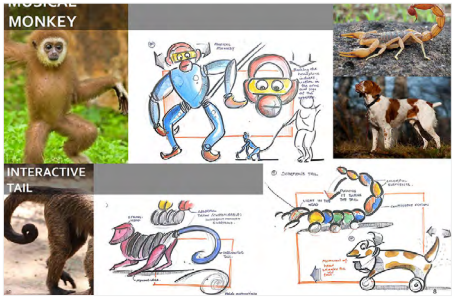












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Biomimicry-inspired toys

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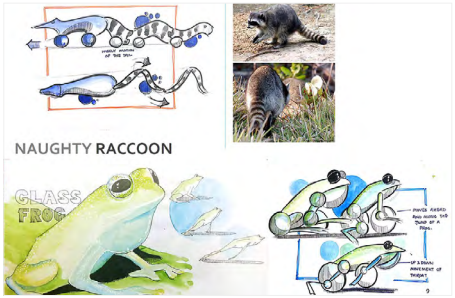

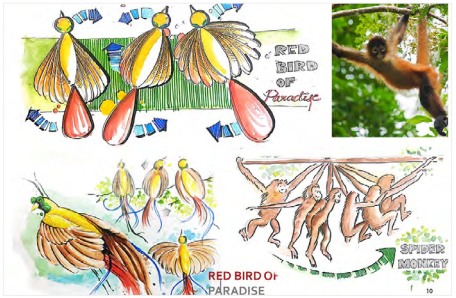

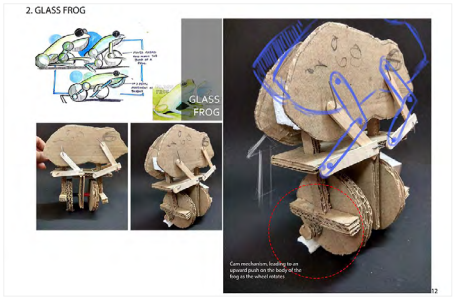

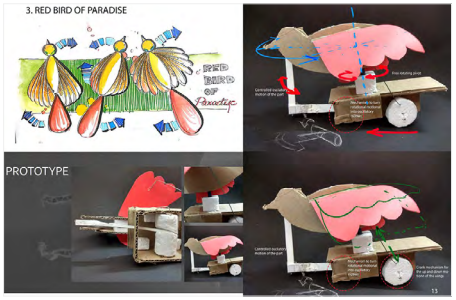

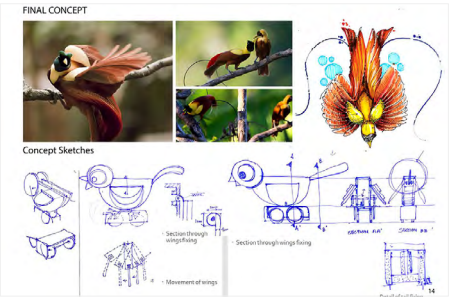

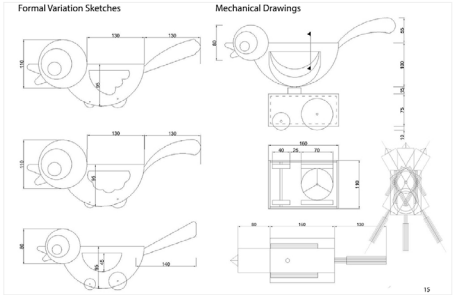

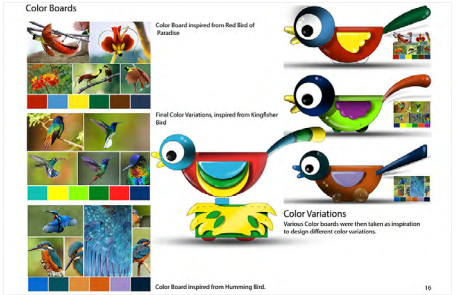

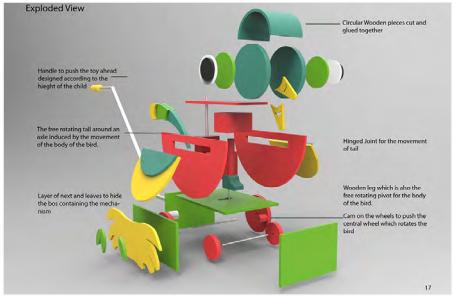

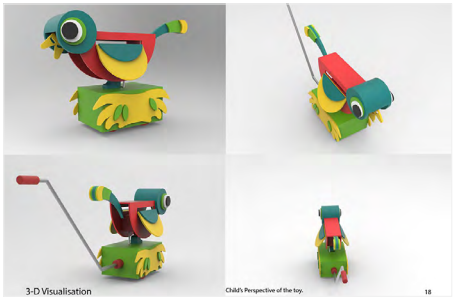

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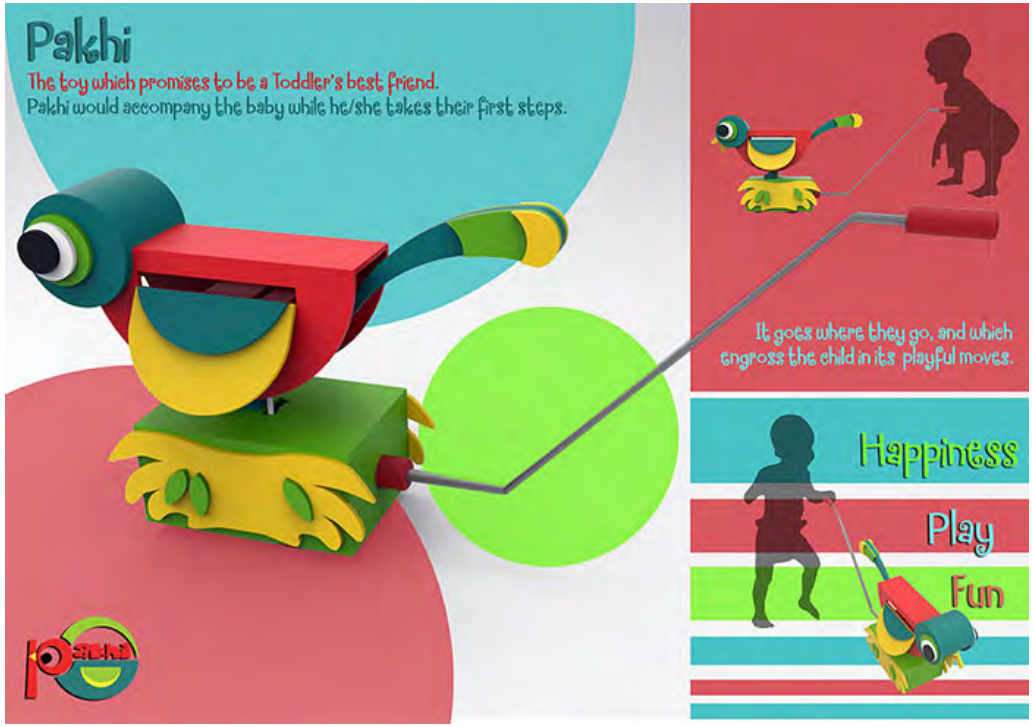
Poster



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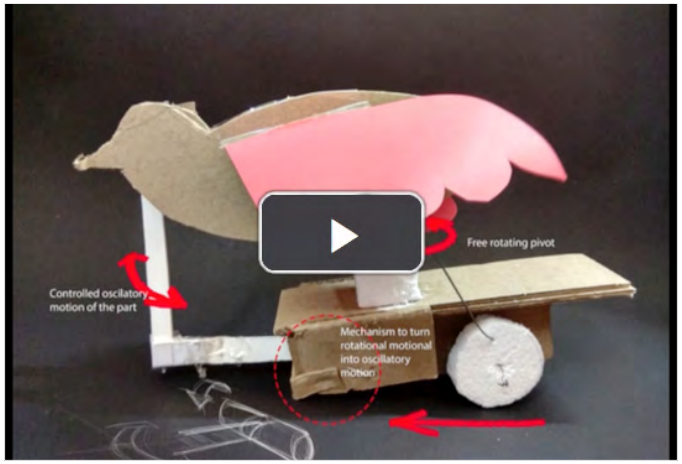
Video

Presentation Stage 1 by Minal Agarwal



YouTube Video Link.....

Toy Design Mechanism by Minal Agarwal

YouTube Video Link.....

Pakhi by Minal Agarwal

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Source:
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Rollerpede by Mridul Jain

The exercise was given as a part of the Product Design Module in the second semester of Jr. M. Des. Industrial design course at IDC, IIT Bombay, conducted by Prof. Vijay Bapat. The class of 14 was divided into groups of 7 each with the first group given a task to design a push toy for 9-15 months old and another group was given a task to design a ride-on toy for 6-12 years old. The first group was given a limitation of using only wood or processed wood as a material. The duration of the module was three weeks.

Biomimicry was given as a concept for design. Everyone has to take inspiration or derive their ideas from nature. Prof. Bapat gave us books regarding nature and nature-inspired designs from his collection to give us a start. The initial days we spent looking for ideas and inspiration, conducting market visits and simultaneously forming our own brief of the toy we would propose to design.

Stage 1 Presentation

Case Study - Slide Show

Video

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Stage 1 Presentation

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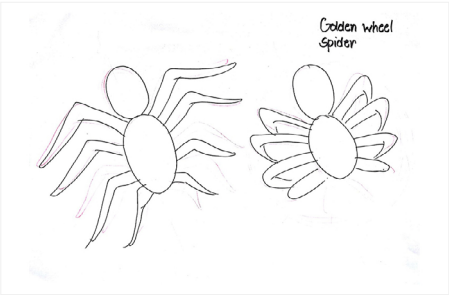
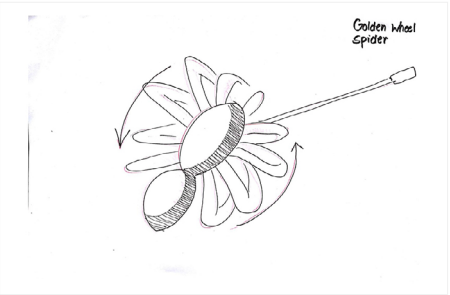
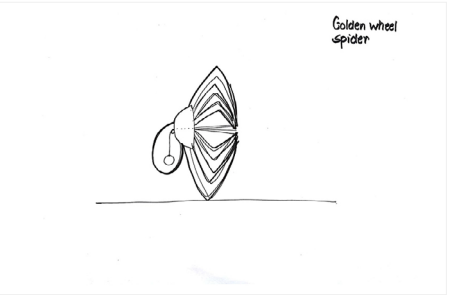
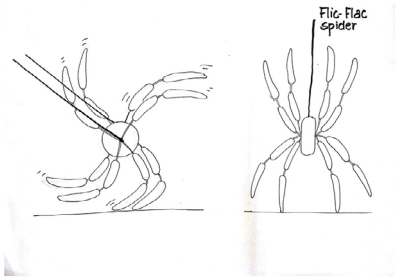
- Rollerpede_Stage 1 Presentation_by Mridul Jain.....









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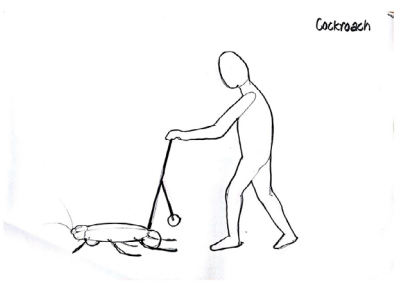

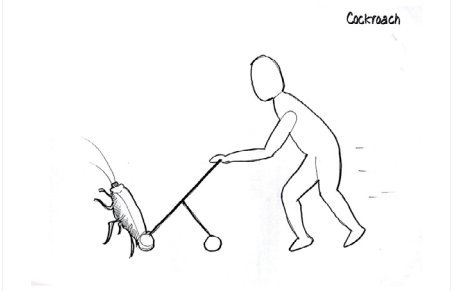

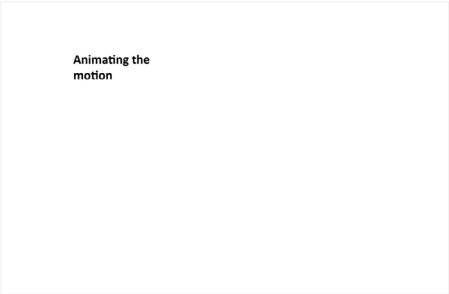

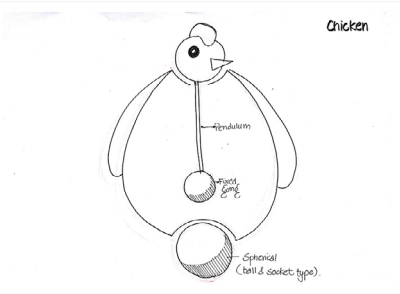

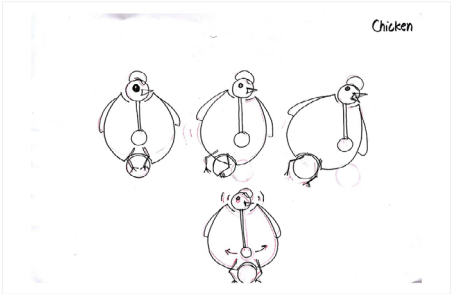

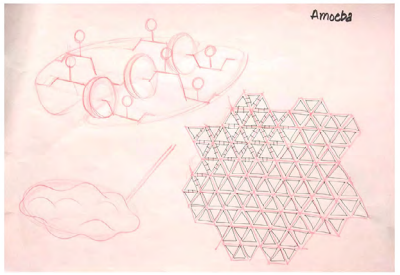

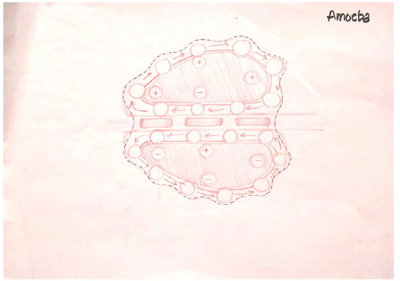

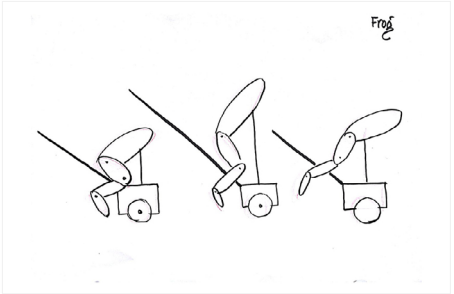

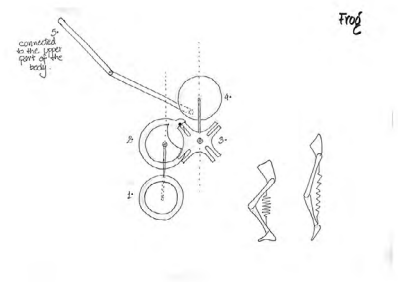

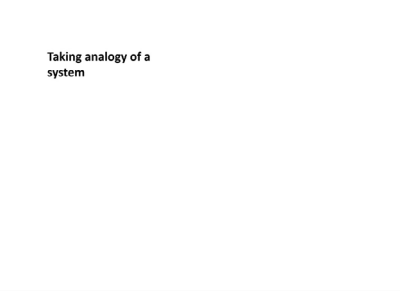

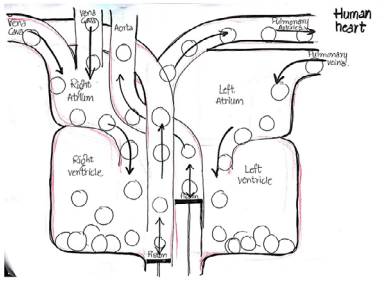

Source:
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Indian Toy Design

Biomimicry-inspired toys

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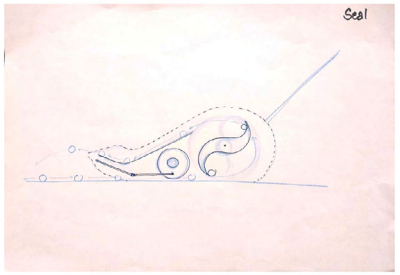

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Case Study - Slide Show

Case Study Download:

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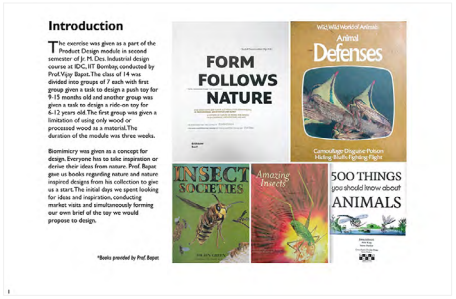

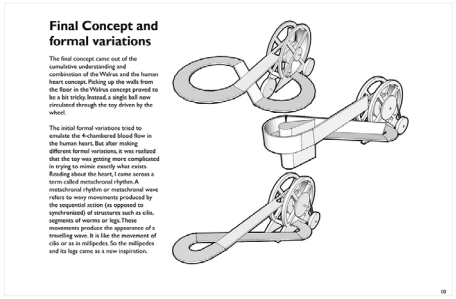

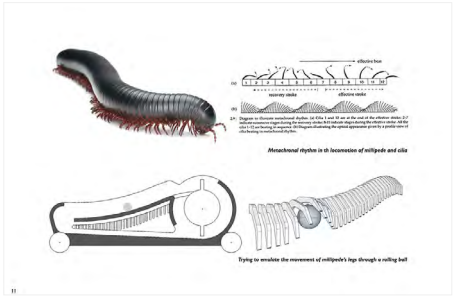

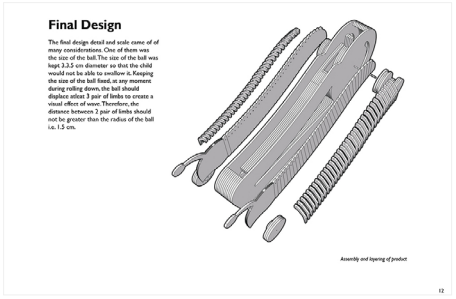

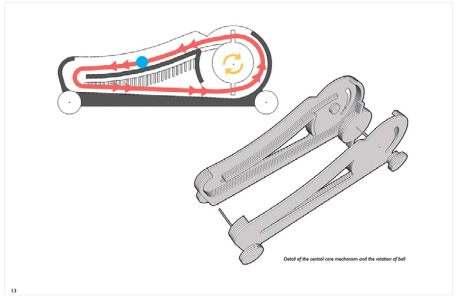

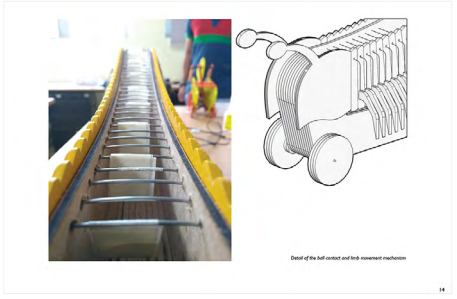

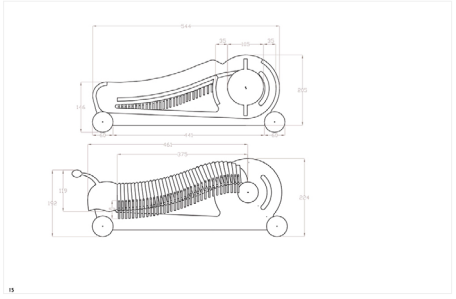

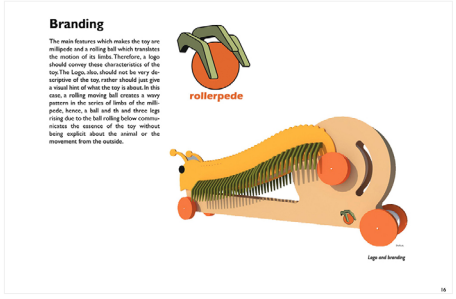

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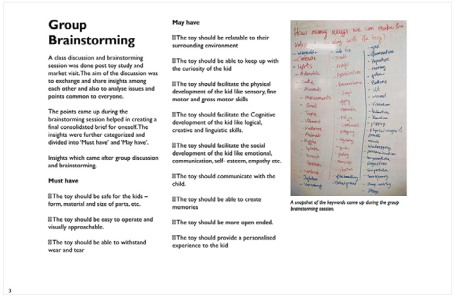

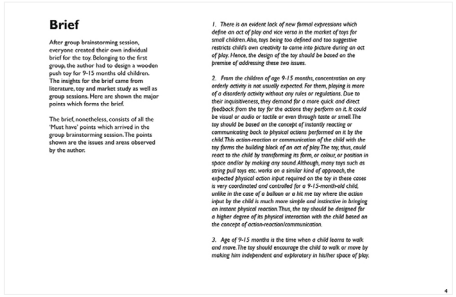

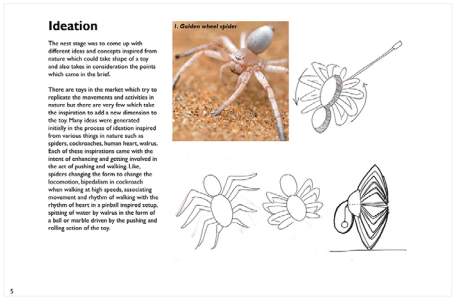

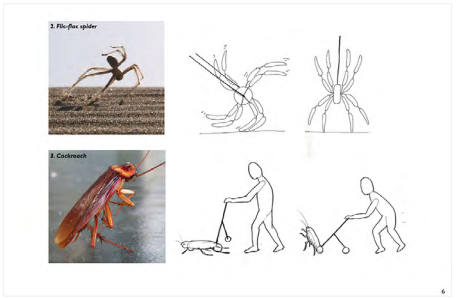

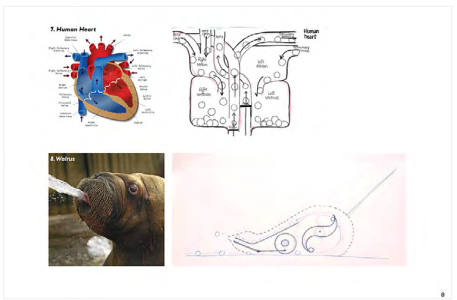

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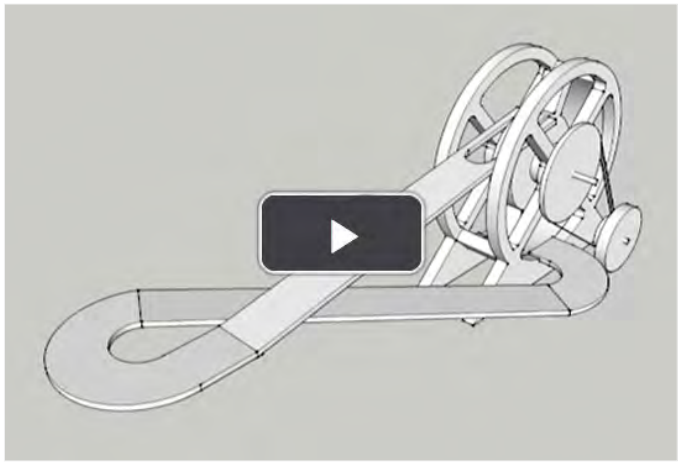
Video

Presentation Stage 1 by Mridul Jain

YouTube Video Link.....

Final Presentation by Mridul Jain



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Source:
https://dsource.in/course/indian-toy-design/students-presentations/push-toy-group/totter-nikita-fatarpekar

Totter by Nikita Fatarpekar

Designing a wooden toy for kids aged 9 to 17 months needs to be very safe, with materials and edges that won't easily get damaged. The toy should be easy for kids to use on their own.

To make it interesting, the toy should move in some way and have colors or shapes that catch kids' eyes. It can be inspired by nature, like animals or plants, to make it more fun and educational.

It should also help kids learn and grow physically by giving them feedback when they play with it. This way, playing with the toy helps kids develop and learn new skills.

Stage 1 Presentation

Case Study - Slide Show

Video

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Stage 1 Presentation

Download:

• Totter_Stage 1 Presentation_by Nikita Fatarpekar.....

Introduction:

The Problem given is For Kids To Play As They Grow From 9 to 17 months Y Old. The Problem Hence Identified Is To Design A Toy That Helps The Kids Development . A product in which the kid himself is engaged to Play and us one of the cognitive ability.

Statement :

The design problem is to design a Toy for kids to play in the house.

Objectives :

The object is to make innovative toy for the kids in house which has:

1)Which meets the demand of 9 to 17 months old age group.

2) it has to be in wooden and simple mechanism.

3) learning experience and playful.

Brief :

The problem is design a wooden toy for a age group of 9 - 17 months old kid which is safe in terms of it material and edge which withstands wear and tear. Kids should operate and approach by themselves. It can create curiosity with movement and visually evokes experience by adopting biomimicking, adopting and learning physical development with constant feedback.

User Study :

1. Kids approach the toy by seeing other kids playing over it.
2. Usability is as per whether they know to play with the toy or that it see familiar to them.
3. The first stage is to understand how the toy works. There is curiosity i mind.

Toy Study :

Description

- AmaKart presents Friction powered Duck toy for kids.
- Watch the duck as it goes for a fun walk, and watch its funny moves. Kids can't resist running playing these funny animal.
- Colorful easy rolling wheels encourage crawl and chase fun, strengthening gross motor skills, balanc coordination.
- Helps baby discover cause and effect

Features

- Type: Push & Pull Along Toys
- Material: Plastic
- Non-battery Operated
- Non-rechargeable Batteries
- Minimum Age: 1 years
- Price - Rs. 184/-

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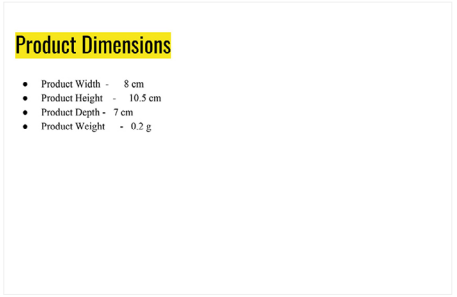
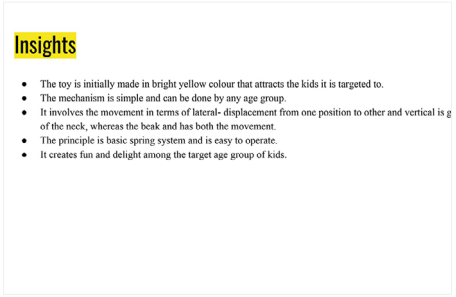
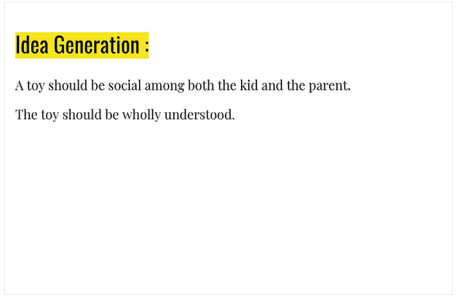
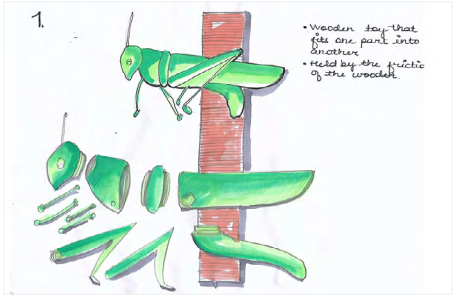
IDC, IIT Bombay

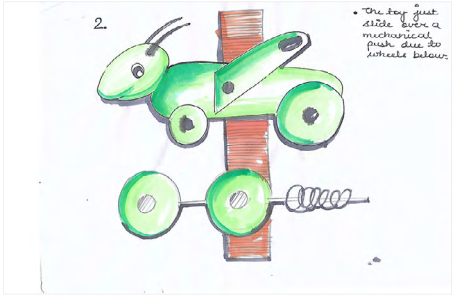
Source:
https://dsource.in/course/indian-toy-design/students-presentations/push-toy-group/totter-nikita-fatarpekar/stage-1

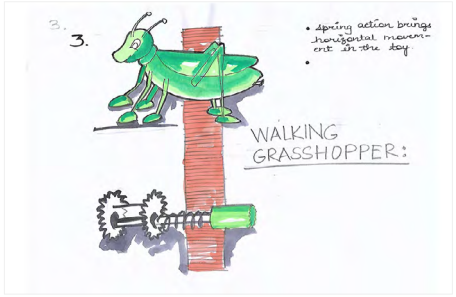


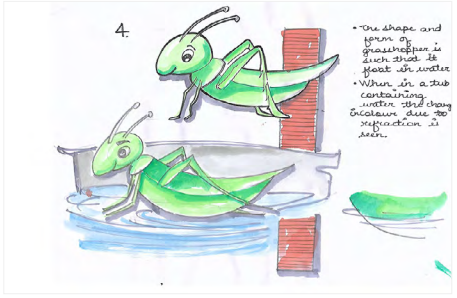


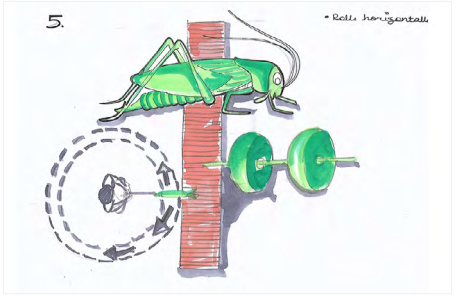


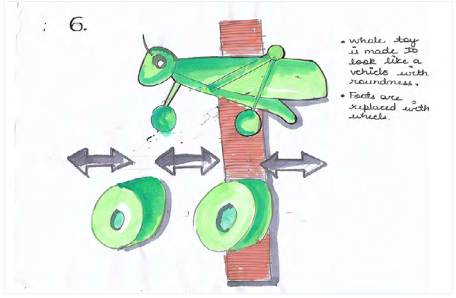


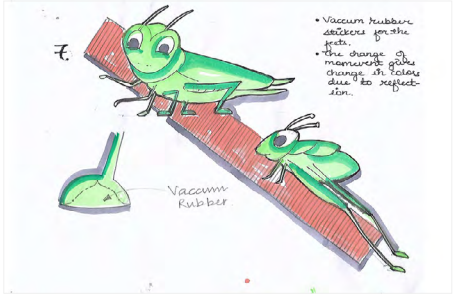


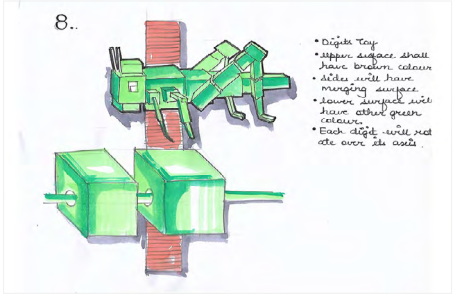


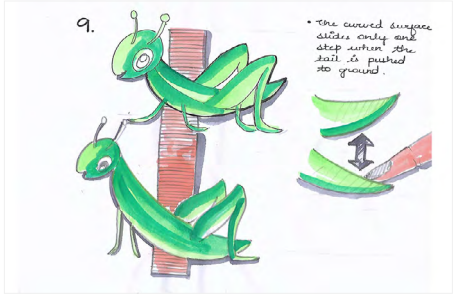












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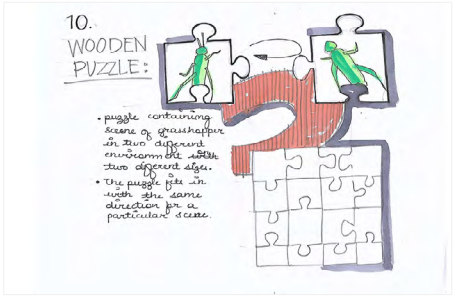

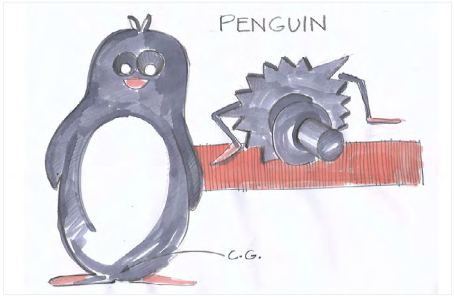

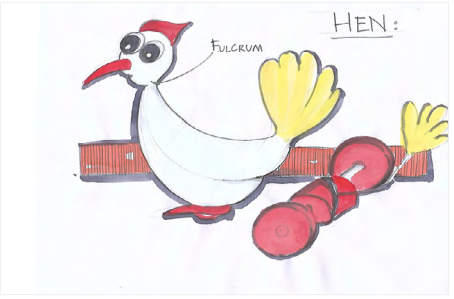

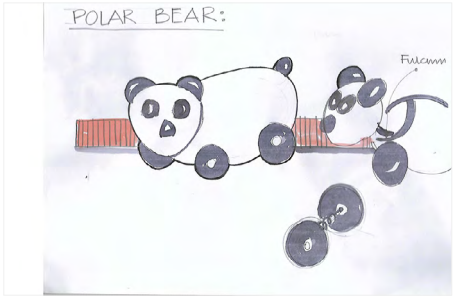

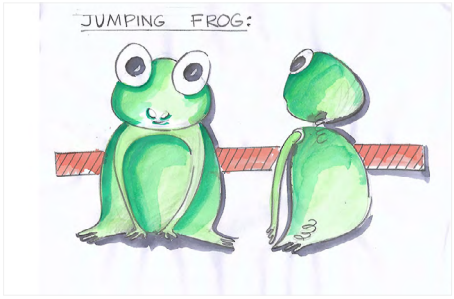

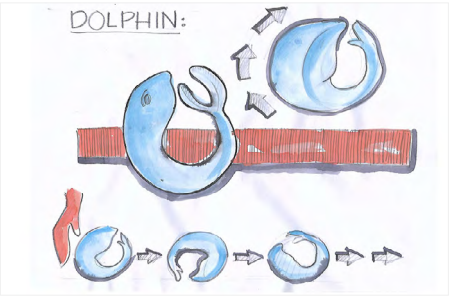

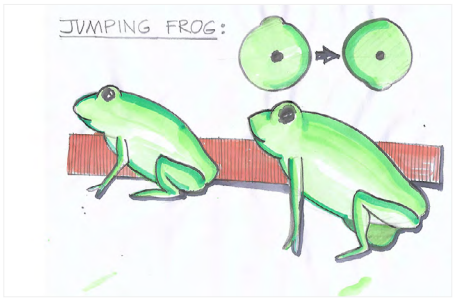

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Case Study - Slide Show

Case Study Download:

• Totter_by Nikita Fatarpekar.....

Introduction:

The Problem given is For Kids To Play As They Grow From 9 to 17 months Y Old. The Problem Hence Identified Is To Design A Toy That Helps The Kids Development . A product in which the kid himself is engaged to Play and us one of the cognitive ability.

Statement :

The design problem is to design a Toy for kids to play in the house.

Objectives :

The object is to make innovative toy for the kids in house which has:

1)Which meets the demand of 9 to 17 months old age group.

2) it has to be in wooden and simple mechanism.

3) learning experience and playful.

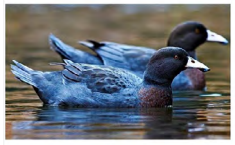
Brief :

The problem is design a wooden toy for a age group of 9 - 17 months old kid which is safe in terms of it material and edge which withstands wear and tear. Kids should operate and approach by themselves. It can create curiosity with movement and visually evokes experience by adopting biomimicking, adopting and learning physical development with constant feedback.

User Study :

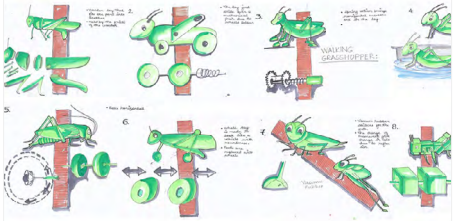
1. Kids approach the toy by seeing other kids playing over it.
2. Usability is as per whether they know to play with the toy or that it see familiar to them.
3. The first stage is to understand how the toy works. There is curiosity i mind.

Inspiration



Its movement of quacking and wobbling

Ideas



Mechanism

Axial crank

Crank

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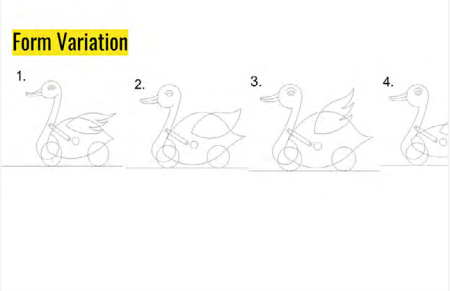

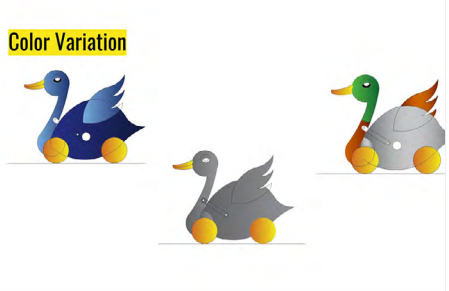

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Video

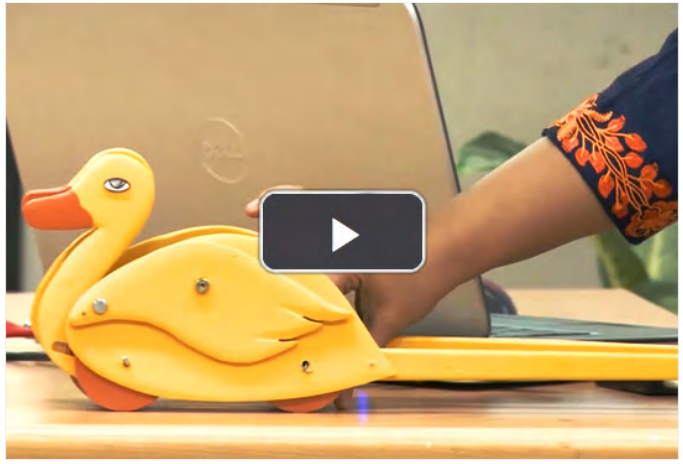
Presentation Stage 1 by Nikita Fatarpekar

YouTube Video Link.....

Toy Design Mechanism by Nikita Fatarpekar

YouTube Video Link.....

Totter by Nikita Fatarpekar



YouTube Video Link.....

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Waliz by Nirmal P J

This project was done as a part of our product design 2 module. The objective of this project was to design a wooden toy for kids between the ages of 9 months to 15 months. The primary material used for making the toy has to be wood but it can be of any form like timber, plywood, particle board, MDF, etc. Other natural materials can also be used for certain applications if required, but they should be of minimal amount and have no plastic parts. The design of the toy has to be inspired by nature and based on biomimicry.

Stage 1 Presentation

Case Study - Slide Show

Poster

Video

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Source:
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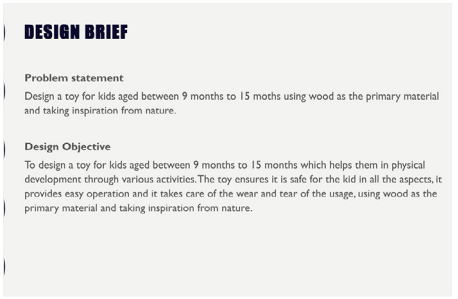
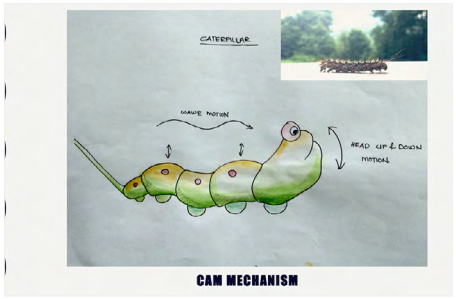
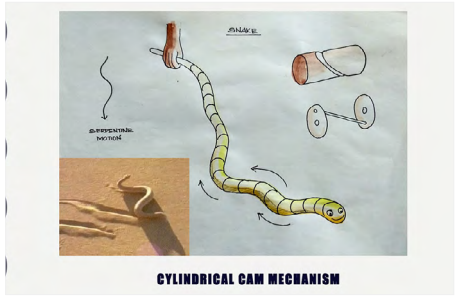
Stage 1 Presentation

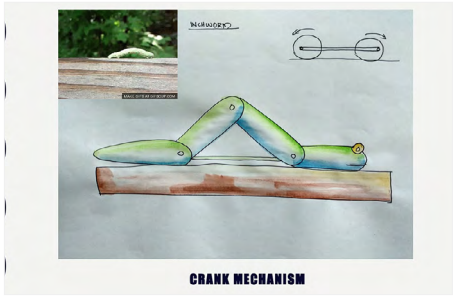
Download:

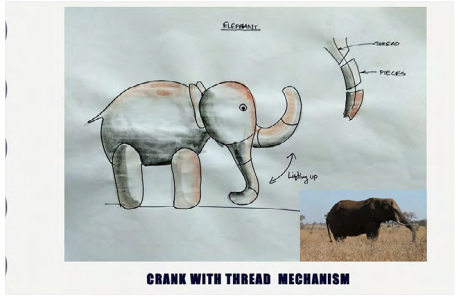
• Waliz_Stage 1 Presentation_by Nirmal P J.....

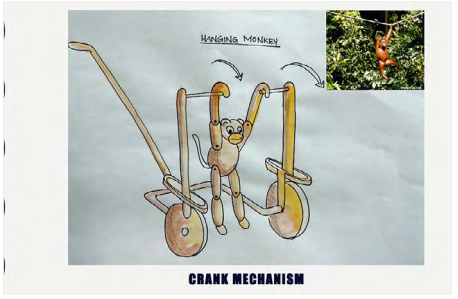


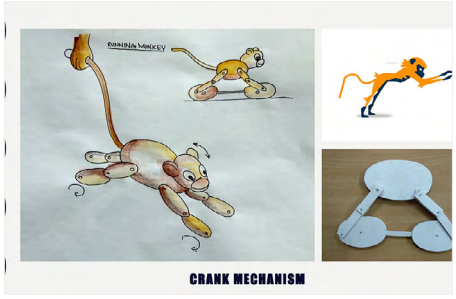












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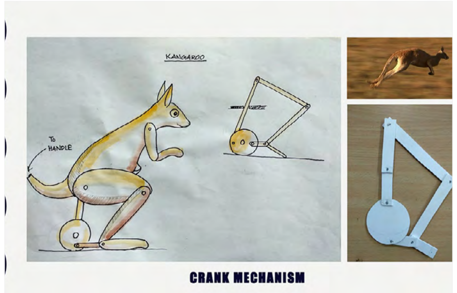

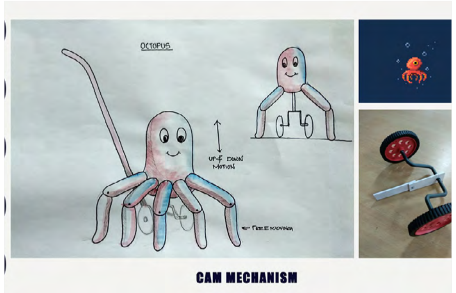

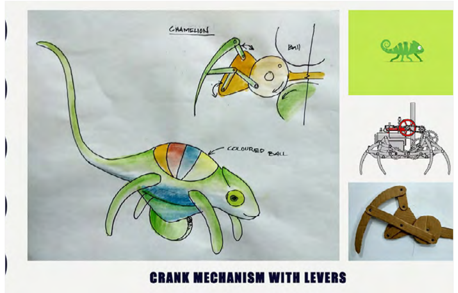

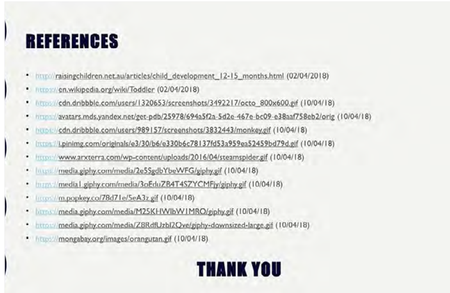

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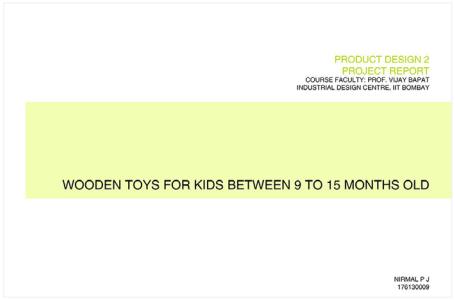
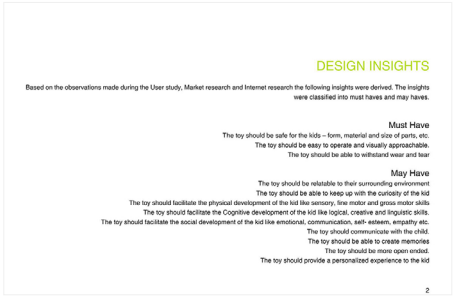
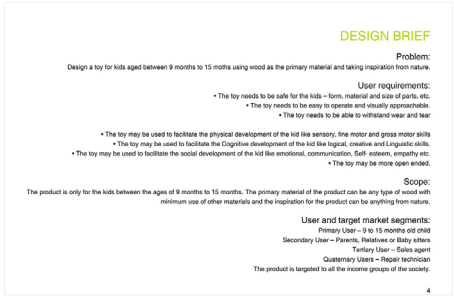
Case Study - Slide Show

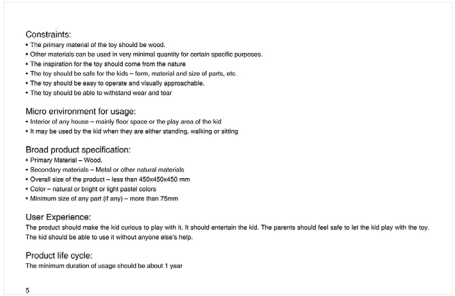
Case Study Download:

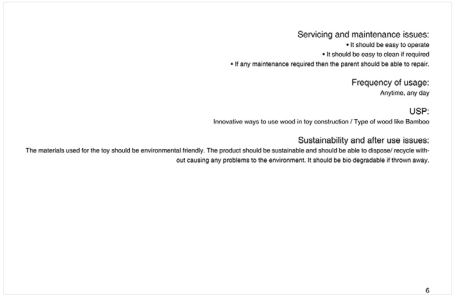
- Waliz_by Nirmal P J.....
- Waliz_Nirmal P J_Report.....

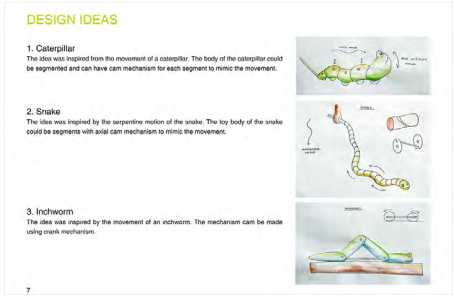












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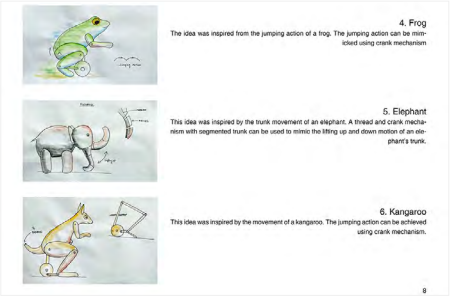

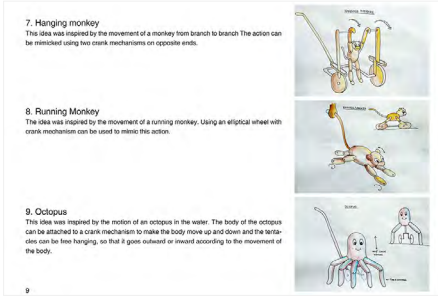

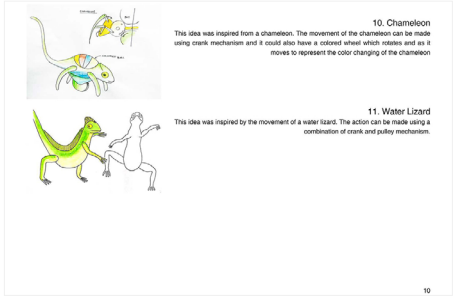

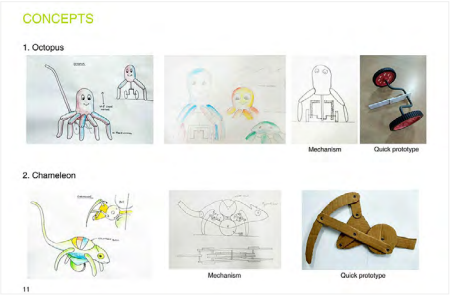

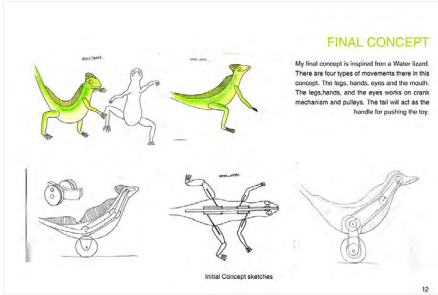

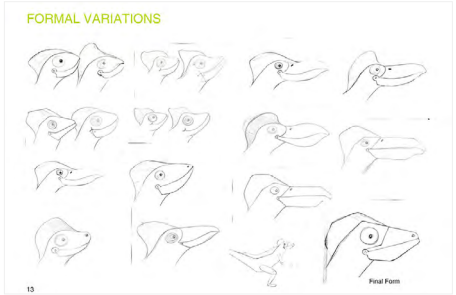

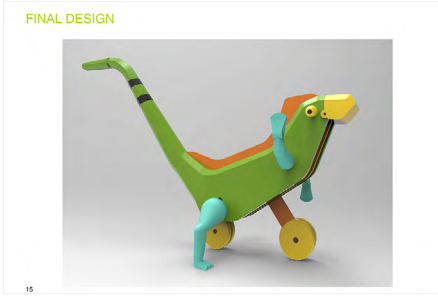

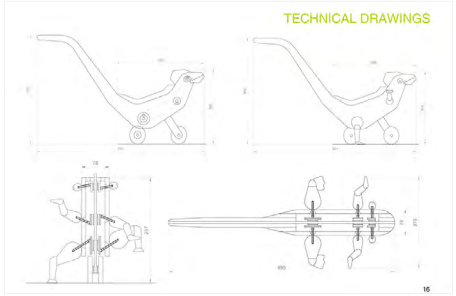

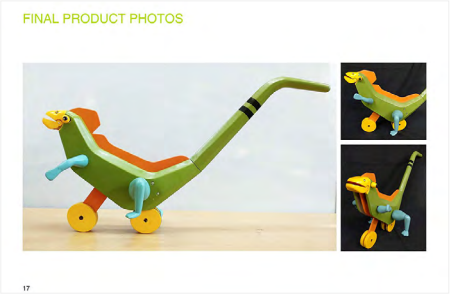

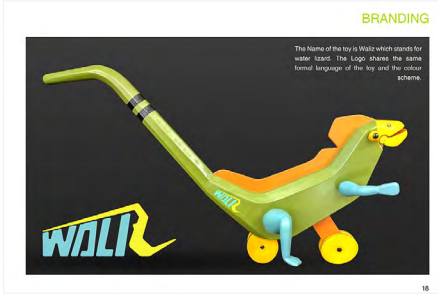

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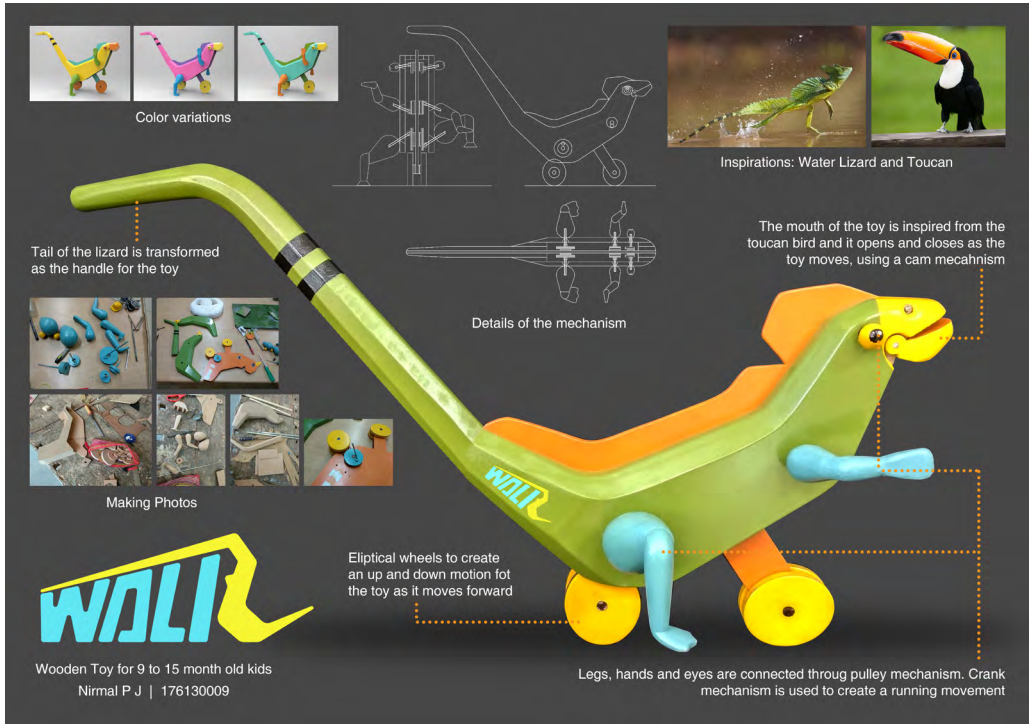
Poster



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https://dsource.in/course/indian-toy-design/students-presentations/push-toy-group/waliz-nirmal-p-j/poster

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Video

Presentation Stage 1 by Nirmal P J

YouTube Video Link.....

Toy Design Mechanism by Nirmal P J

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Waliz by Nirmal P J

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Toto by Rajat

Often growing toddlers tend to be very curiously agile when they start observing, understanding and communicating the world around them. By the time they grow older, they gain enough experience to notice and react to any kind of sensory input. They may learn to make decisions based on the things thrown at them as entertainment like electronic gadgets. So this becomes an important concern when the child tries to get things with similar visual form or appeal.

So as a part of Toy Design domain, the challenge is to design a wooden toy suitable for a child (9-15 months old). The toy should be designed by biomimetic as a learning from nature which also highly corresponds to the adaption of living creatures in nature. For this toy, aquatic animals like Octopuses, Dolphins, Jellyfish and hens are looked upon as inspiration for their wavy, flaring, quirky and jerky motions and dynamic yet soft forms.

Stage 1 Presentation

Case Study - Slide Show

Poster

Video

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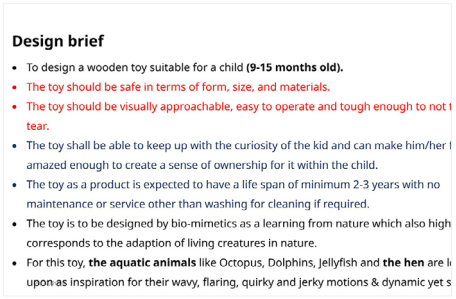
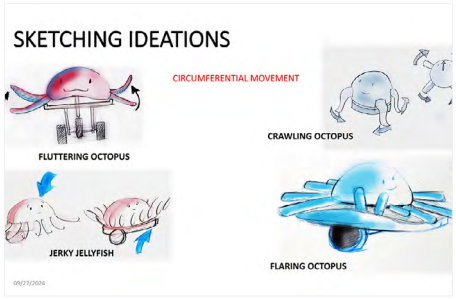
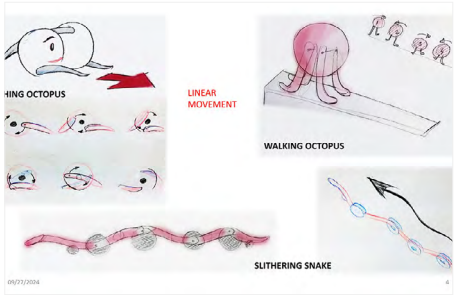
Stage 1 Presentation

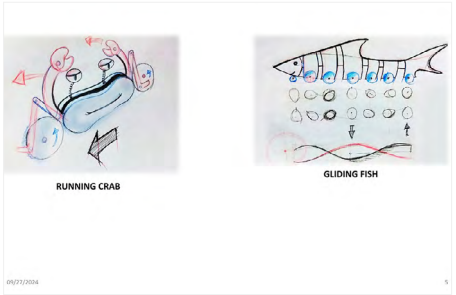
Download:

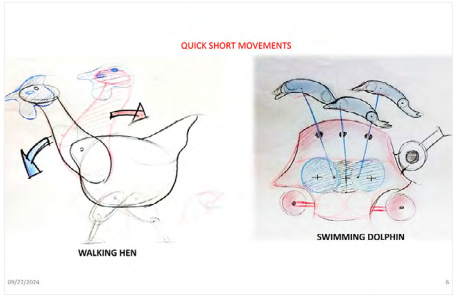
- Toto_Stage 1 Presentation_by Rajat.....

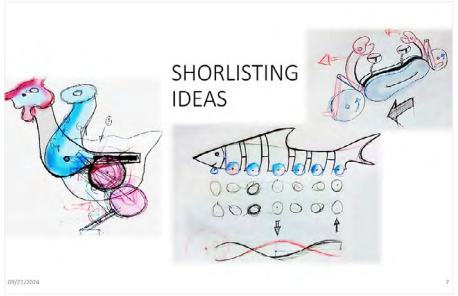


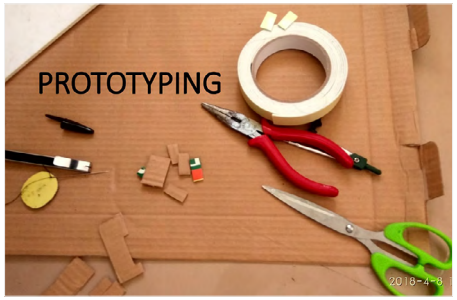












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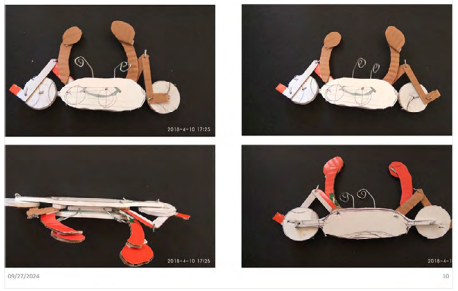

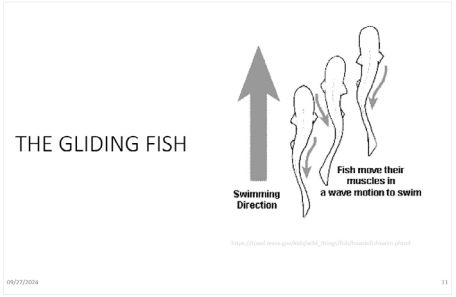

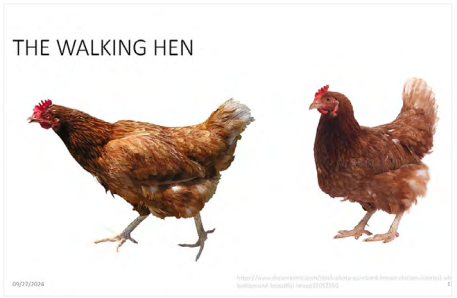

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Case Study - Slide Show

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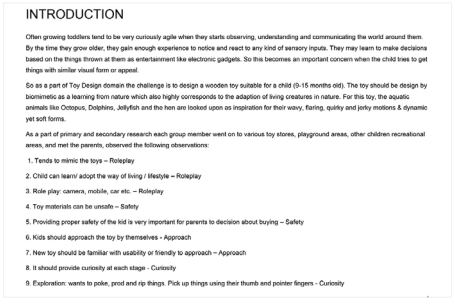

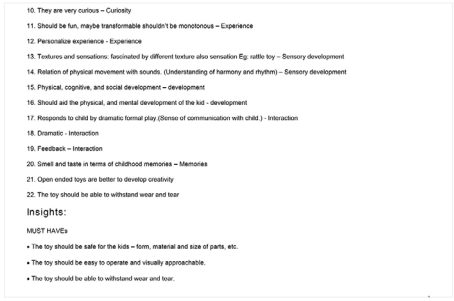

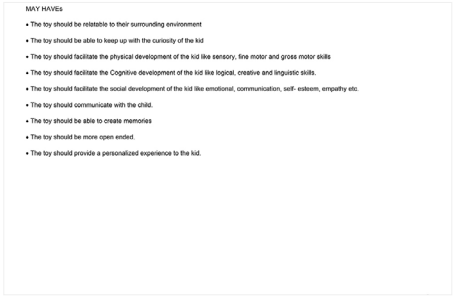

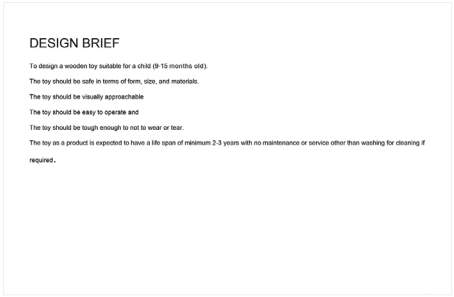

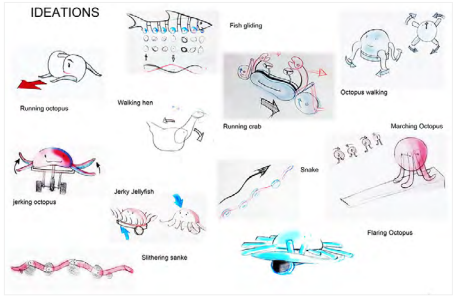

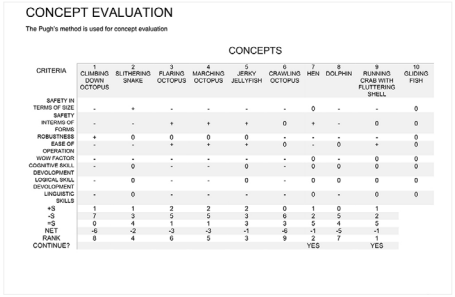

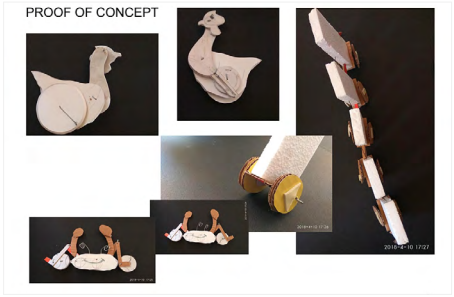

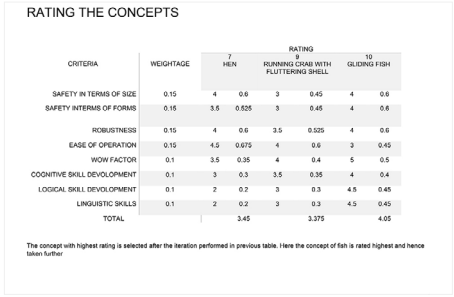

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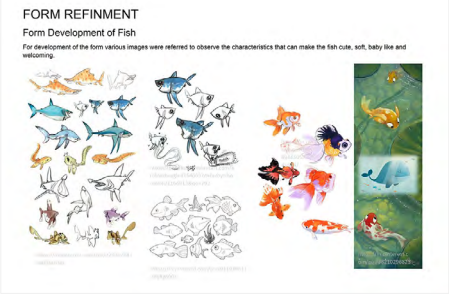

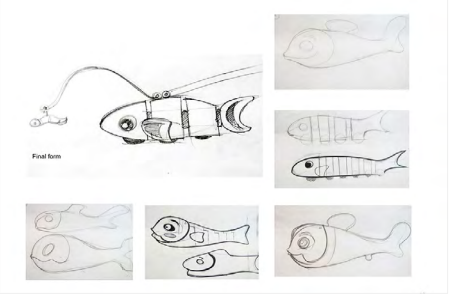

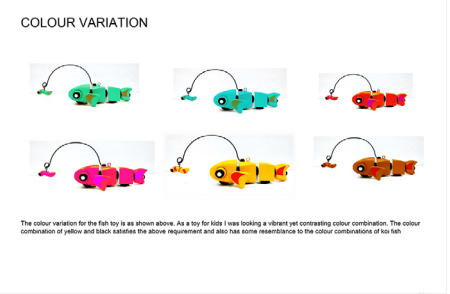

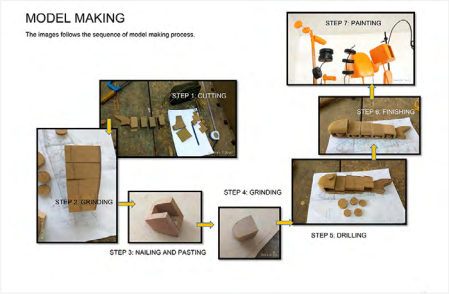

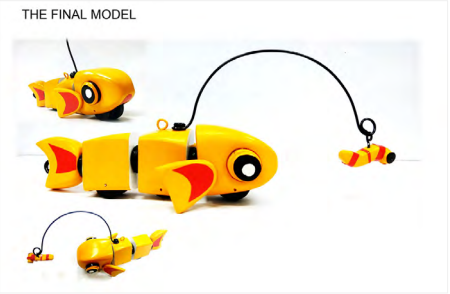

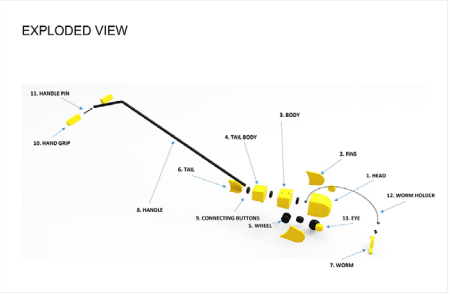

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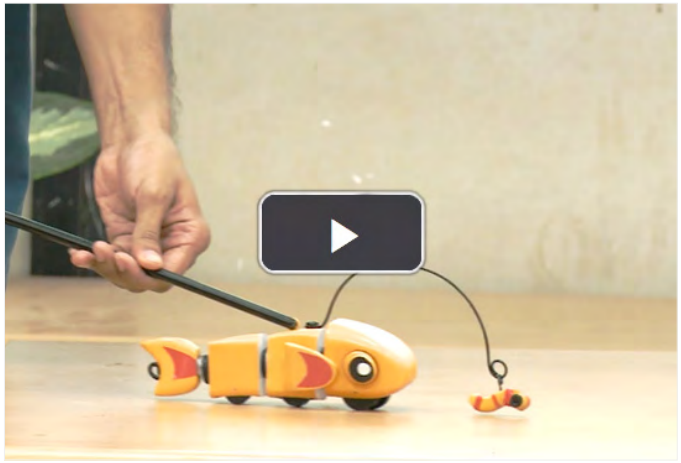
Video

Presentation Stage 1 by Rajat

YouTube Video Link.....

Final Presentation by Rajat



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Chani by Aamod Narkar

The aim of the project is to design a wooden toy for children aged 9-24 months inspired by a selected animal, biomimicking its actions in order to provide the child with a playful experience of the animal. The toy will be made from plywood, MDF, or wood, ensuring safety and durability. It should be operated by pulling or pushing and designed with colors and shapes that are friendly for young users. The toy is intended for indoor use, fostering imaginative play and physical interaction within that environment.

Case Study - Slide Show

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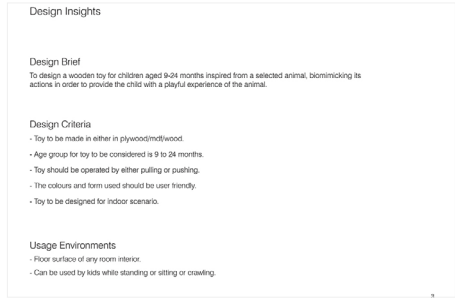

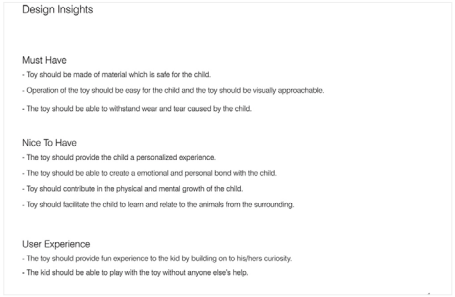

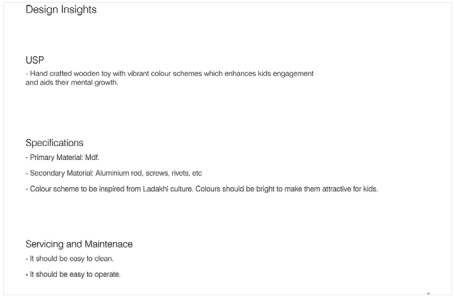

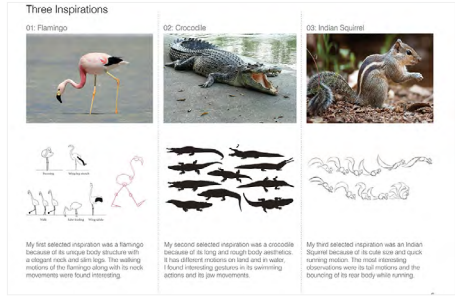

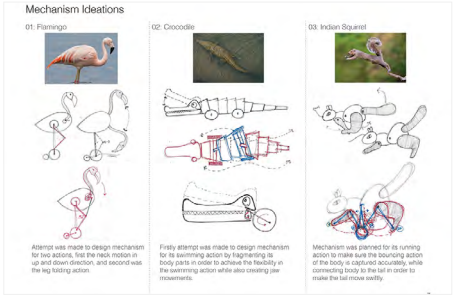

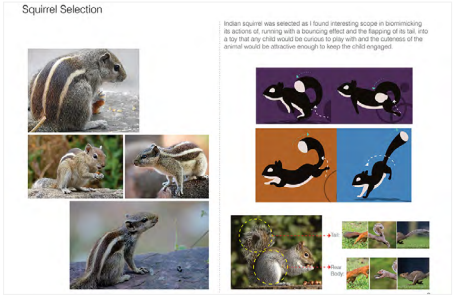

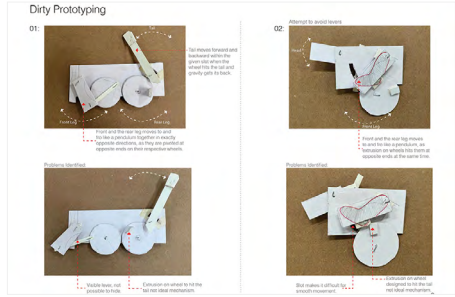

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1, 2, 3, 4, 5, 6
- 6A. Push Toy - Group A
  - 6Aa, 6Ab, 6Ac, 6Ad, 6Ae, 6Af, 6Ag
  - 6Ah. Chani by Aamod Narkar
    - 6Ahi. Case Study - Slide Show
    - 6Ahii. Poster
    - 6Ahiii. Video
  - 6Ai, 6Aj, 6Ak, 6Al, 6Am, 6An, 6Ao
  - 6Ap, 6Aq, 6Ar, 6As, 6At, 6Au, 6Av
- 6B. Ride-on Toy - Group B

7. Toys
8. Links
9. Video
10. Contact Details

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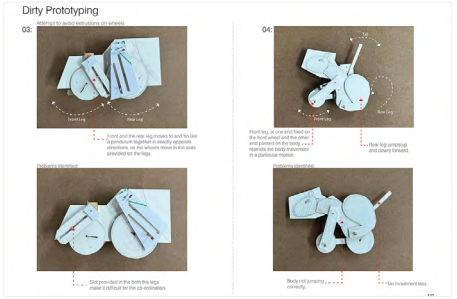

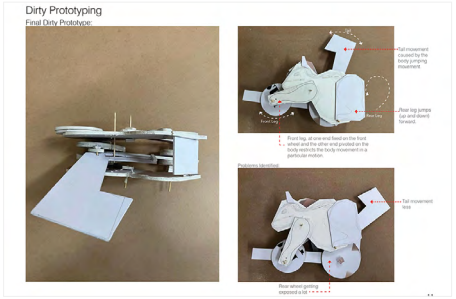

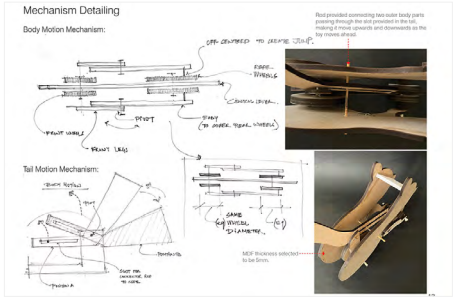

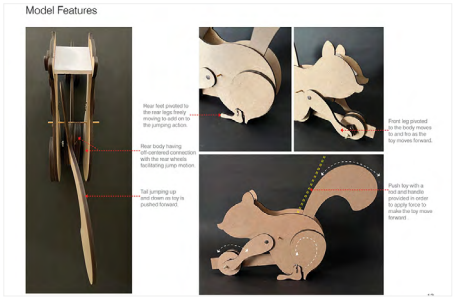

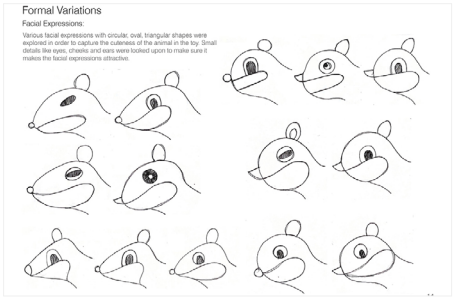

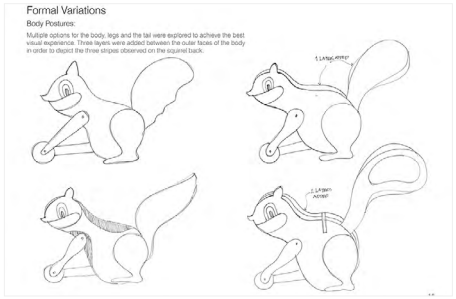

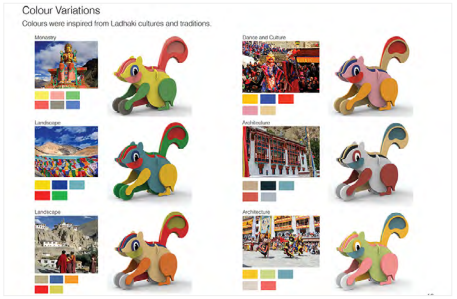

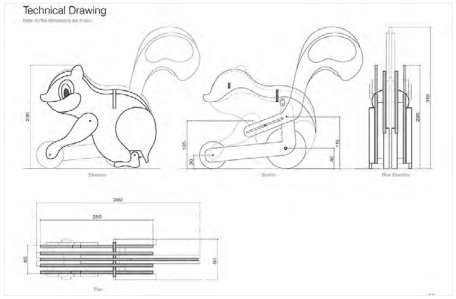

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Video

Chani by Aamod Narkar

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Rolly by Ashuj Chawda

Toys are fun material objects for children's playing experience. For children aged from 15 to 24 months, a toy ignites their cognitive powers and stimulates their imagination. It also directs their behavior and interaction towards their parents, peers and environment.

Case Study - Slide Show

Poster

Video

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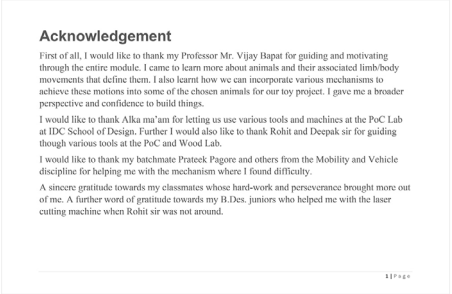

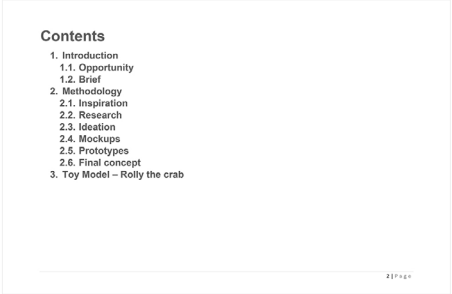

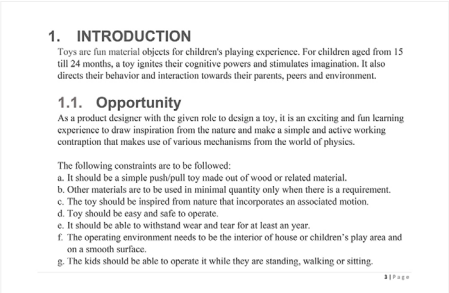

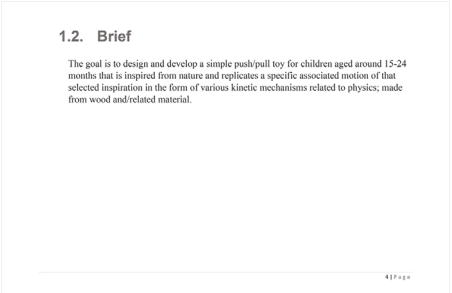

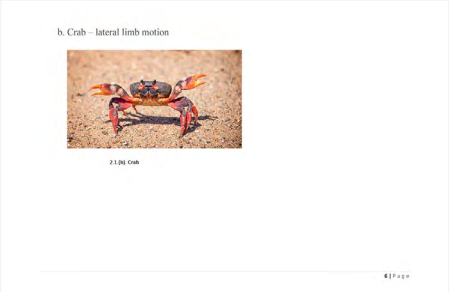

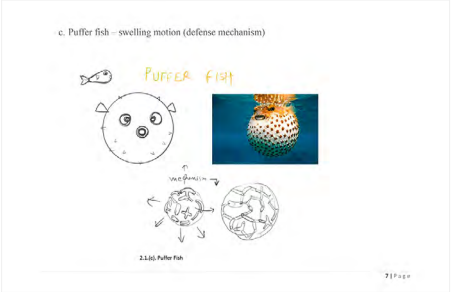

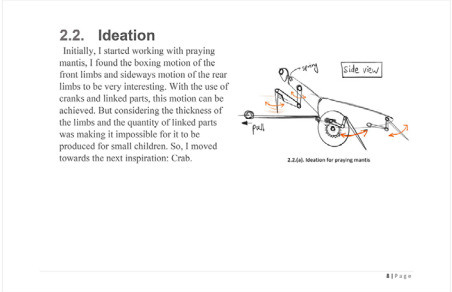

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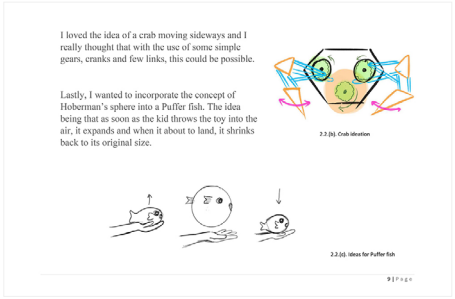
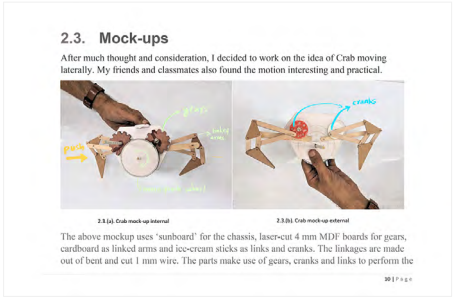

I loved the idea of a crab moving sideways and I really thought that with the use of some simple gears, cranks and few links, this could be possible.

Lastly, I wanted to incorporate the concept of Hoberman's sphere into a Puffer fish. The idea being that as soon as the kid throws the toy into the air, it expands and when it about to land, it shrinks back to its original size.

2.2.(b). Crab ideation

2.2.(c). Ideas for Puffer fish

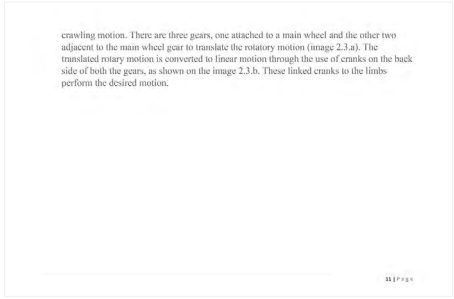

2.3. Mock-ups

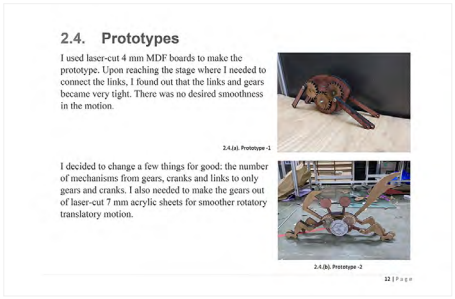
After much thought and consideration, I decided to work on the idea of Crab moving laterally. My friends and classmates also found the motion interesting and practical.

2.3.(a). Crab mock-up internal

2.3.(b). Crab mock-up external

The above mockup uses 'sumboard' for the chassis, laser-cut 4 mm MDF boards for gears, cardboard as linked arms and ice-cream sticks as links and cranks. The linkages are made out of bent and cut 1 mm wire. The parts make use of gears, cranks and links to perform the


crawling motion. There are three gears, one attached to a main wheel and the other two adjacent to the main wheel gear to translate the rotatory motion (image 2.3.a). The translated rotary motion is converted to linear motion through the use of cranks on the back side of both the gears, as shown on the image 2.3.b. These linked cranks to the limbs perform the desired motion.

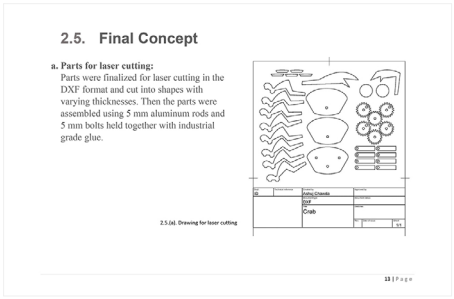

2.4. Prototypes

I used laser-cut 4 mm MDF boards to make the prototype. Upon reaching the stage where I needed to connect the links, I found out that the links and gears became very tight. There was no desired smoothness in the motion.

2.4.(a). Prototype -1

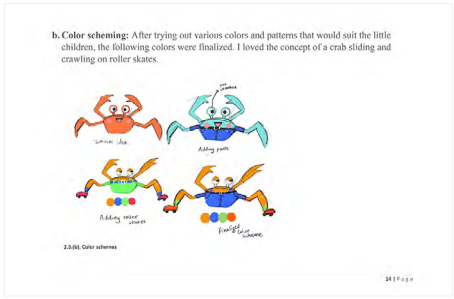
I decided to change a few things for good: the number of mechanisms from gears, cranks and links to only gears and cranks. I also needed to make the gears out of laser-cut 7 mm acrylic sheets for smoother rotatory translatory motion.

2.4.(b). Prototype -2

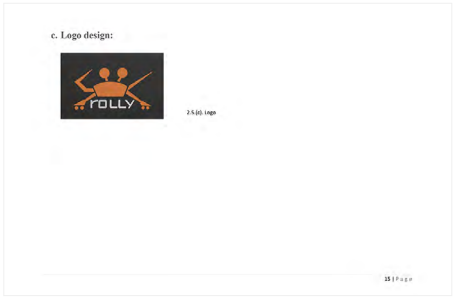

2.5. Final Concept

a. Parts for laser cutting:
Parts were finalized for laser cutting in the DXF format and cut into shapes with varying thicknesses. Then the parts were assembled using 5 mm aluminum rods and 5 mm bolts held together with industrial grade glue.

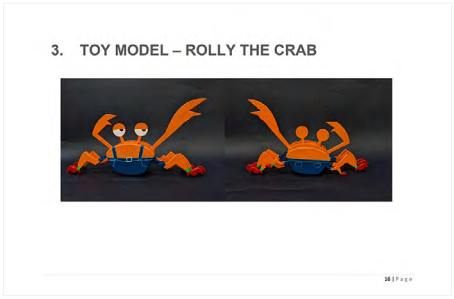
2.5.(a). Drawing for laser cutting


b. Color scheming: After trying out various colors and patterns that would suit the little children, the following colors were finalized. I loved the concept of a crab sliding and crawling on roller skates.

2.5.(b). Color schemes


c. Logo design:

2.5.(c). Logo


3. TOY MODEL – ROLLY THE CRAB

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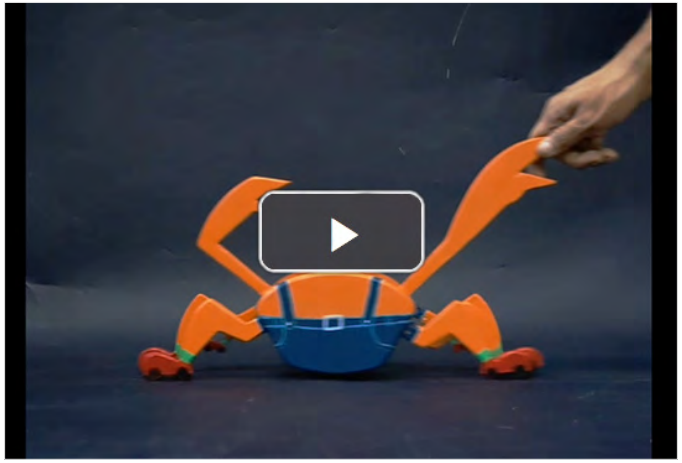
Video

Rolly by Ashuj Chawda



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Chef Olie by Athira E

The aim of the project is to design a push toy for kids aged 15-24 months. The design must take inspiration from nature by using Bionics and Biomimetic principles to analyse the movements, and physiology of animals and incorporate them in the final design.

Case Study - Slide Show

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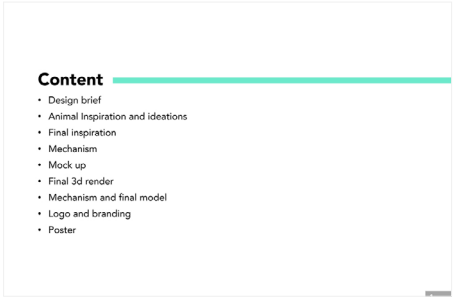

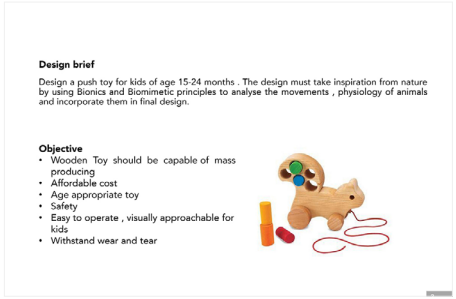

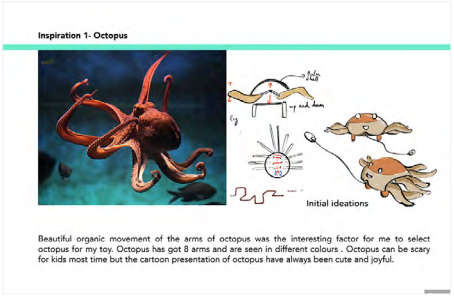

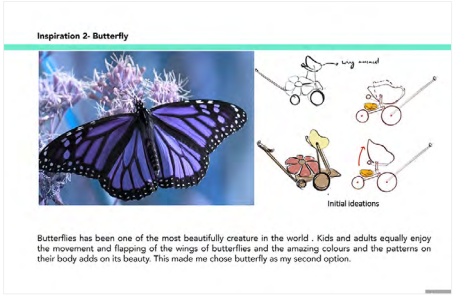

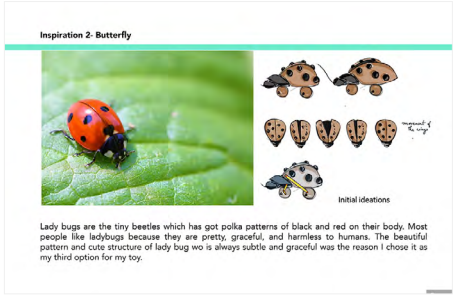

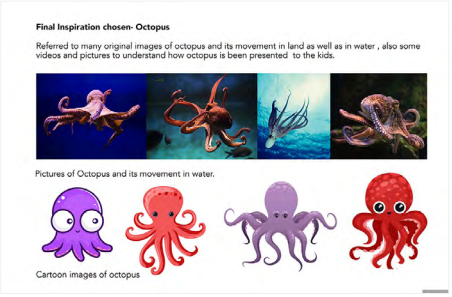

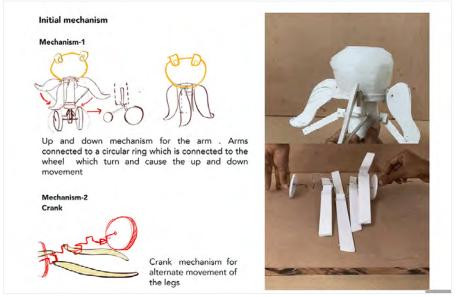

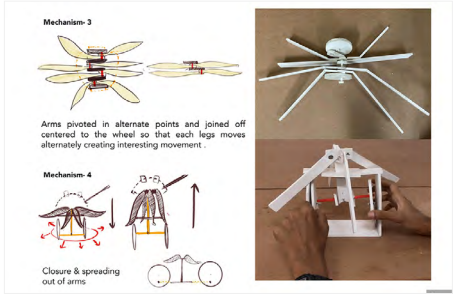

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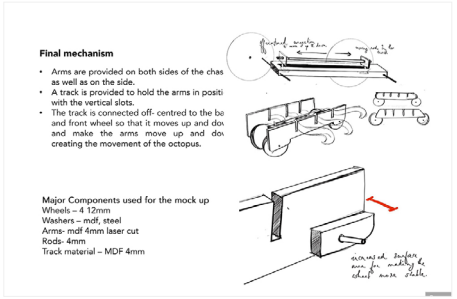

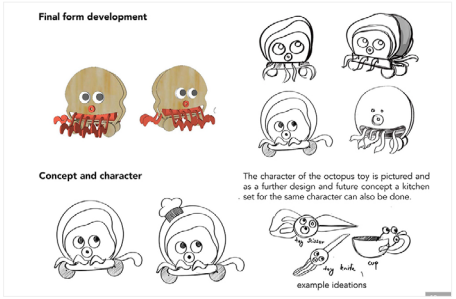

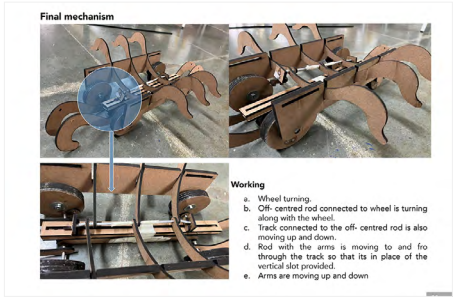

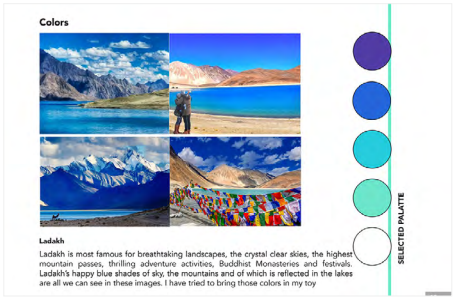

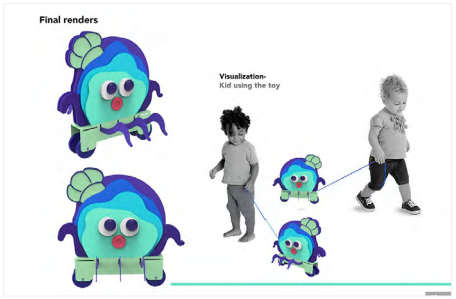

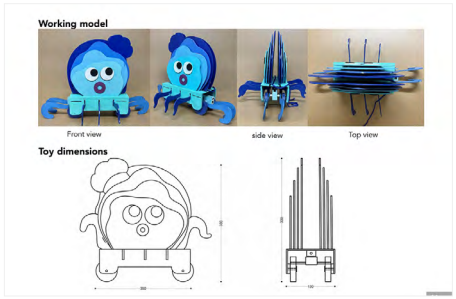

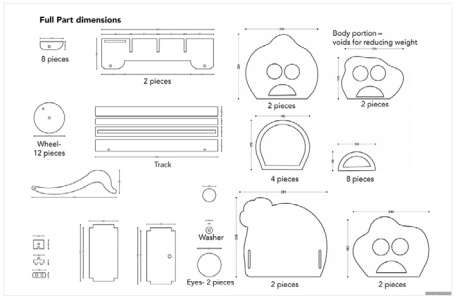

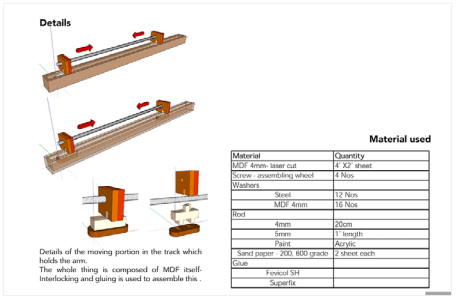

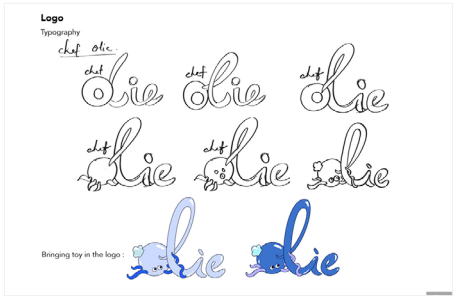

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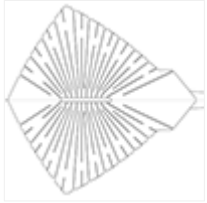
Sting Ray by Infant Bibin I

The aim of the project is to design a wooden pull toy for kids that is mechanically operated and the motion should be biomimicry-inspired.

Stage 1 Presentation



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Stage 1 Presentation

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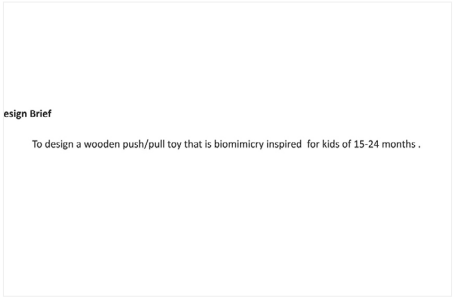
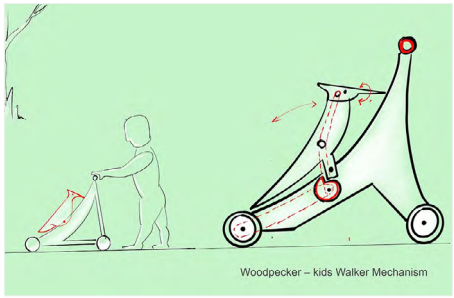
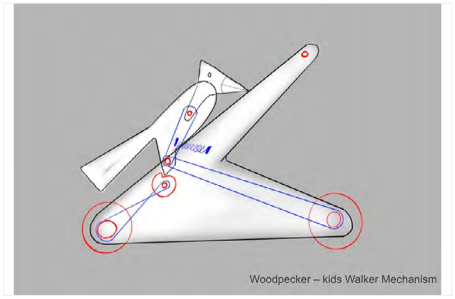
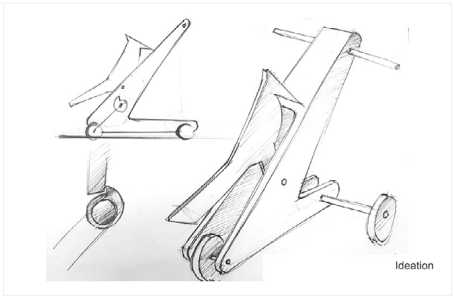
- Sting Ray_Stage 1 Presentation_by Infant Bibin I.....









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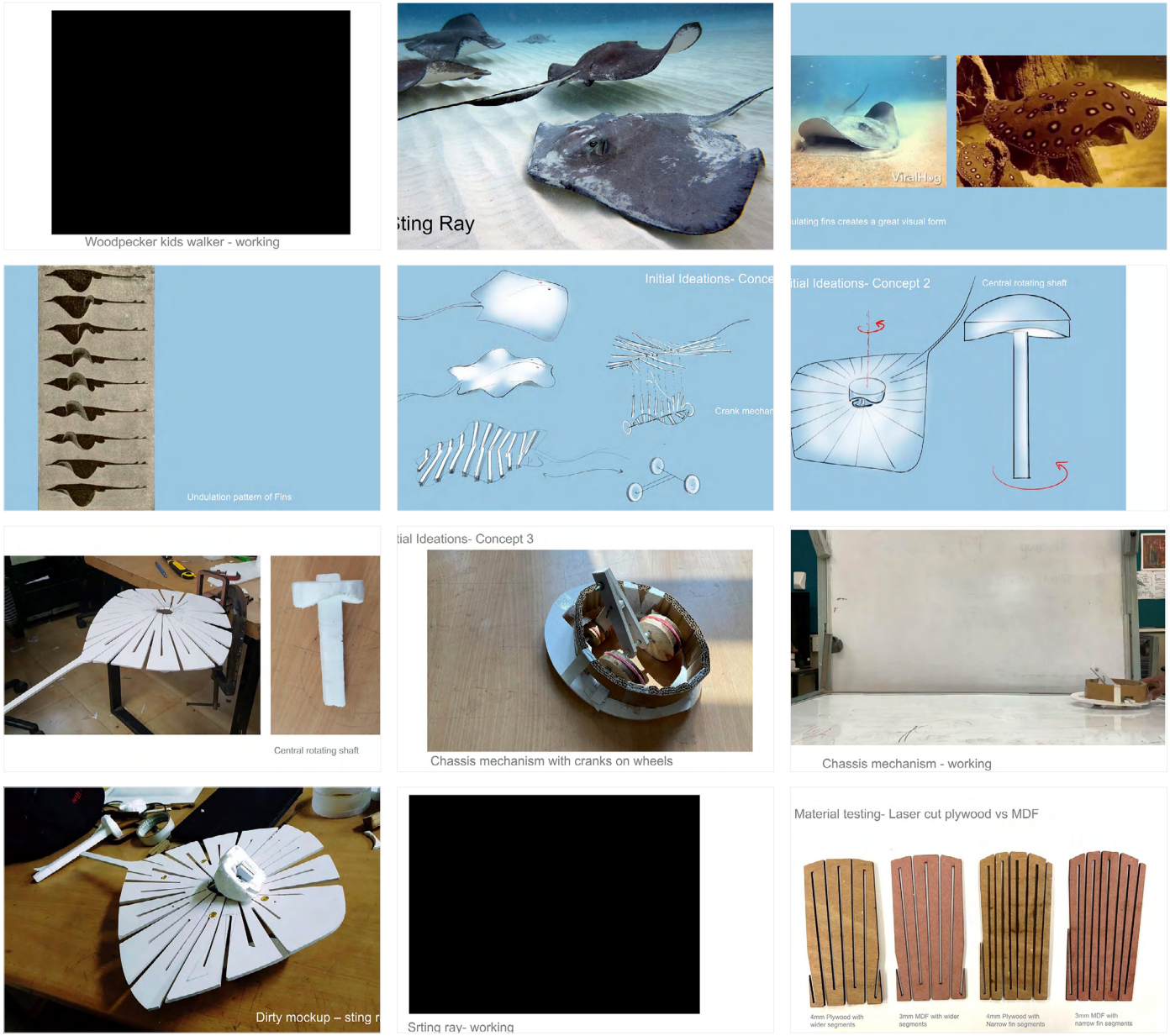

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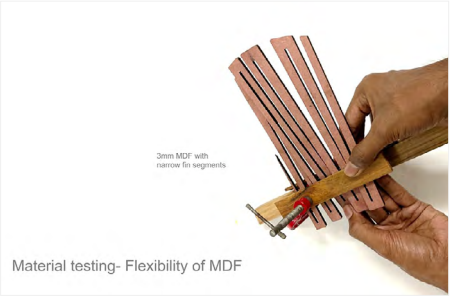

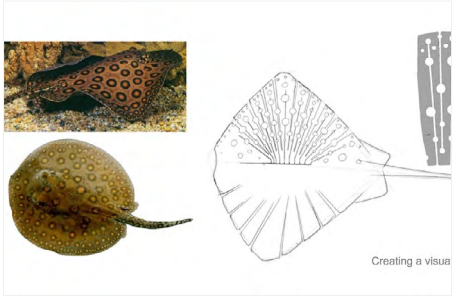

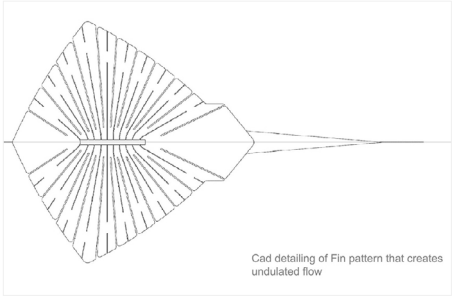

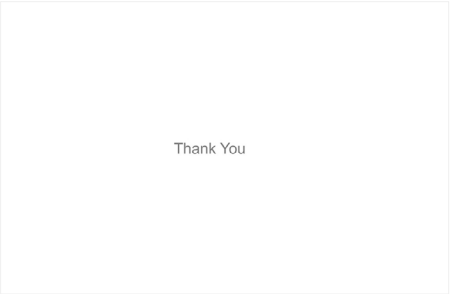

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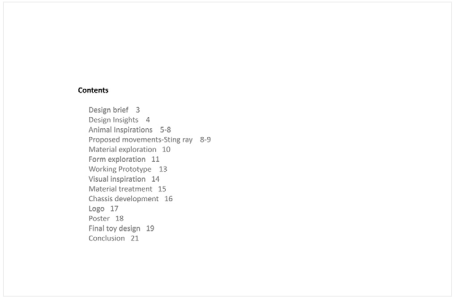

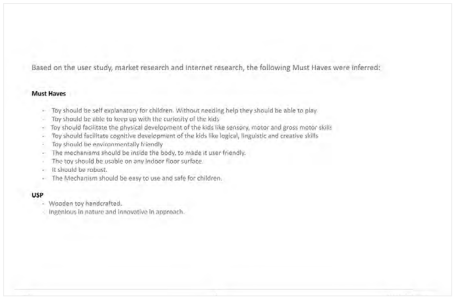

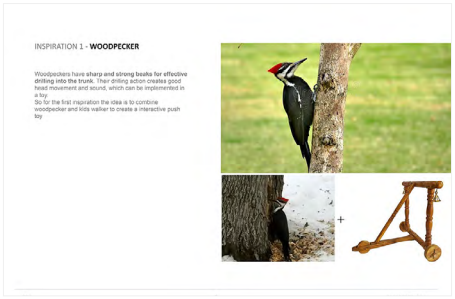

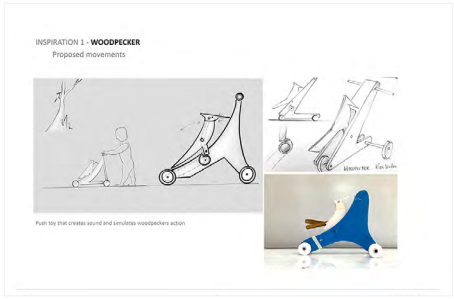

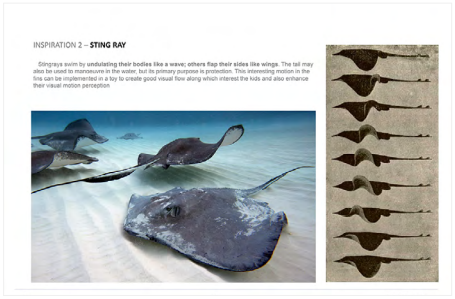

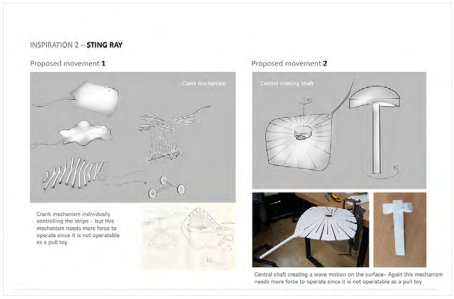

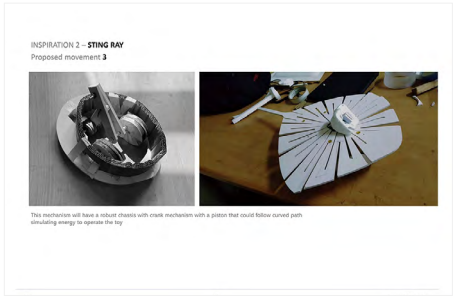

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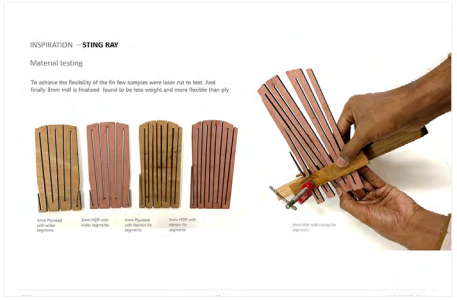

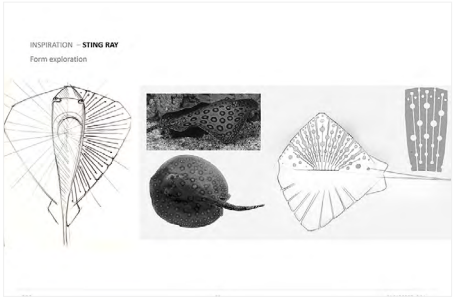

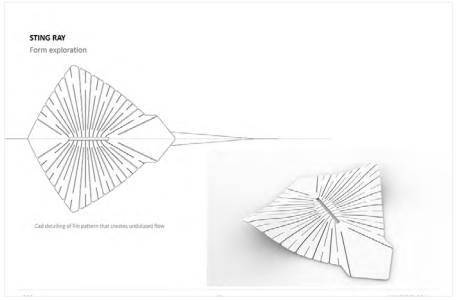

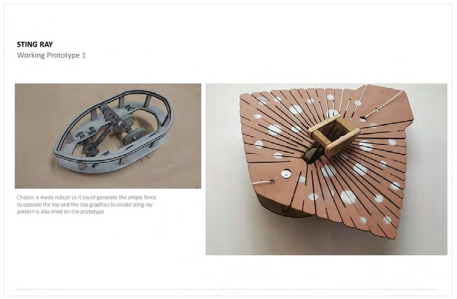

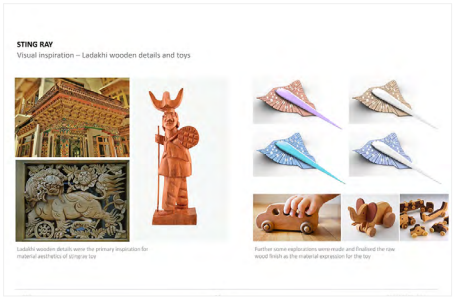

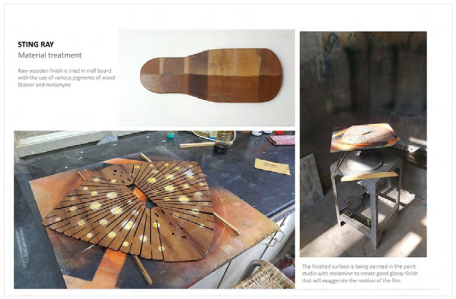

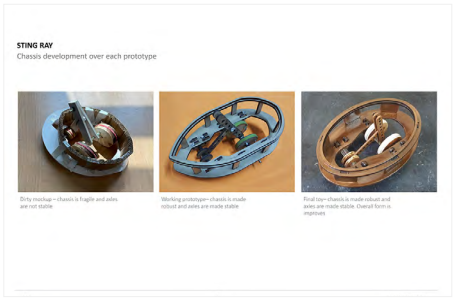

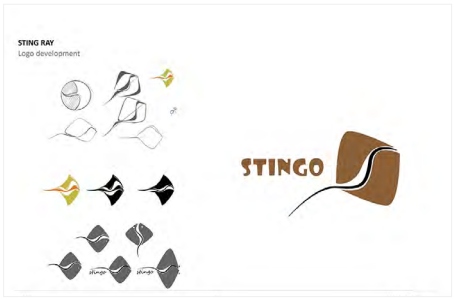

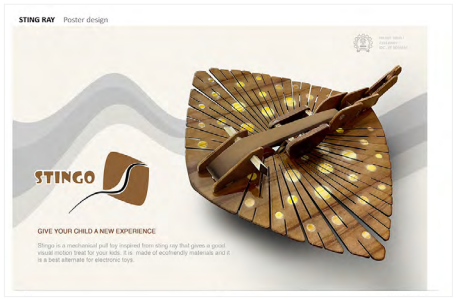

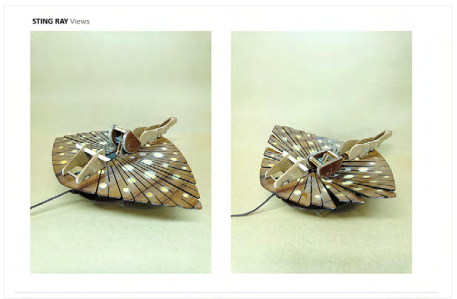

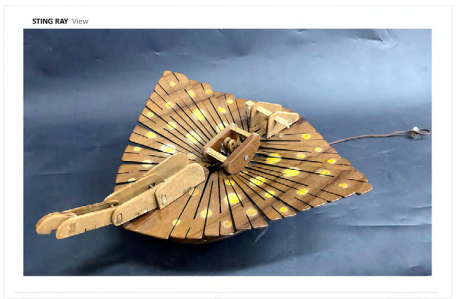

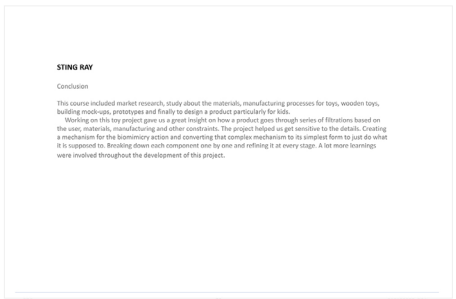

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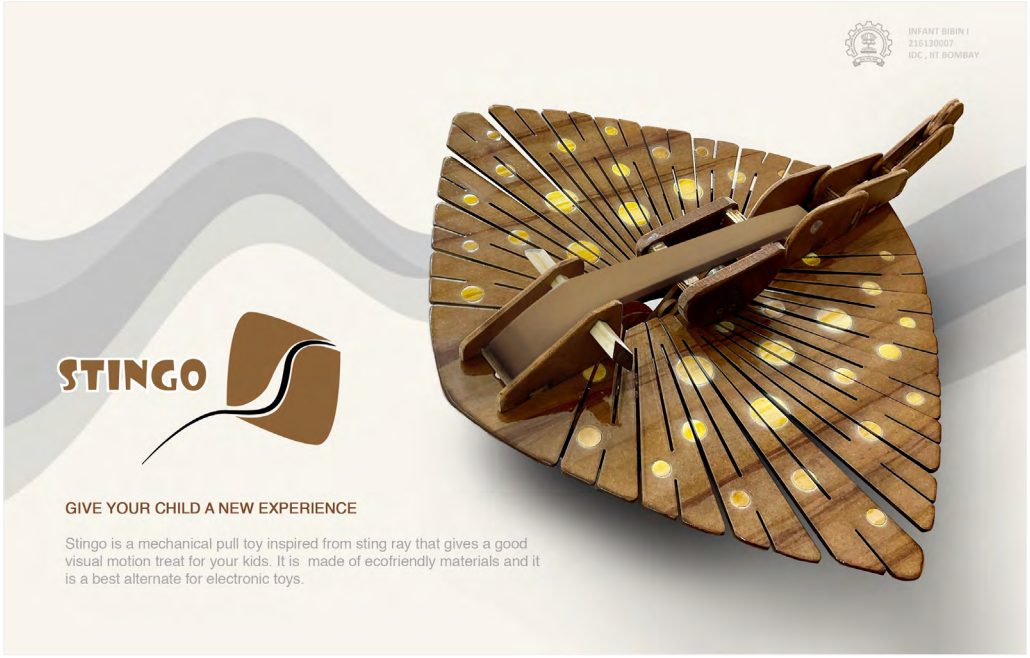

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Akira by Mohammed Hazique Kola

The aim of the project is to design a wooden toy for kids of the age group 9-15 months. It should be safe in terms of its material and edge treatment. It must be sturdy to withstand wear and tear. Kids should operate it by themselves by either pushing or pulling the toy.

Varied elements such as sound, light, and mechanical movement must be incorporated so as to create curiosity. The toy must mimic the biomechanical movements and over a visually unique experience.

Stage 1 Presentation

Case Study - Slide Show

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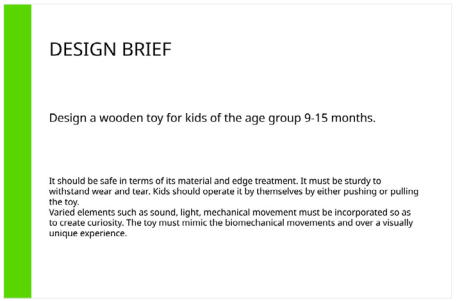
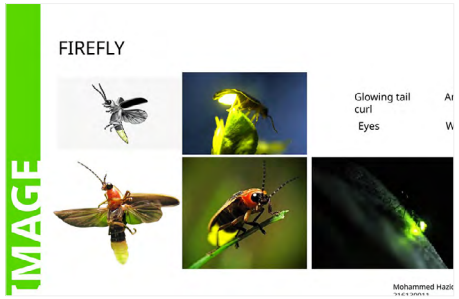
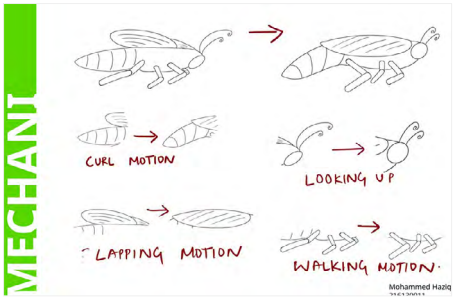
Stage 1 Presentation

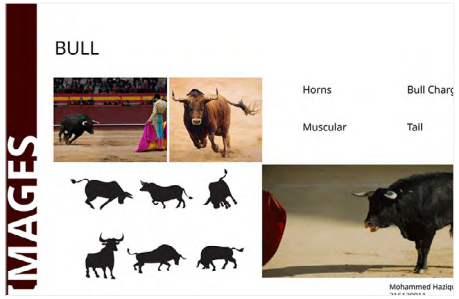
Download:

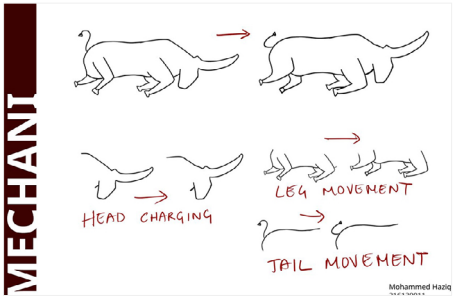
- Akira_Stage 1 Presentation_by Mohammed Hazique Kola.....











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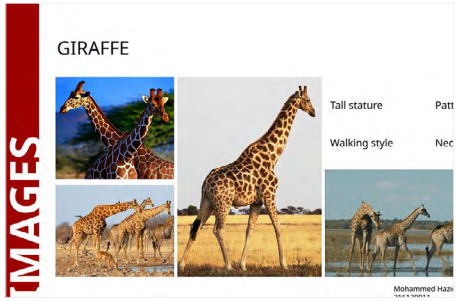

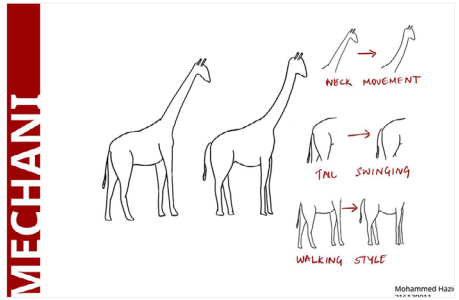

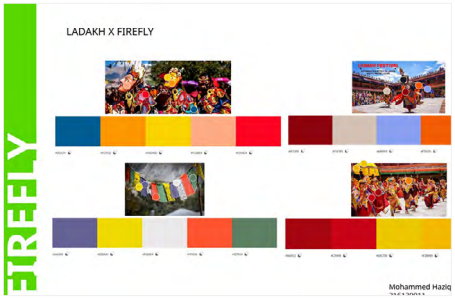

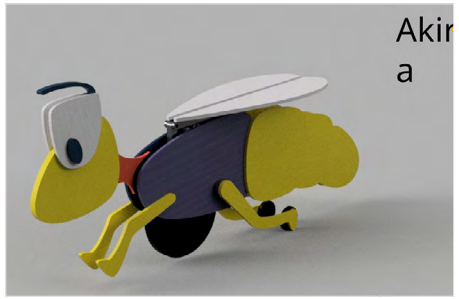

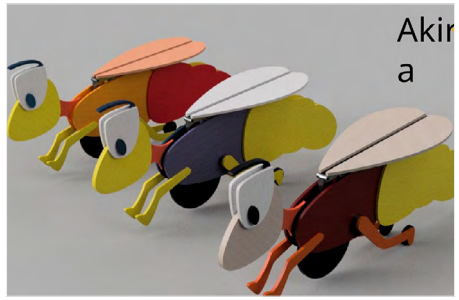

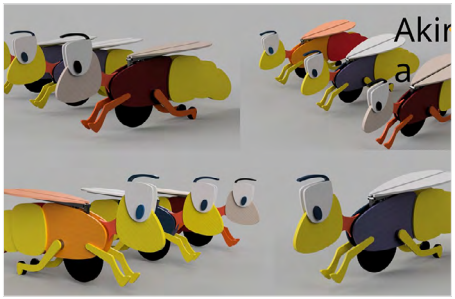

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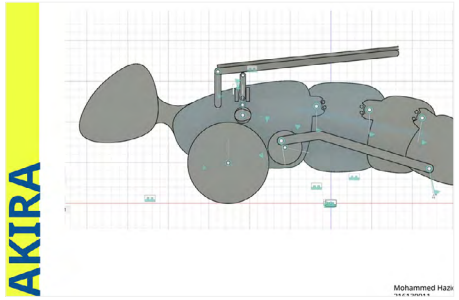

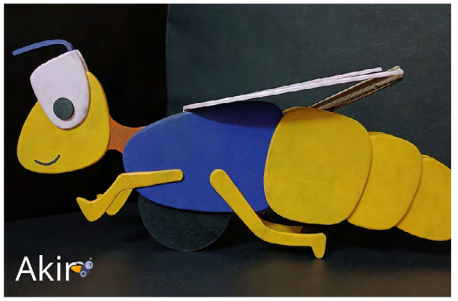

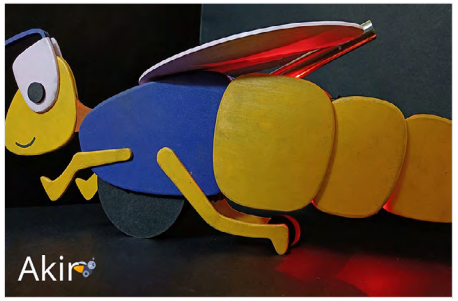

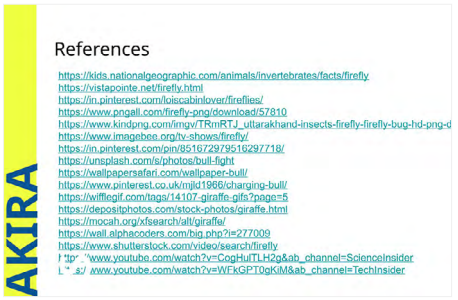

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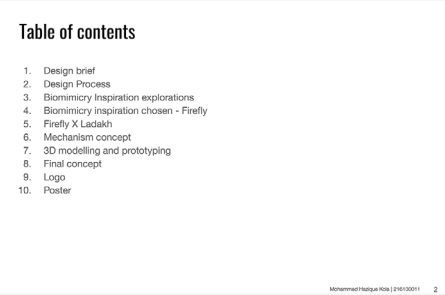

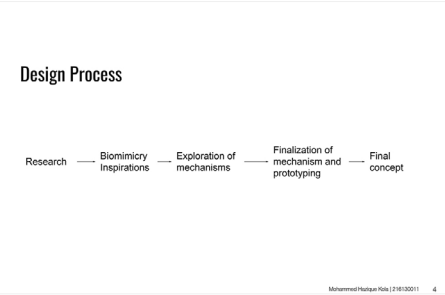

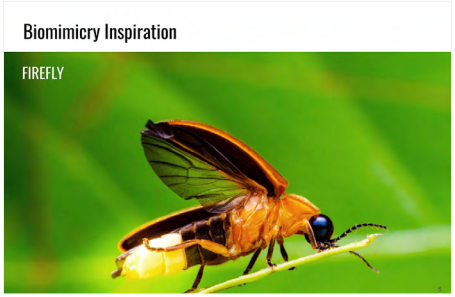

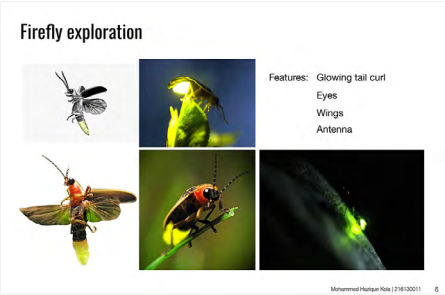

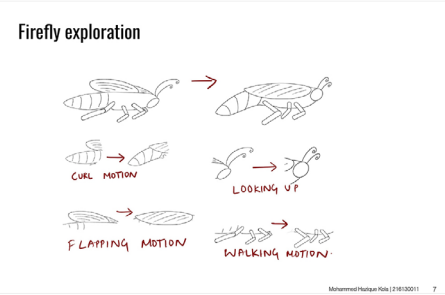

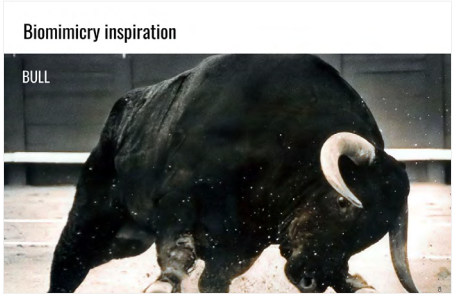

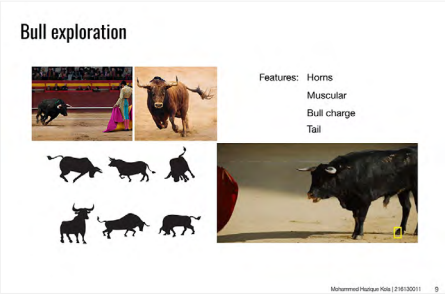

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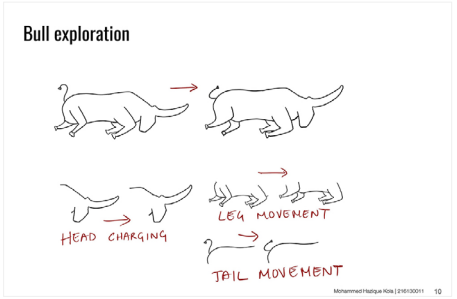

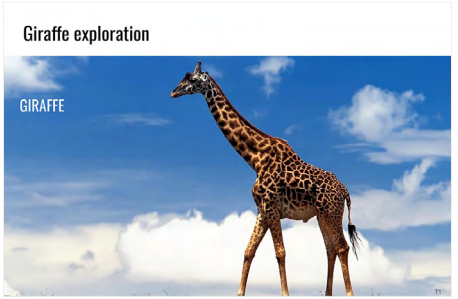

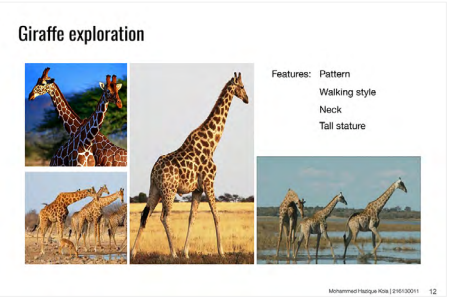

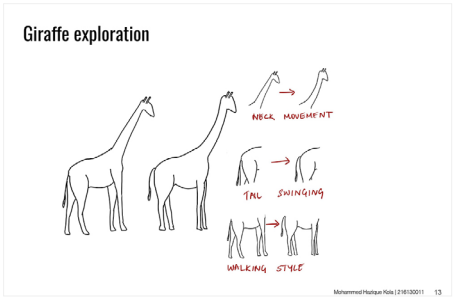

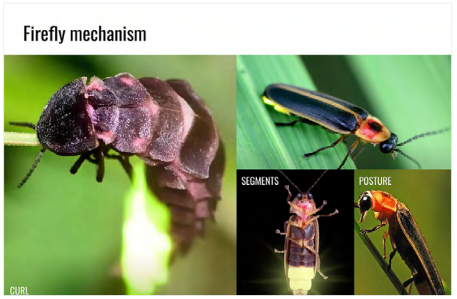

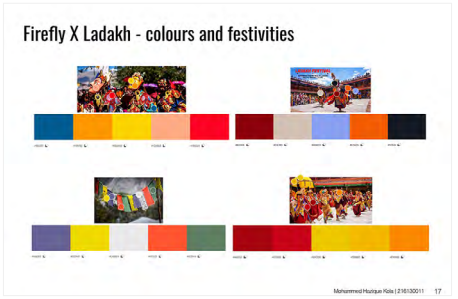

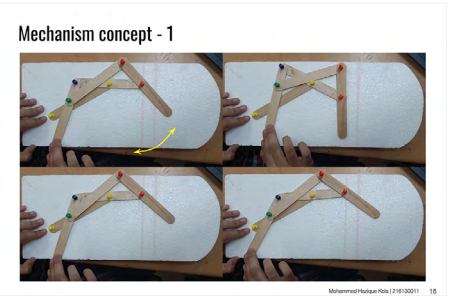

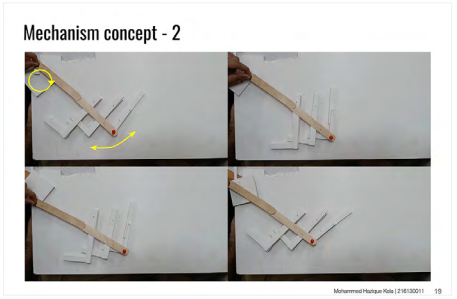

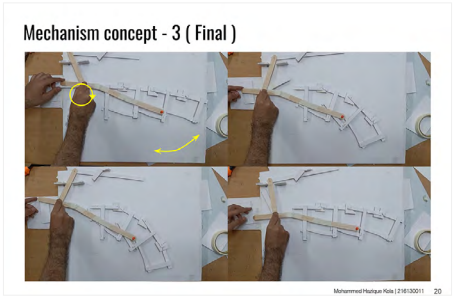

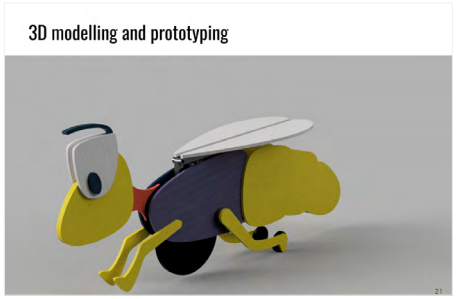

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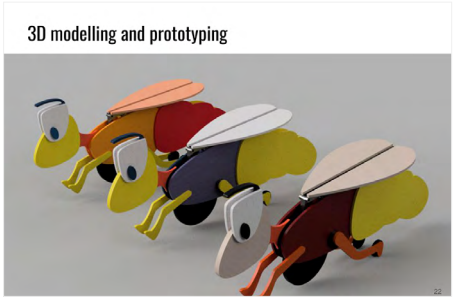

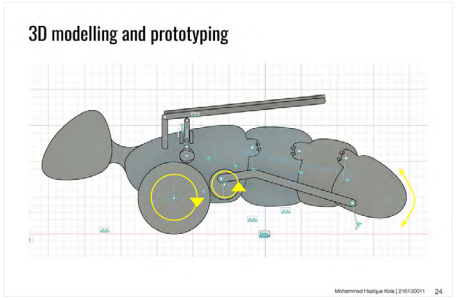

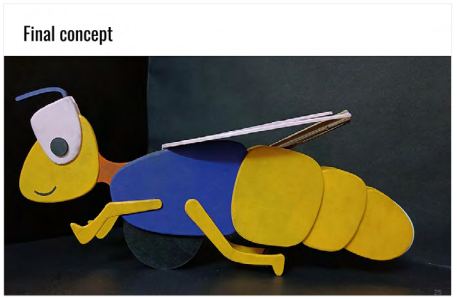

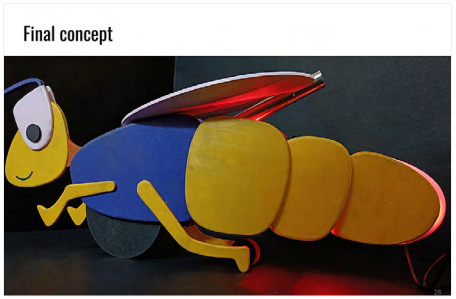

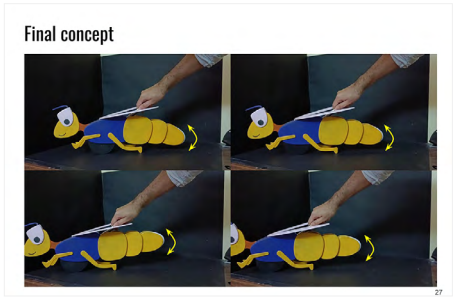

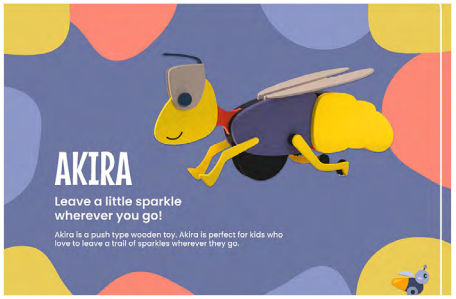

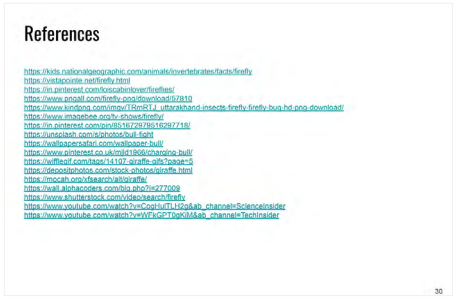

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Video

Akira by Mohammed Hazique Kola

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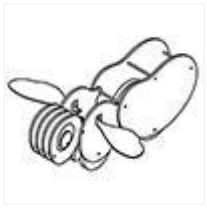
Buzz by Mugdha Dengle

This project is done as part of the PD2 module. The primary objective is to design a wooden toy for kids between the age group of 9 to 24 months. The primary material to be used is mdf. The design of the toy is to be inspired by nature-based animal biomimicry.

Stage 1 Presentation



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Stage 1 Presentation

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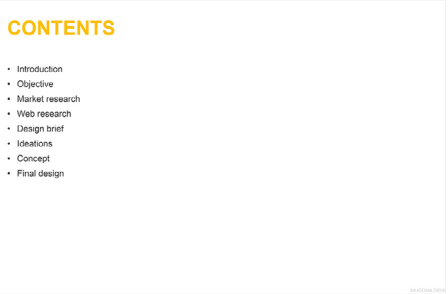
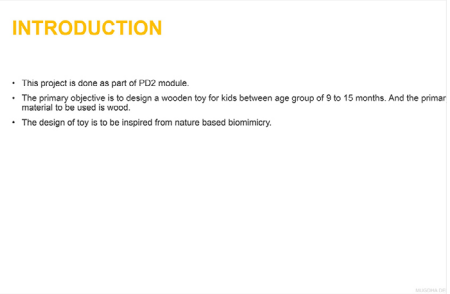
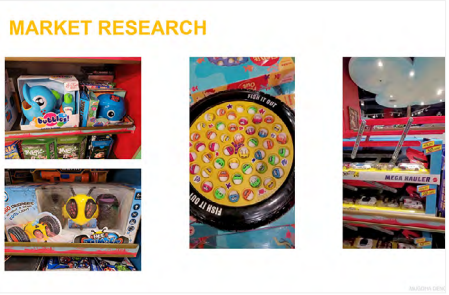
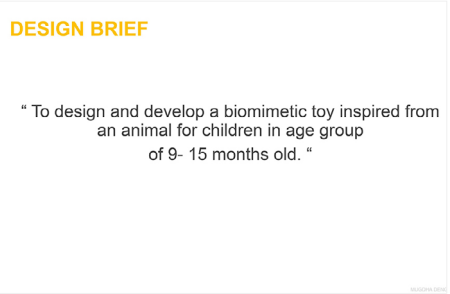
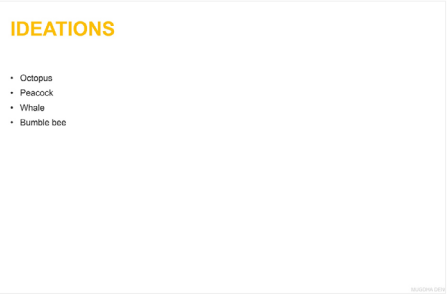
- Buzz_Stage 1 Presentation_by Mugdha Dengle.....

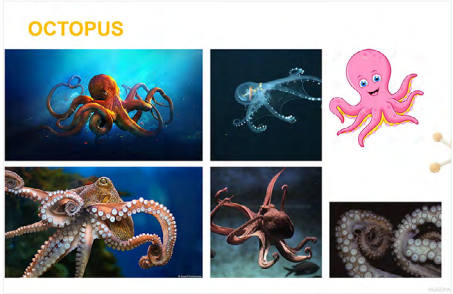












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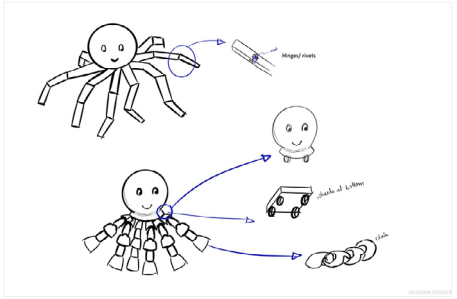

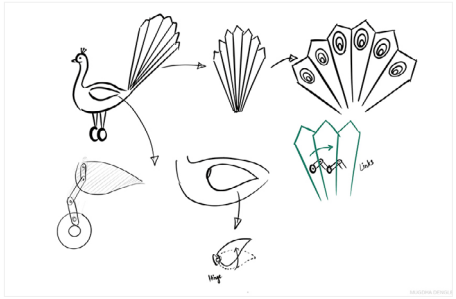

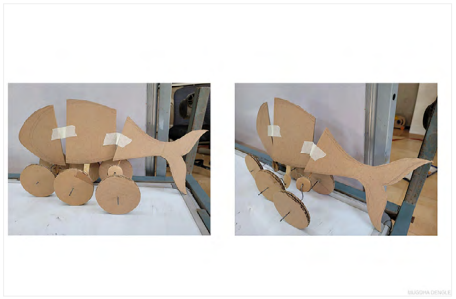

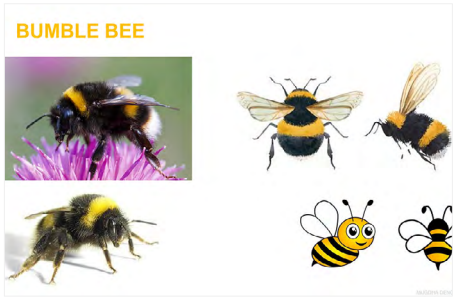

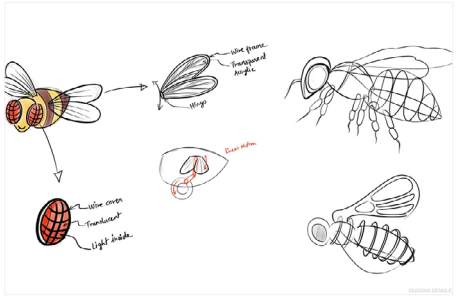

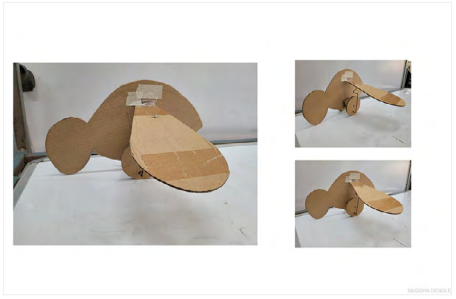

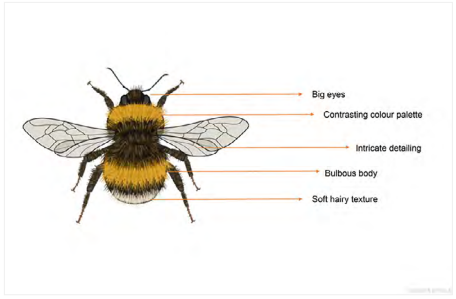

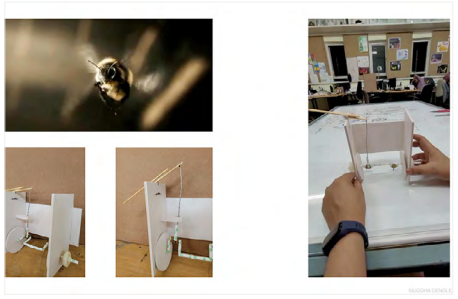

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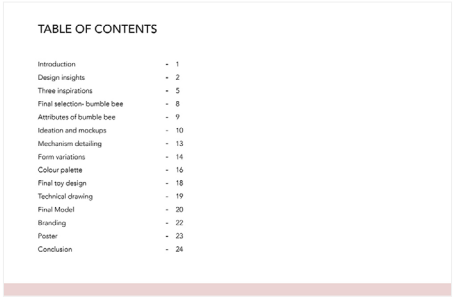
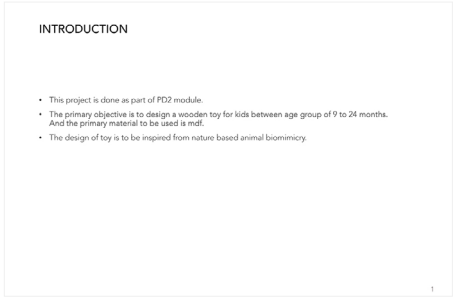
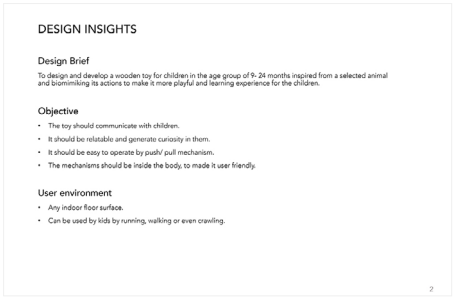
Case Study - Slide Show

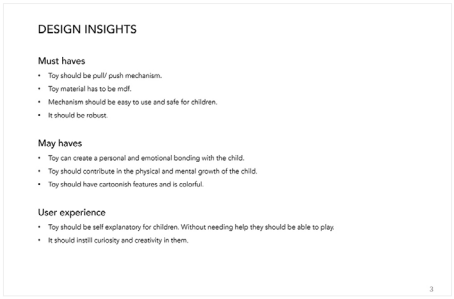
Case Study Download:

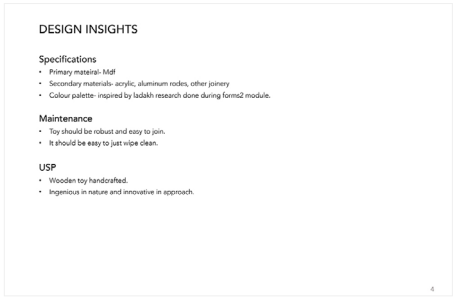
• **Buzz_by Mugdha Dengle.....**

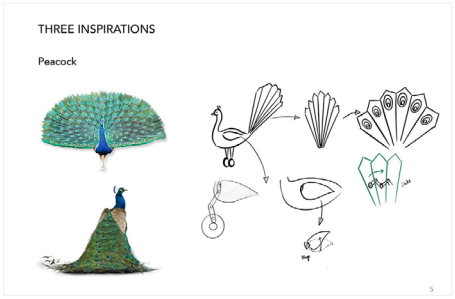


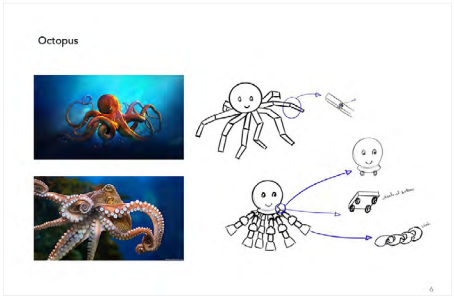


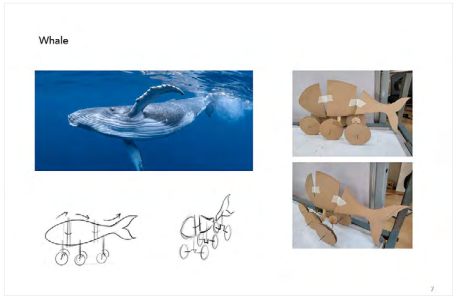












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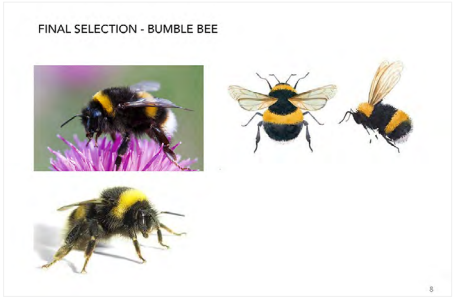

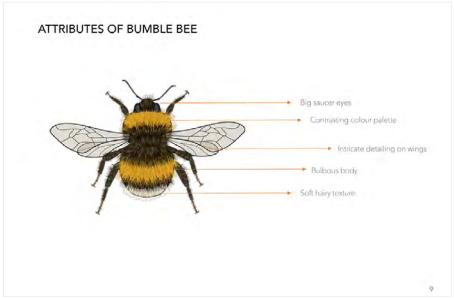

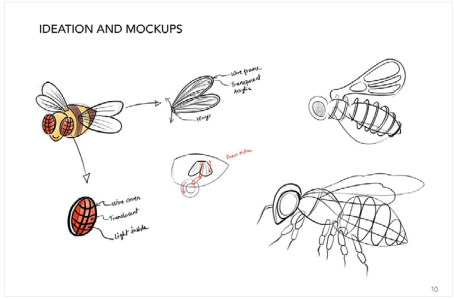

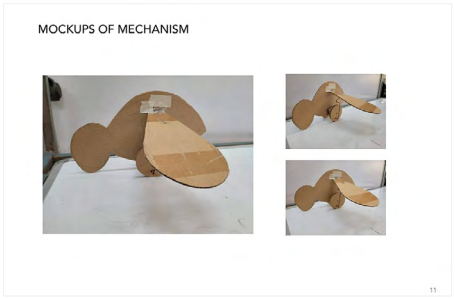

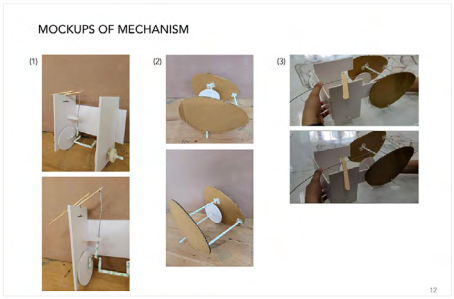

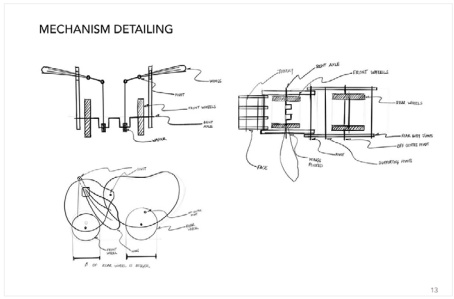

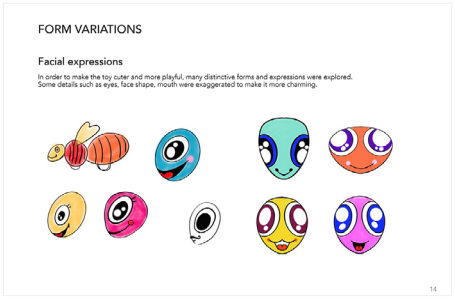

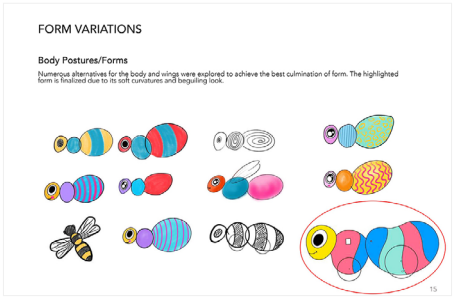

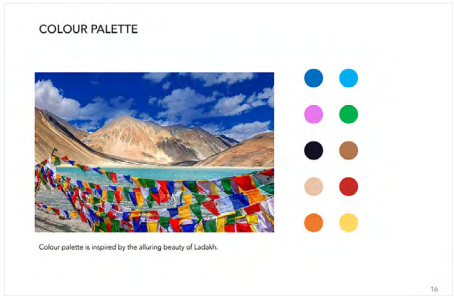

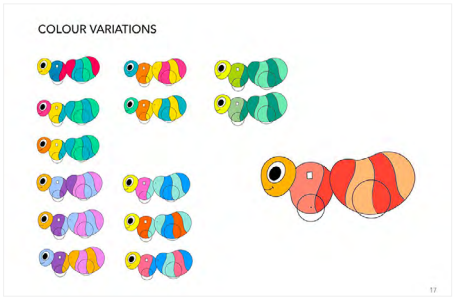

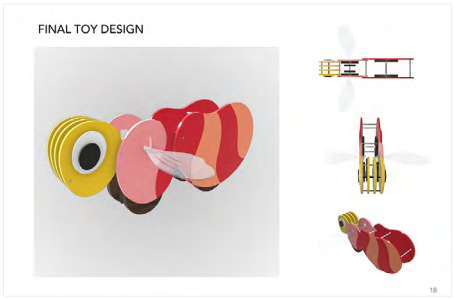

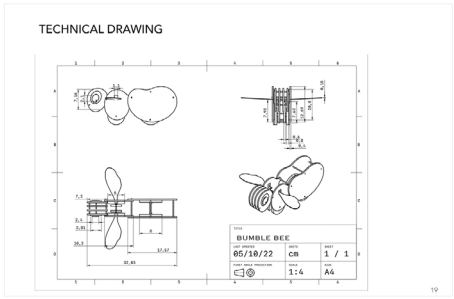

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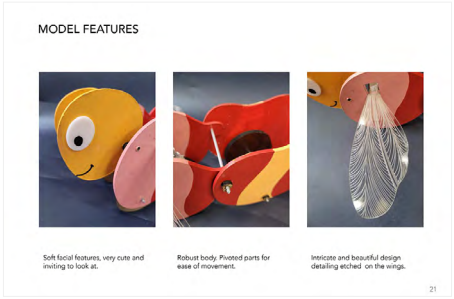

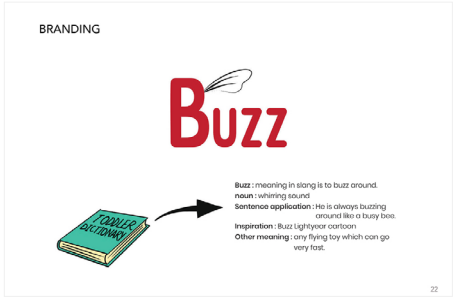

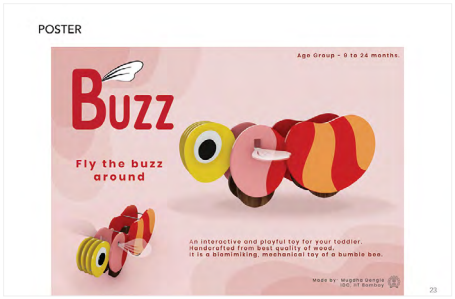

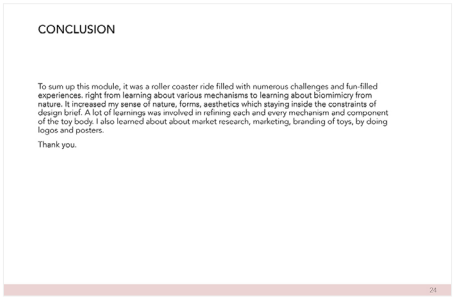

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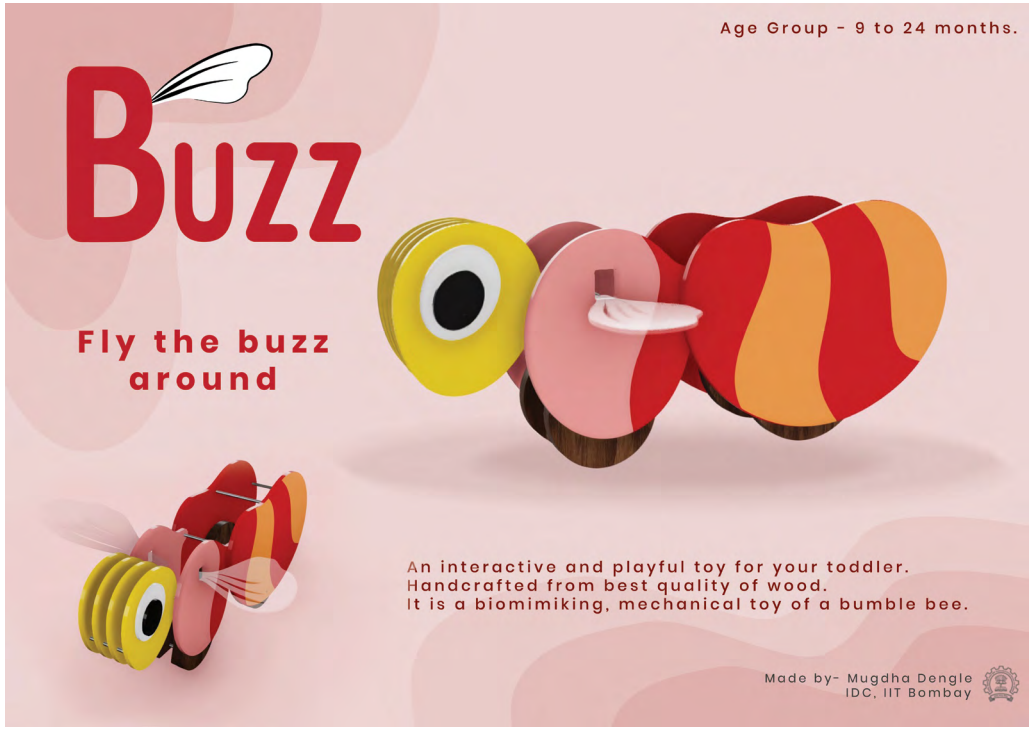
Poster



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Source:
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Tooti by Naiga Catherine

The aim of the project is to design a wooden toy for kids of age group 9 to 15 months.
- taking bionic inspiration
- facilitates movement
- evokes an element of surprise in kid
- That should be safe in its form, function and material
- And approachable

Stage 1 Presentation

Case Study - Slide Show

Poster

Video

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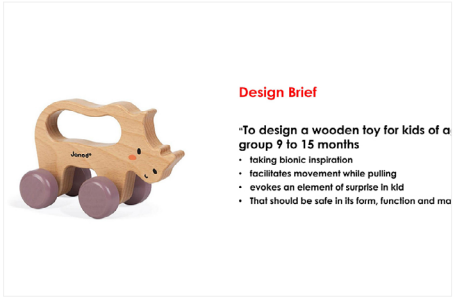
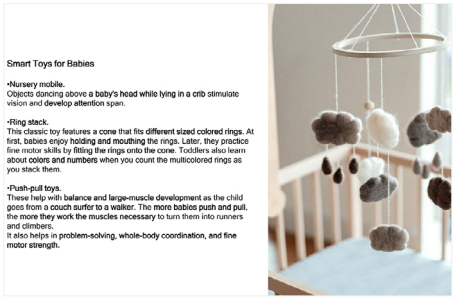
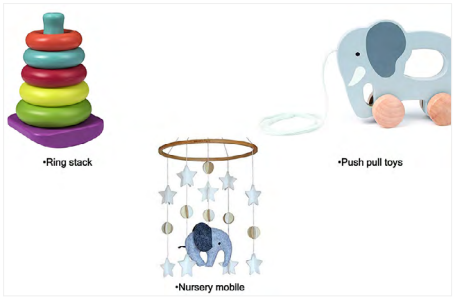
Stage 1 Presentation

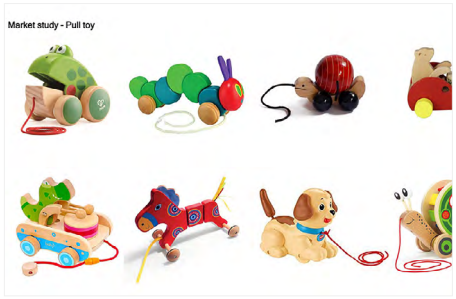
Download:

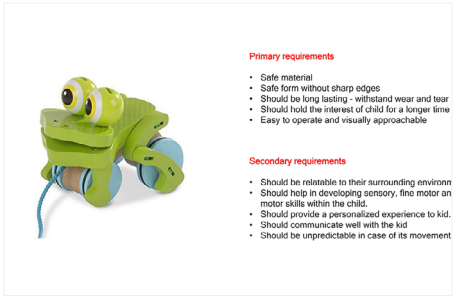
• Tooti_Stage 1 Presentation_by Naiga Catherine.....

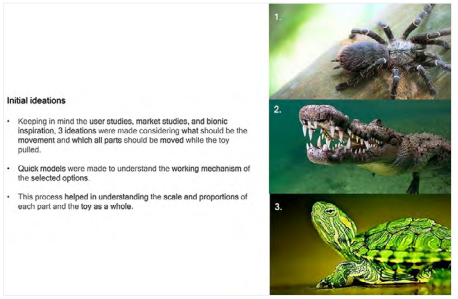


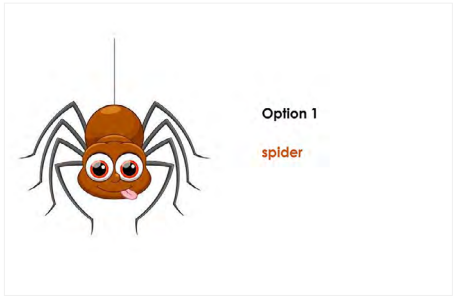












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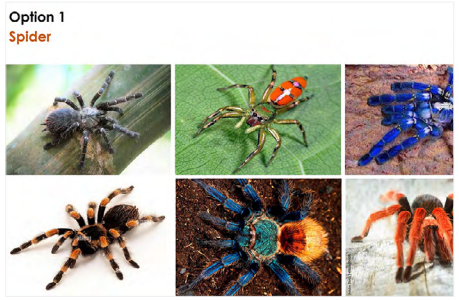

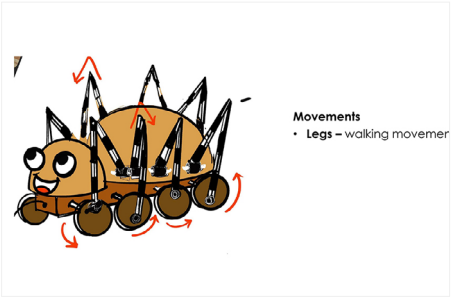

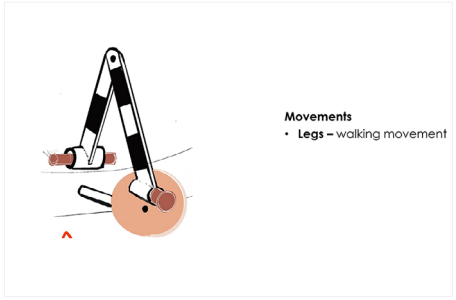

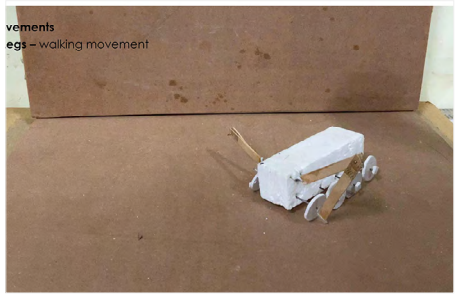

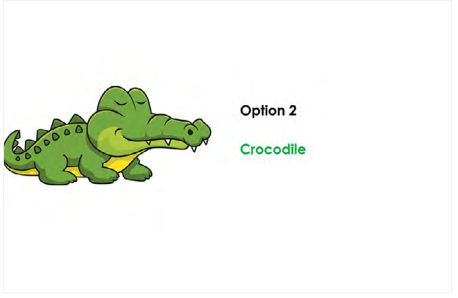

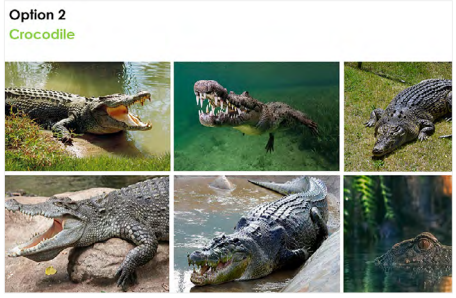

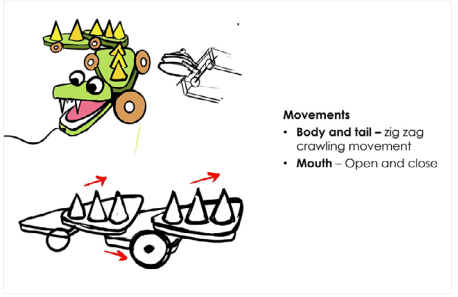

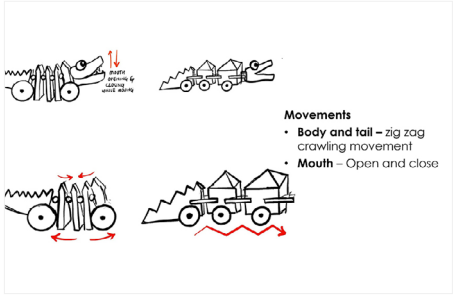

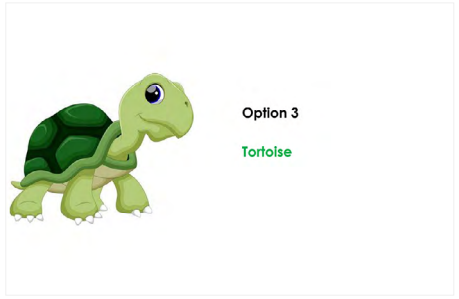

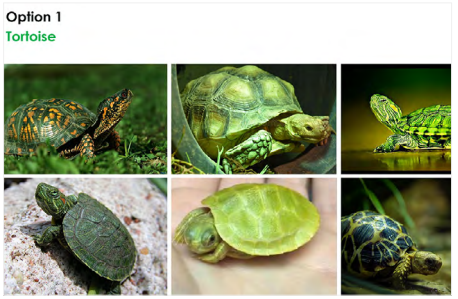

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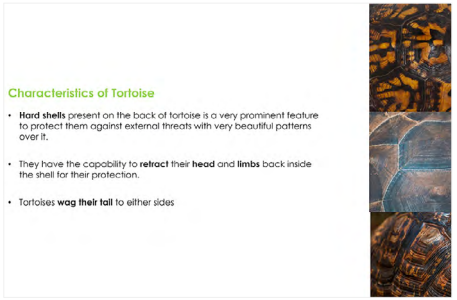

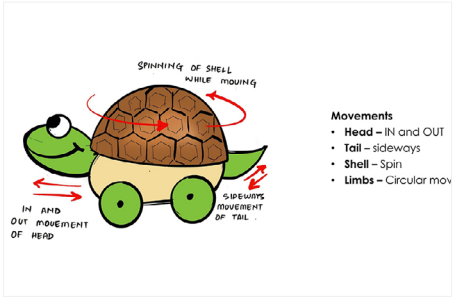

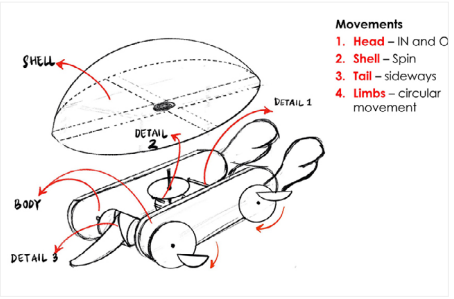

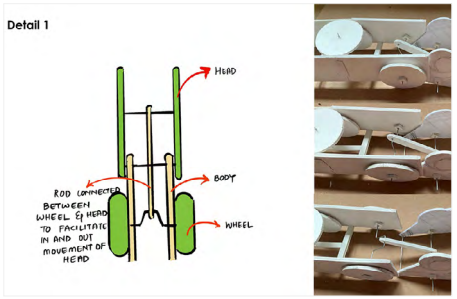

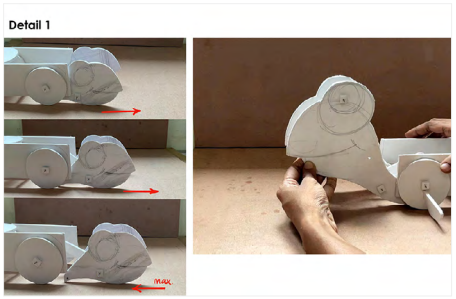

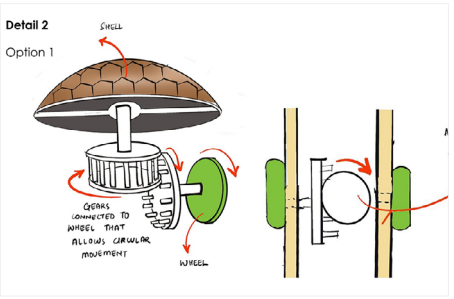

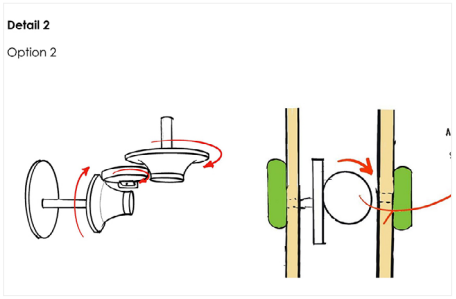

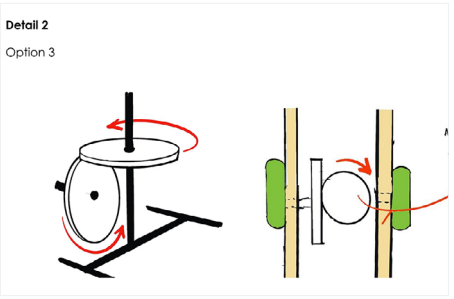

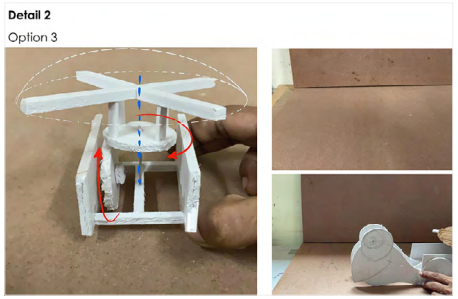

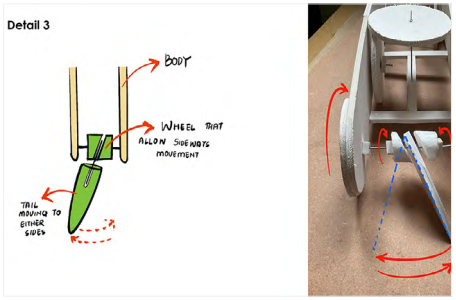

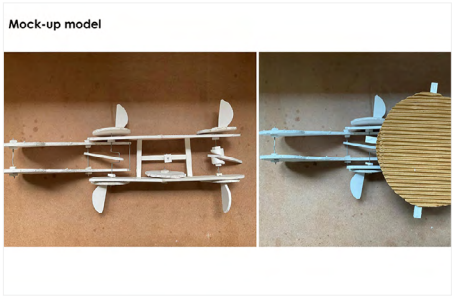

Source:
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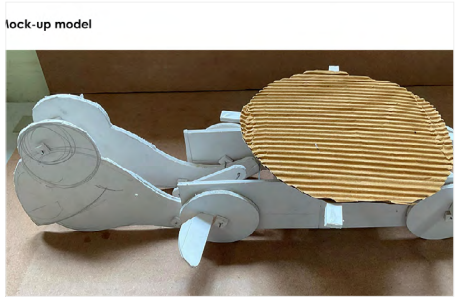

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Case Study - Slide Show

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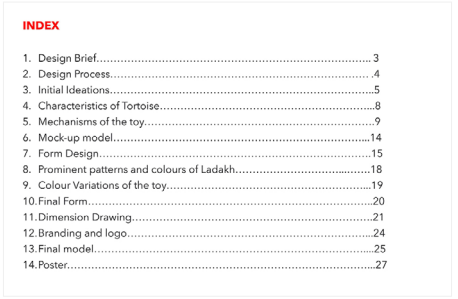

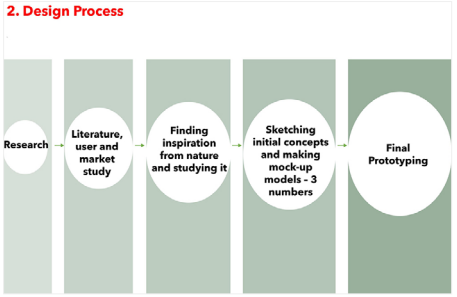

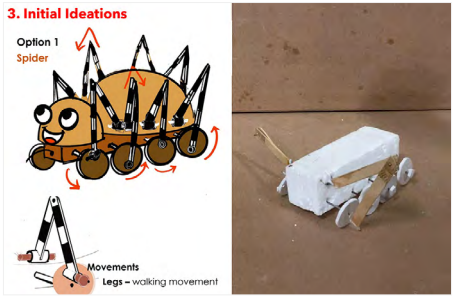

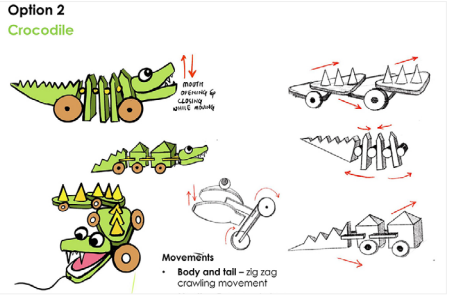

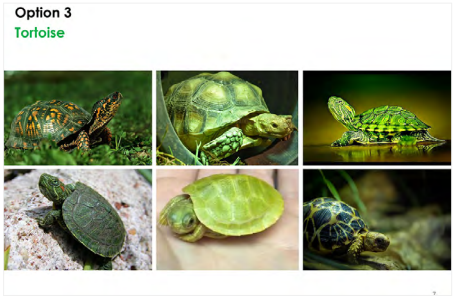

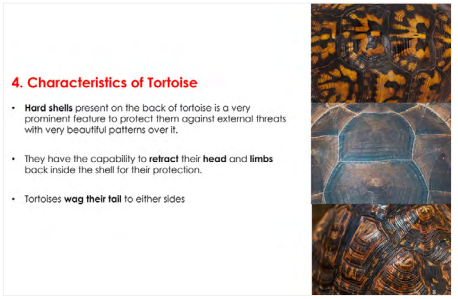

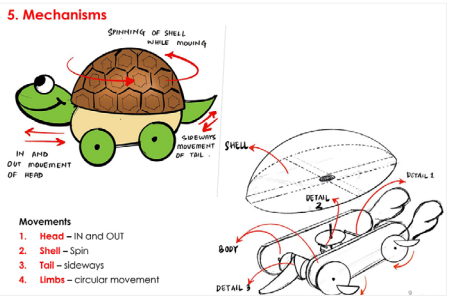

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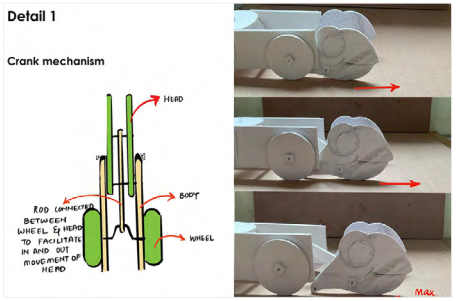

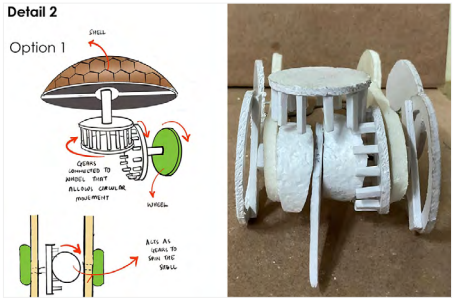

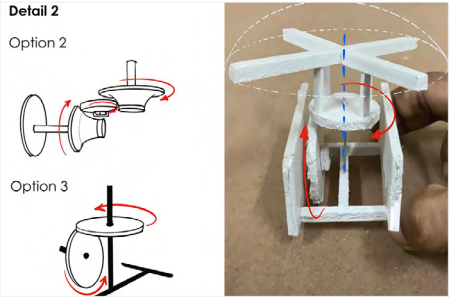

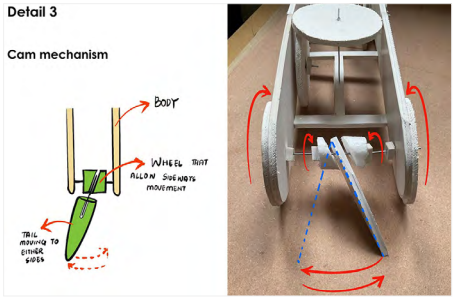

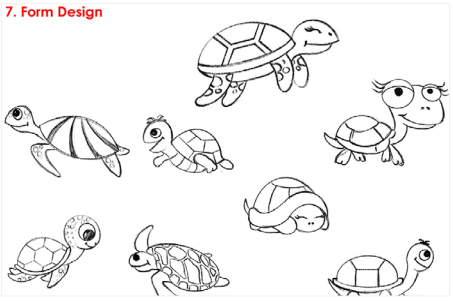

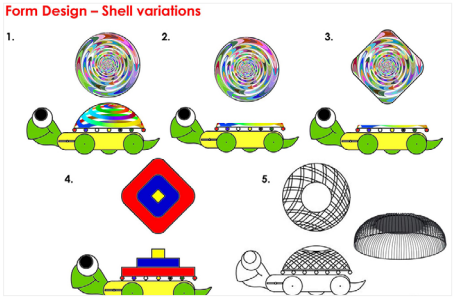

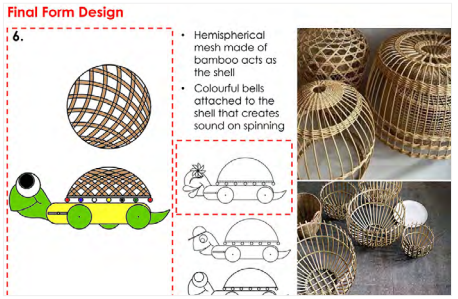

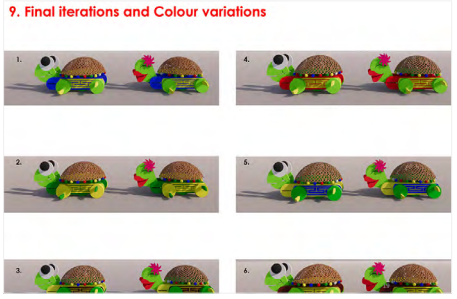

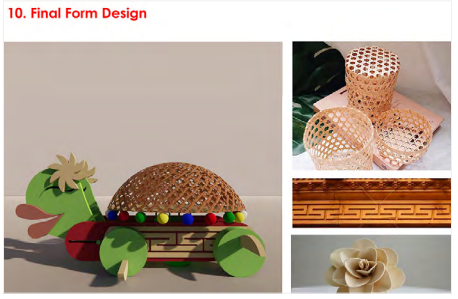

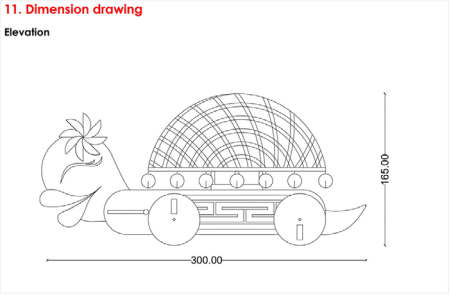

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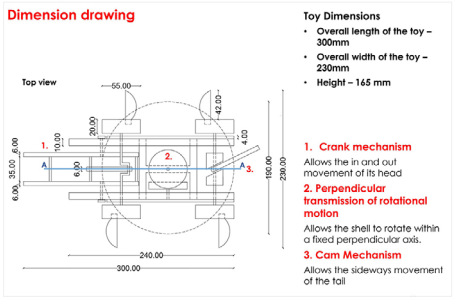

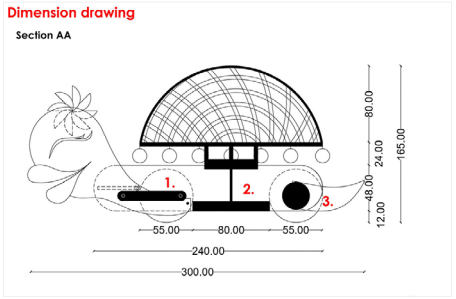

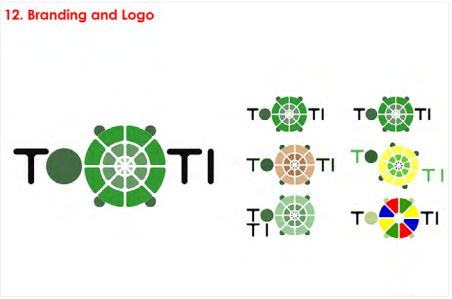

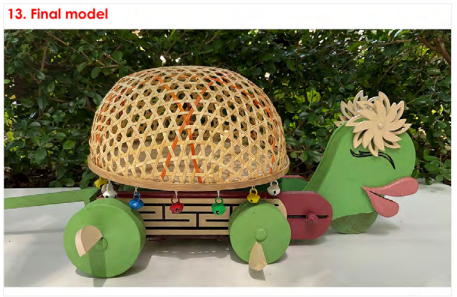

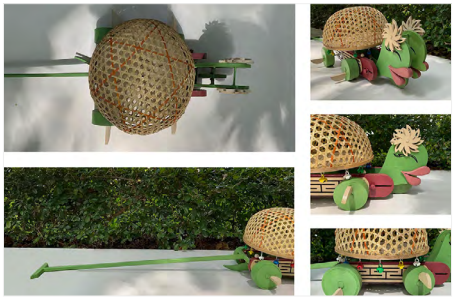

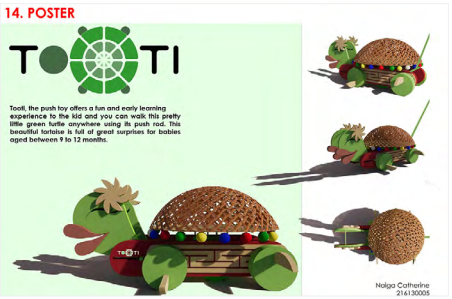

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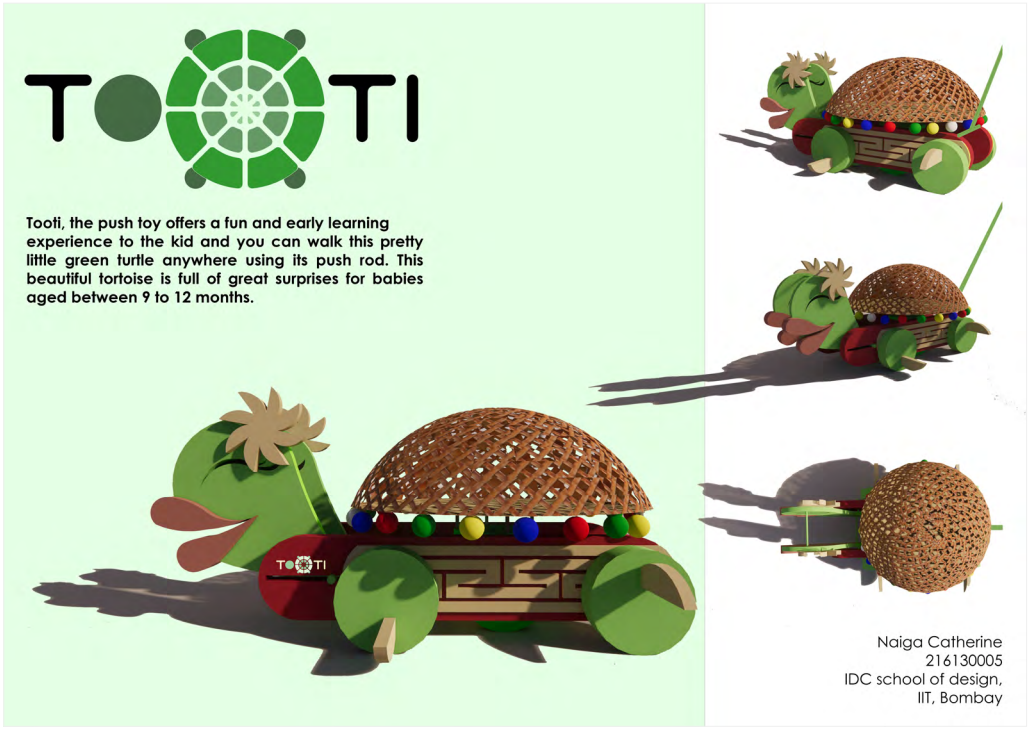

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Video

Tooti by Naiga Catherine

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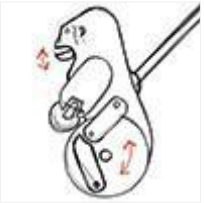
Source:
https://dsource.in/course/indian-toy-design/students-presentations/push-toy-group/go-bananas-parth-rathod

Go Bananas by Parth Rathod

The aim of the project is to design a wooden toy for kids of the age group 15-24 months.
- It should be safe in terms of its material and edge treatment.
- It must be sturdy to withstand wear and tear.
- Kids should operate it by themselves by either pushing or pulling the toy.
- Varied elements such as sound, light, mechanical movement must be incorporated so as to create curiosity.
- The toy must mimic the bio-mechanical movements of an animal and provide a visually unique experience.



Stage 1 Presentation

Case Study - Slide Show

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Stage 1 Presentation

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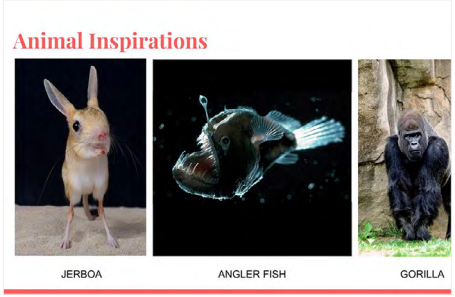

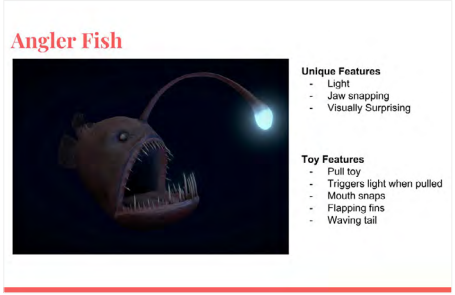

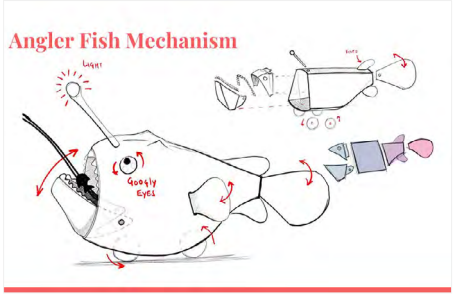

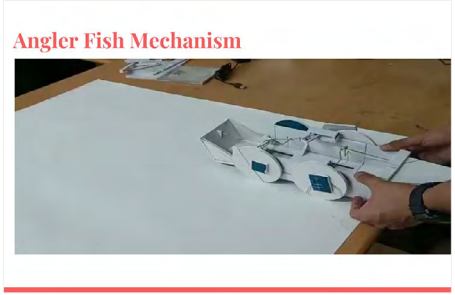

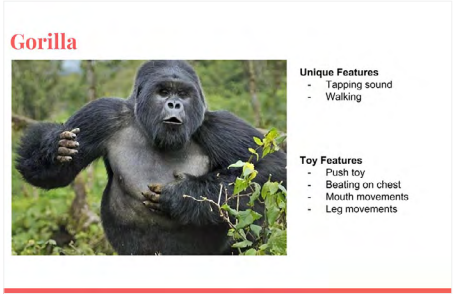

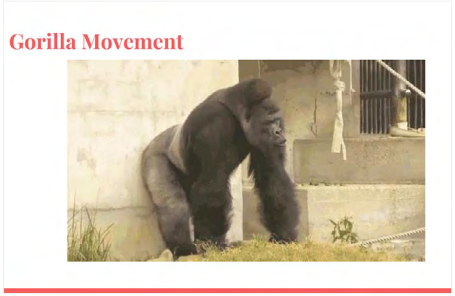

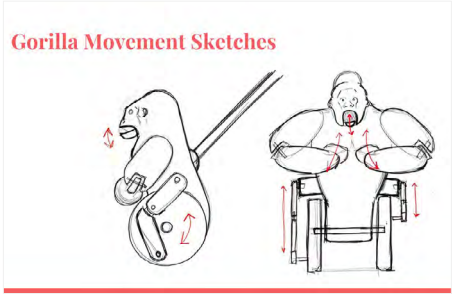

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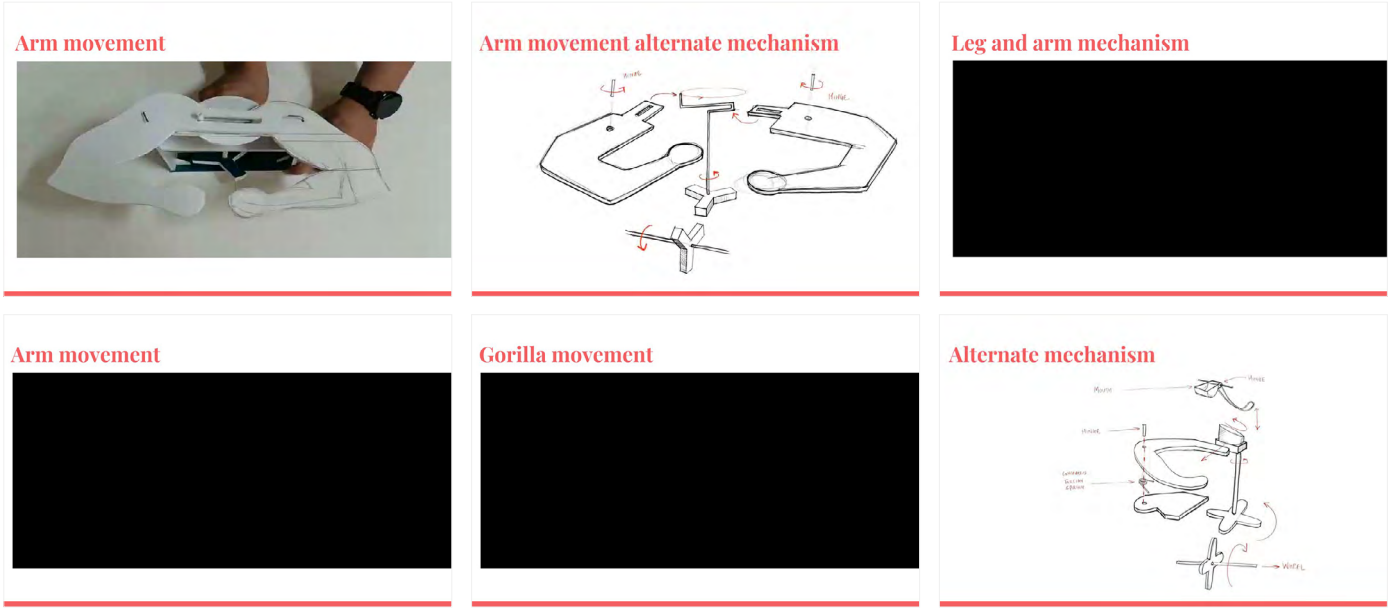

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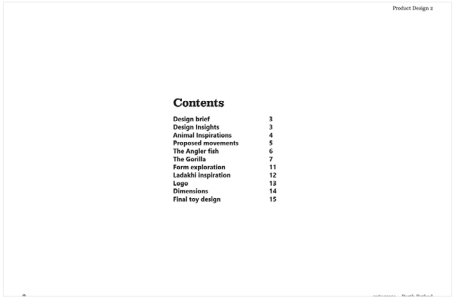
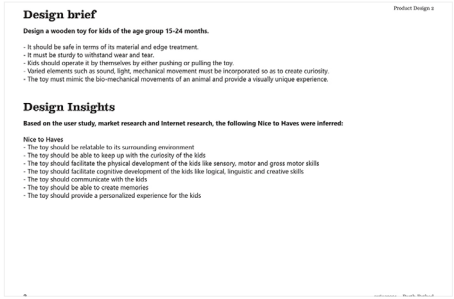
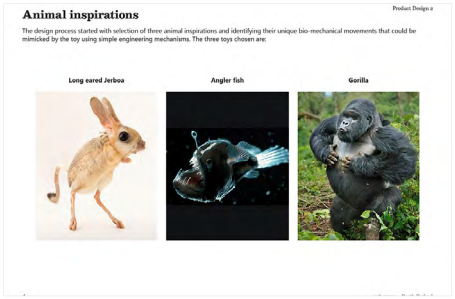
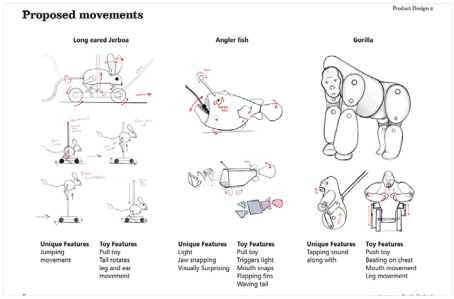
Case Study Download:

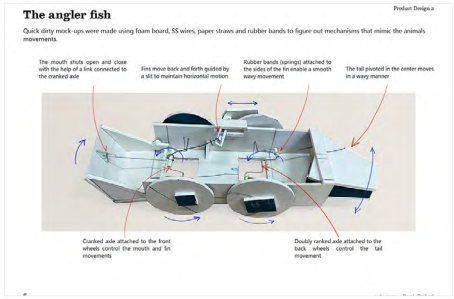
• Go Bananas_by Parth Rathod_Report.....

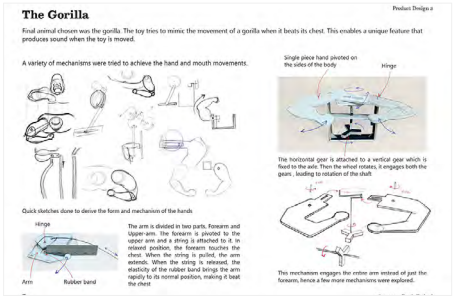


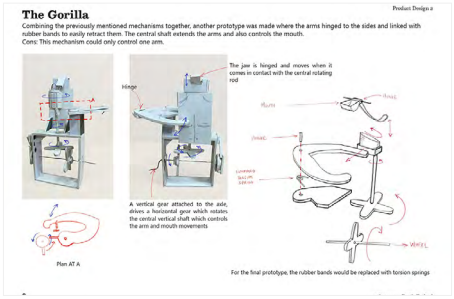


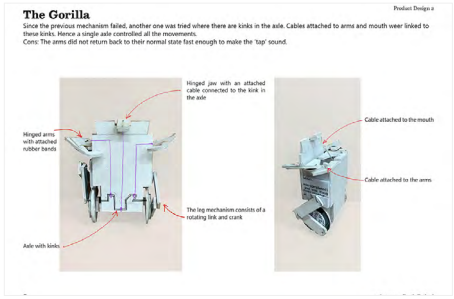












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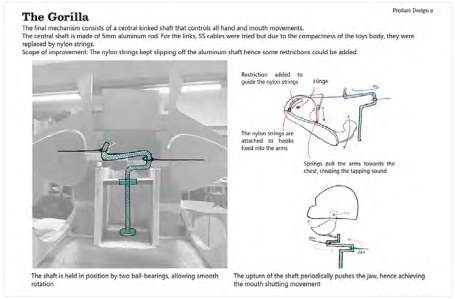

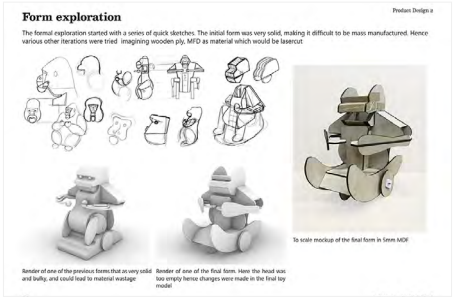

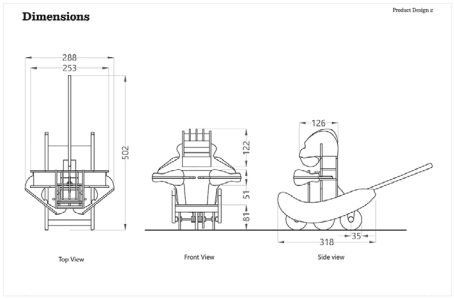

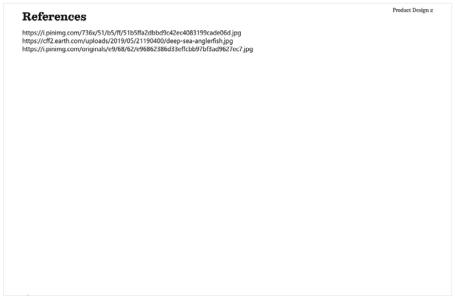

Source:
https://dsource.in/course/indian-toy-design/students-presentations/push-toy-group/go-bananas-parth-rathod/case-study

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Video

Go Bananas by Parth Rathod

YouTube Video Link.....

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Source:
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Buba by Prathmesh Pedamkar

The aim of the project is to design a wooden push/pull toy for kids, aged 9 to 24 months, by taking bionic inspiration, which is easy to manufacture.

Stage 1 Presentation

Case Study - Slide Show

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Stage 1 Presentation

Download:

- Buba_Stage 1 Presentation_by Prathmesh Pedamkar.....

The Brief

Design a wooden push/pull toy for kids, aged 9 to 24 months, by ta
bionic inspiration.

User Insights

1. Kid gets curious after seeing the toy and try to figure out what to
with it. Play? Throw? Give to somebody?
2. Usually they use one toy for about 6 months
3. Prefer less complex looking toys

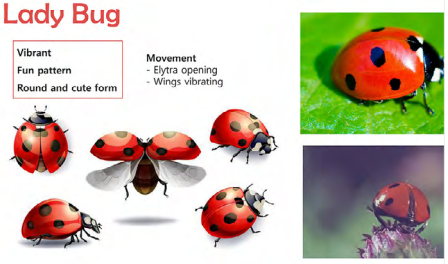
Must Haves

1. Roundness (no sharp edges)
2. Sound feedback
3. Less components (to avoid wear and tear, and failure)
4. Visually appealing and inviting

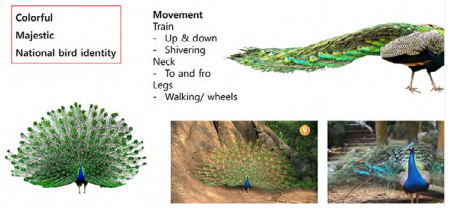
May Haves

1. The child should be able to play or fidget without pulling or pushin
2. Facilitate physical development
3. Open ended
4. Personal experience

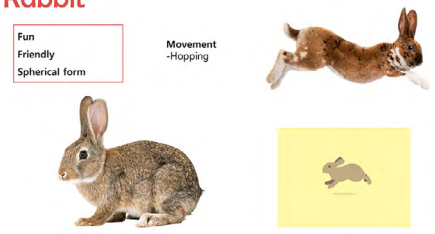
Lady Bug



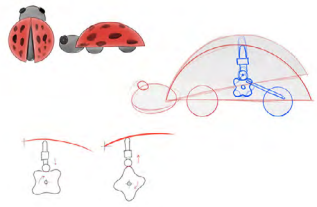
Peacock



Rabbit



Mechanism



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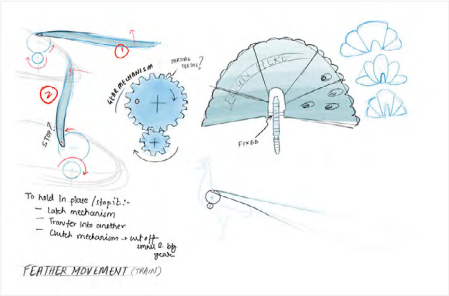
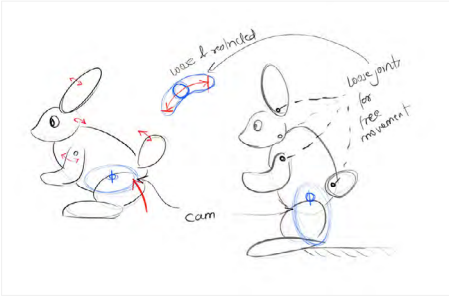
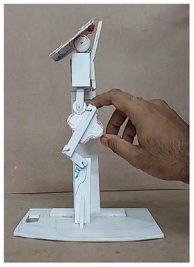
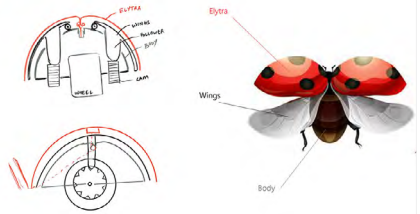




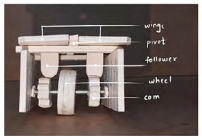
Mechanism Mock-up

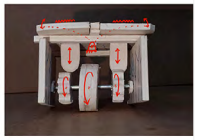


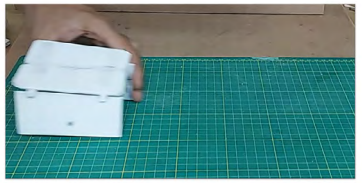
Details

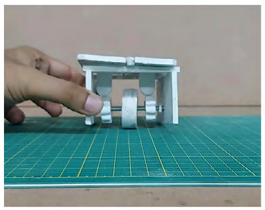


Mock-up 2









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Case Study - Slide Show

Case Study Download:

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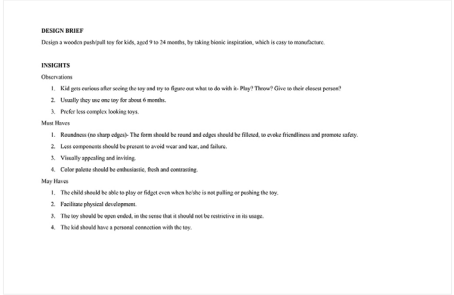

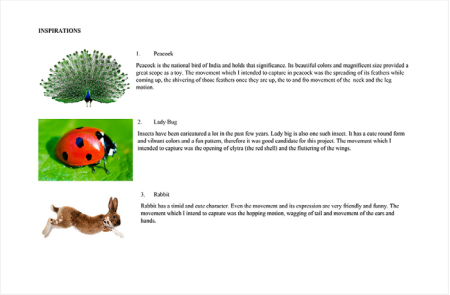

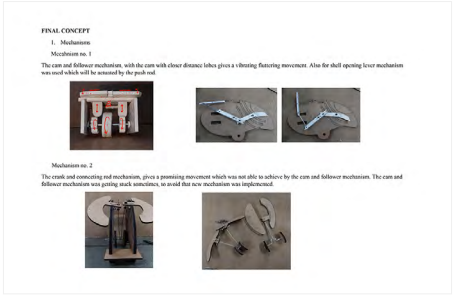

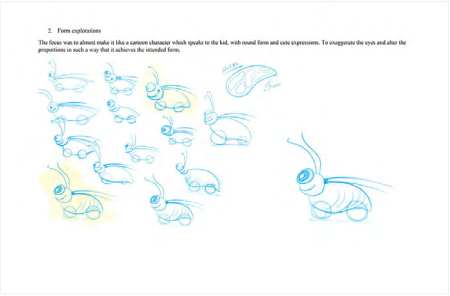

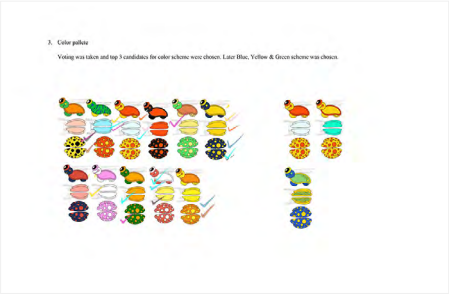

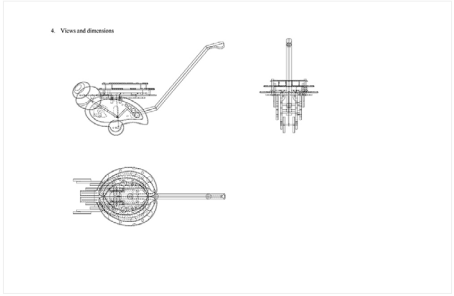

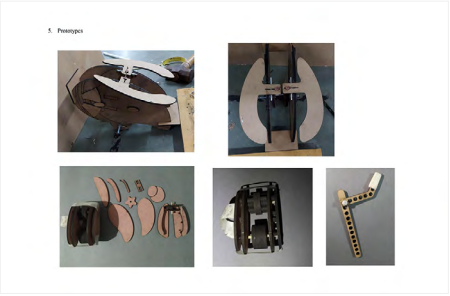

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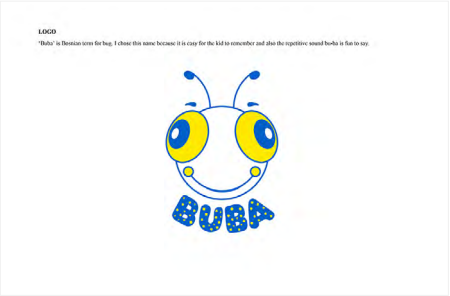

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Pambo by Sagar D Dabherao

The aim of the project is to design an animal-inspired push/pull toy for the age group of 15-24 months.

Constraints
1. The primary material of the toy should be wood.
2. Other materials can be used in very minimal quantity for specific purpose.
3. Toy should be inspired form nature.
4. It should be safe for kids – form, material, size of parts, etc.
5. It should be easy to operate and visually approachable.
6. It should be able to withstand wear and tear.

Environment of use
1. Interior of the house – floor space or play area of the kid.
2. It may be used by the kids when they are either standing, walking or sitting.

Stage 1 Presentation

Case Study - Slide Show

Poster

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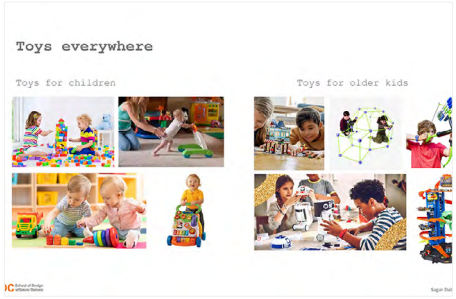
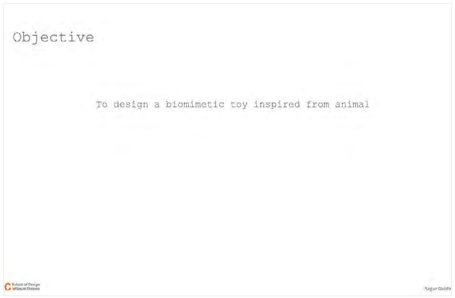
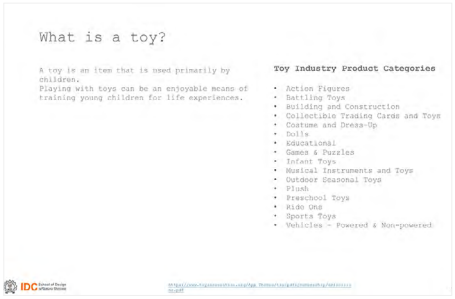
Stage 1 Presentation

Download:

• Pambo_Stage 1 Presentation_by Sagar D Dabherao.....







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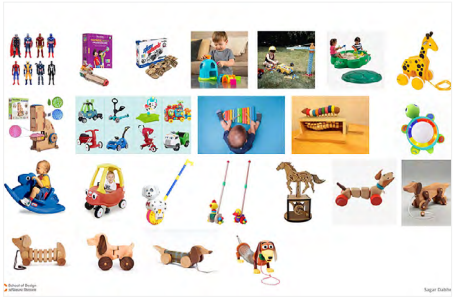

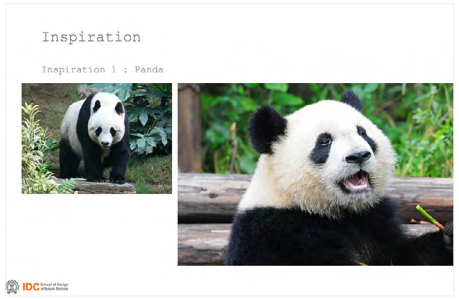

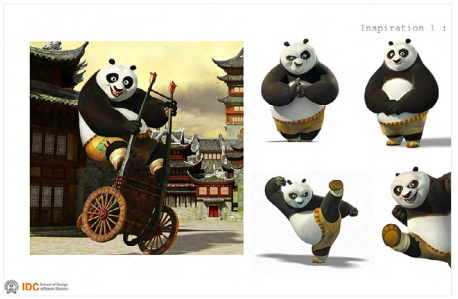

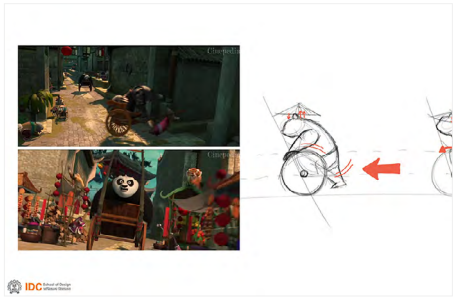

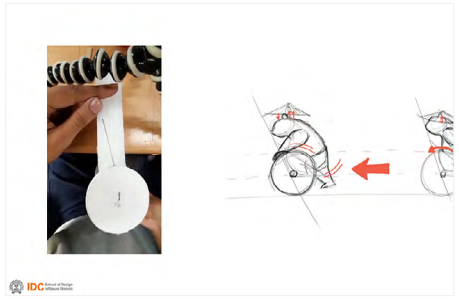

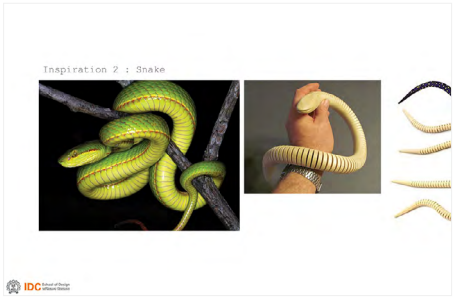

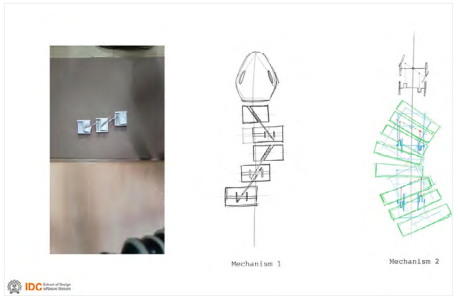

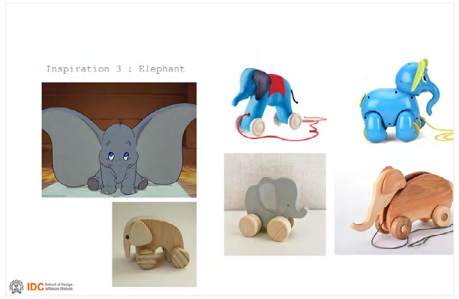

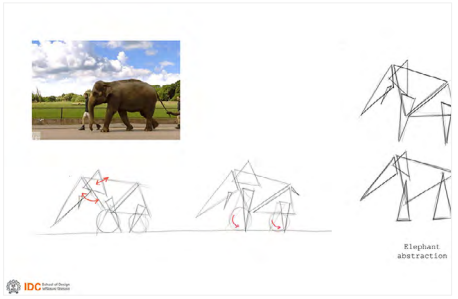

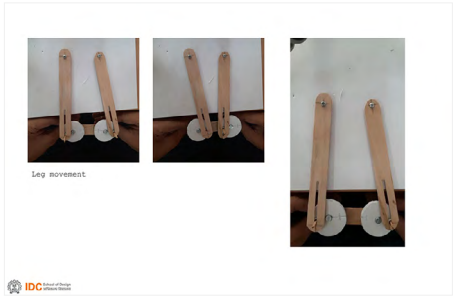

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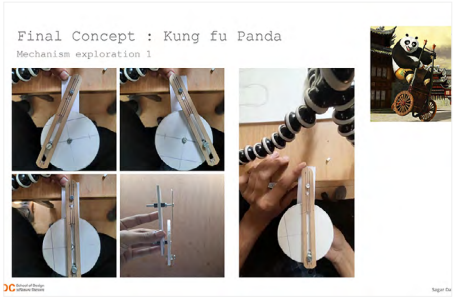

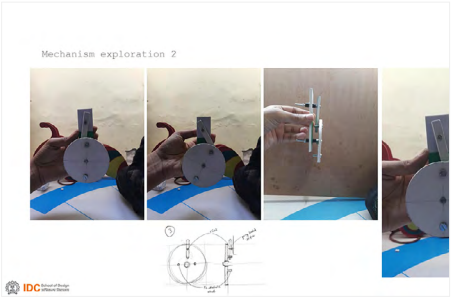

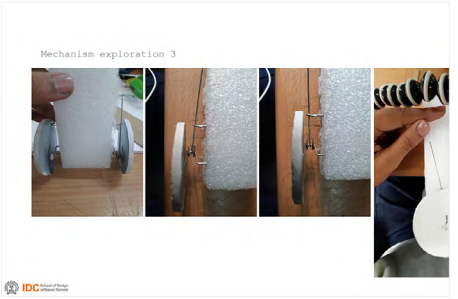

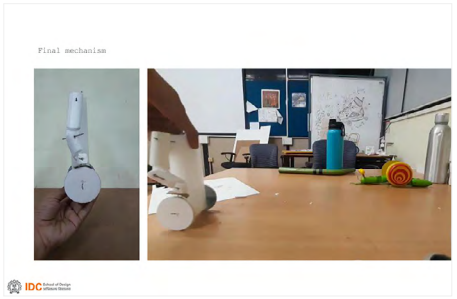

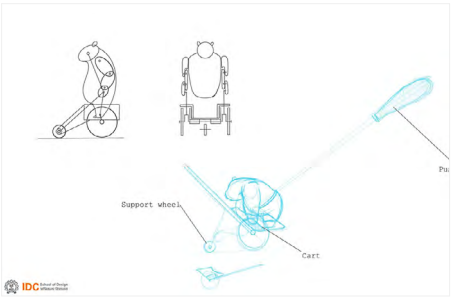

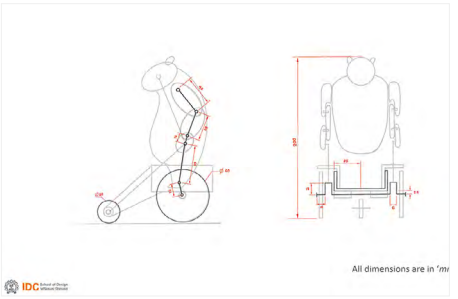

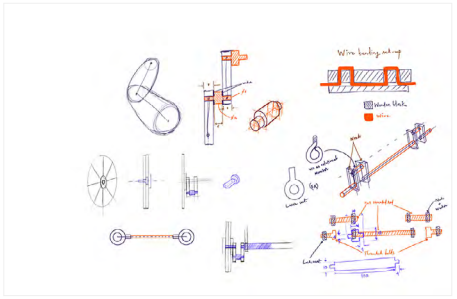

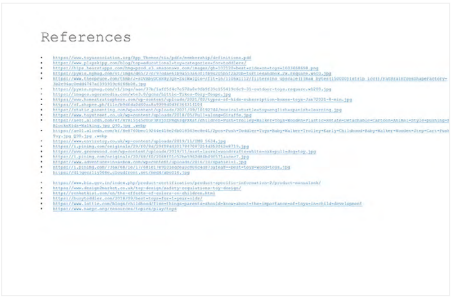

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Case Study - Slide Show

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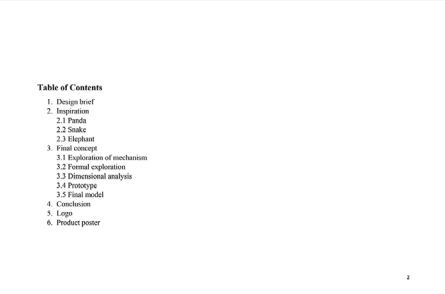

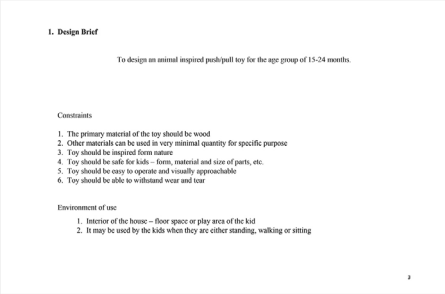

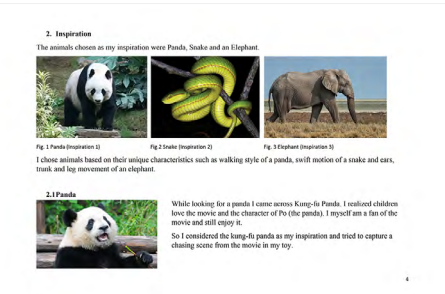

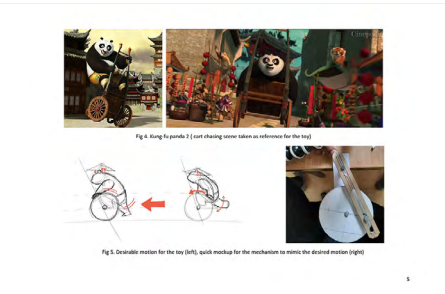

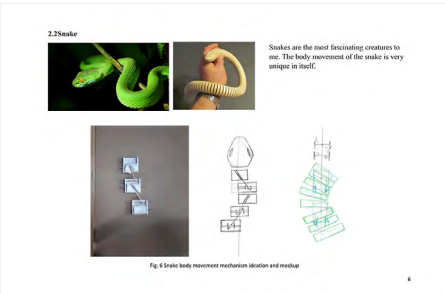

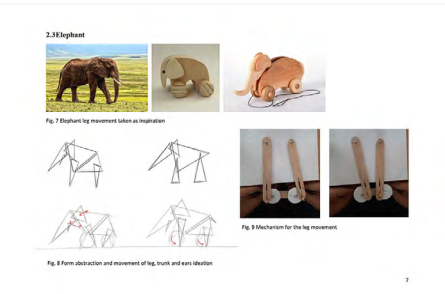

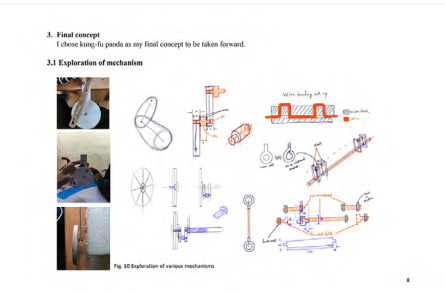

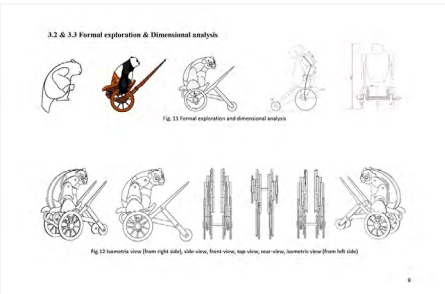

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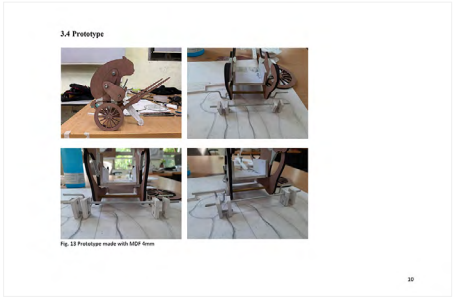

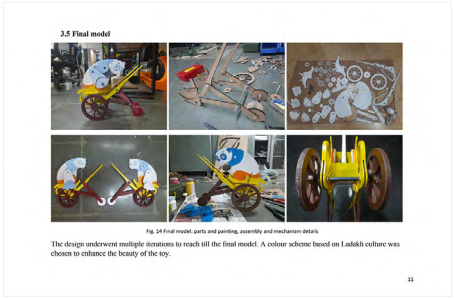

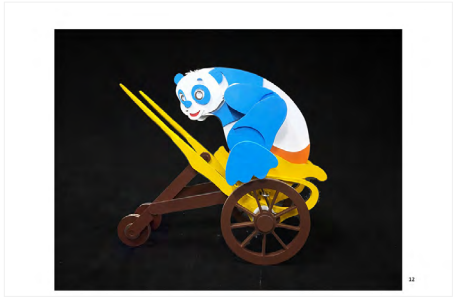

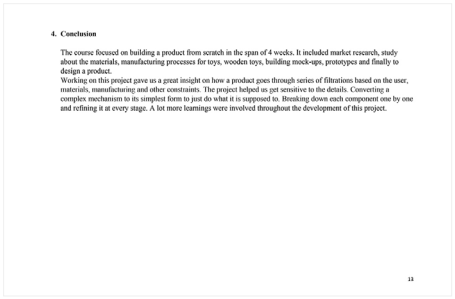

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Video

Pambo by Sagar D Dabherao

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Muro by Shivani M

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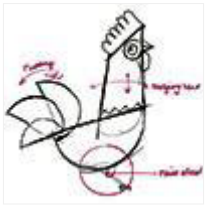

Stage 1 Presentation

Case Study - Slide Show

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Stage 1 Presentation

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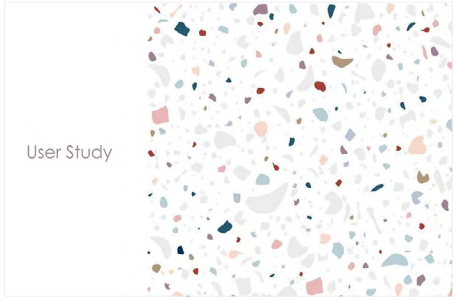

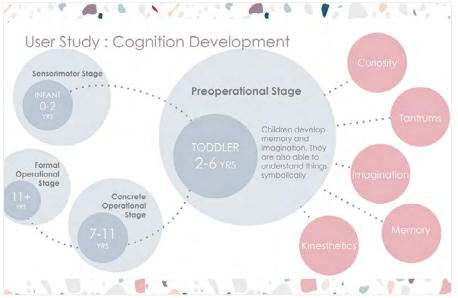

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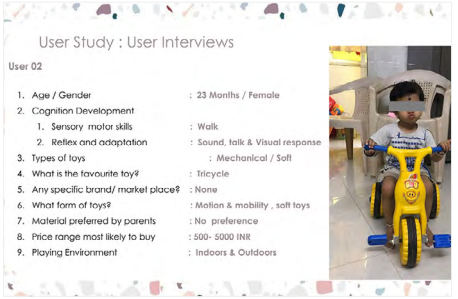

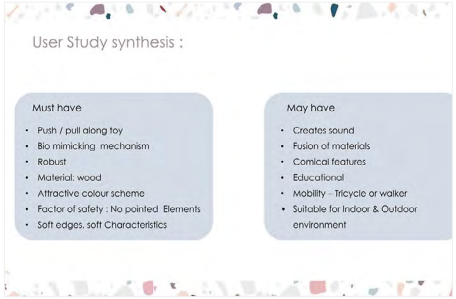

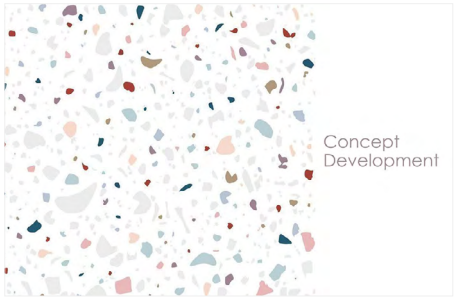

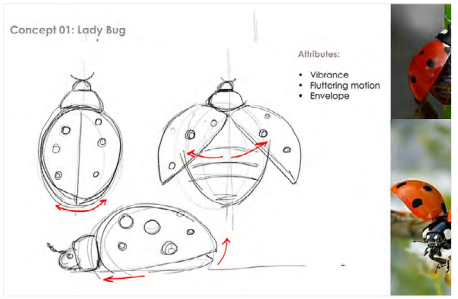

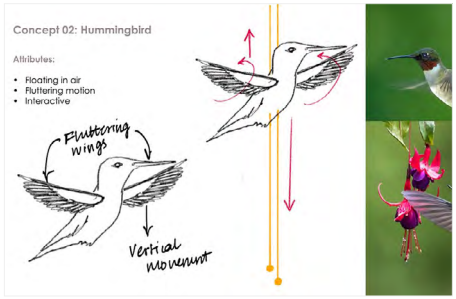

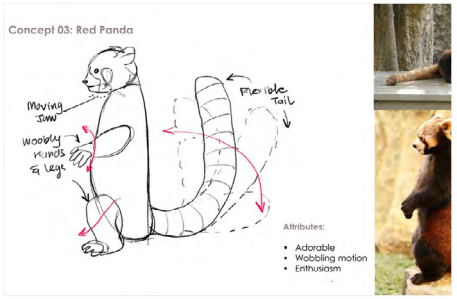

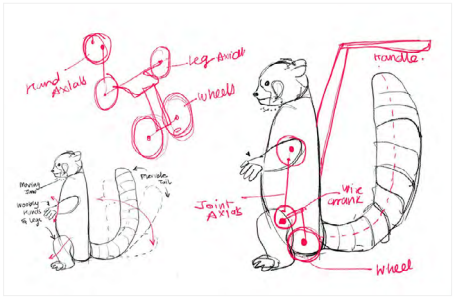

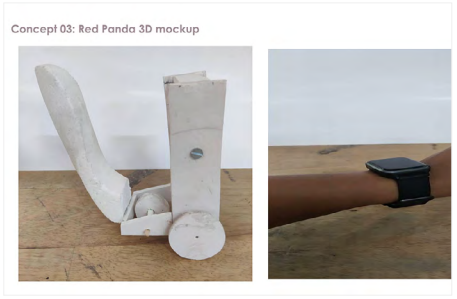

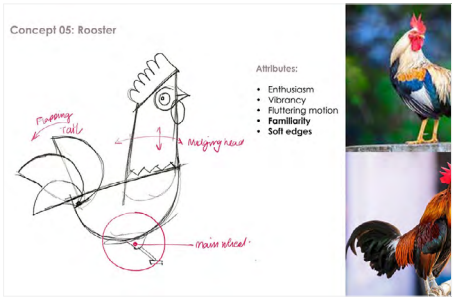

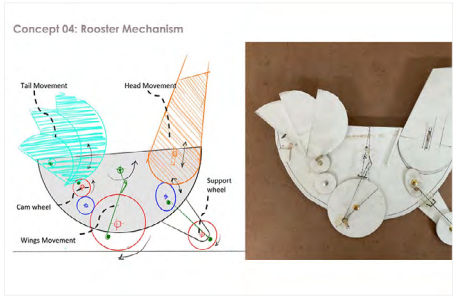

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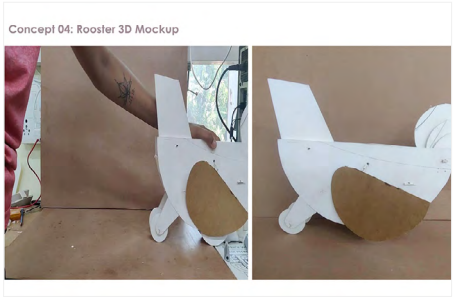

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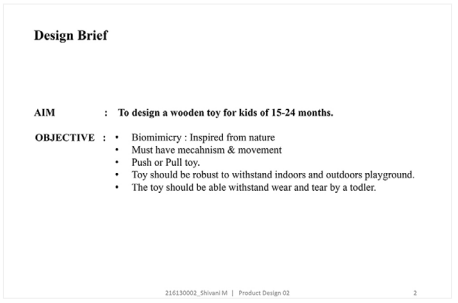
Case Study - Slide Show

Case Study Download:

• Muro_by Shivani M.....


Design Brief

AIM : To design a wooden toy for kids of 15-24 months.

OBJECTIVE :
- Biomimicry : Inspired from nature
- Must have mecahnism & movement
- Push or Pull toy.
- Toy should be robust to withstand indoors and outdoors playground.
- The toy should be able withstand wear and tear by a todler.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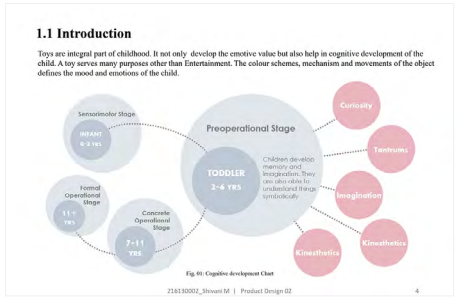
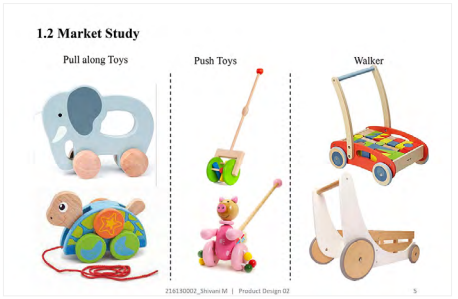

1.1 Introduction

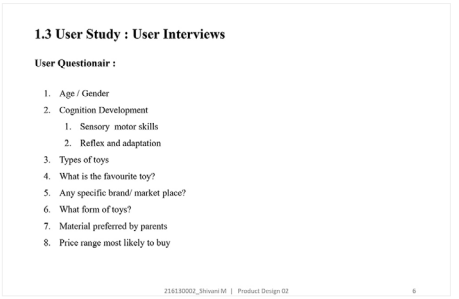
Toys are integral part of childhood. It not only develop the emotive value but also help in cognitive development of the child. A toy serves many purposes other than Entertainment. The colour schemes, mechanism and movements of the object defines the mood and emotions of the child.

Sensorimotor Stage
INFANT 0-2 YRS
Preoperational Stage
TODDLER 2-6 YRS
Children develop memory and imagination. They are also able to understand things symbolically.
Curiosity
Tantrums
Imagination
Kinesthetics
Formal Operational Stage
11+ YRS
Concrete Operational Stage
7-11 YRS
Kinesthetics

Fig. 01: Cognitive development Chart

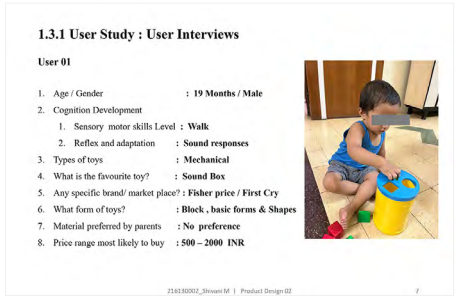

1.2 Market Study

Pull along Toys | Push Toys | Walker


1.3 User Study : User Interviews

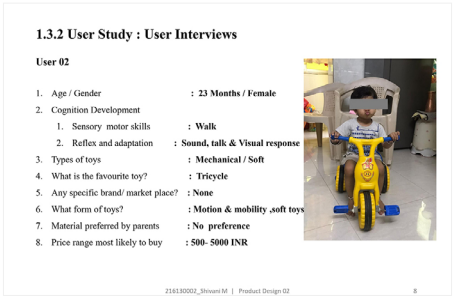
User Questionair :

1. Age / Gender
2. Cognition Development
   1. Sensory motor skills
   2. Reflex and adaptation
3. Types of toys
4. What is the favourite toy?
5. Any specific brand/ market place?
6. What form of toys?
7. Material preferred by parents
8. Price range most likely to buy


1.3.1 User Study : User Interviews

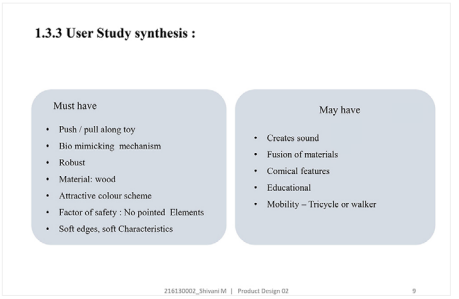
User 01

1. Age / Gender	: 19 Months / Male
2. Cognition Development	
1. Sensory motor skills Level	: Walk
2. Reflex and adaptation	: Sound responses
3. Types of toys	: Mechanical
4. What is the favourite toy?	: Sound Box
5. Any specific brand/ market place?	: Fisher price / First Cry
6. What form of toys?	: Block , basic forms & Shapes
7. Material preferred by parents	: No preference
8. Price range most likely to buy	: 500 – 2000 INR


1.3.2 User Study : User Interviews

User 02

1. Age / Gender	: 23 Months / Female
2. Cognition Development	
1. Sensory motor skills	: Walk
2. Reflex and adaptation	: Sound, talk & Visual response
3. Types of toys	: Mechanical / Soft
4. What is the favourite toy?	: Tricycle
5. Any specific brand/ market place?	: None
6. What form of toys?	: Motion & mobility ,soft toys
7. Material preferred by parents	: No preference
8. Price range most likely to buy	: 500- 5000 INR


1.3.3 User Study synthesis :

Must have
- Push / pull along toy
- Bio mimicking mechanism
- Robust
- Material: wood
- Attractive colour scheme
- Factor of safety : No pointed Elements
- Soft edges, soft Characteristics

May have
- Creates sound
- Fusion of materials
- Comical features
- Educational
- Mobility – Tricycle or walker

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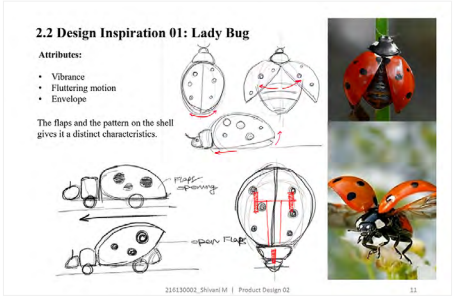

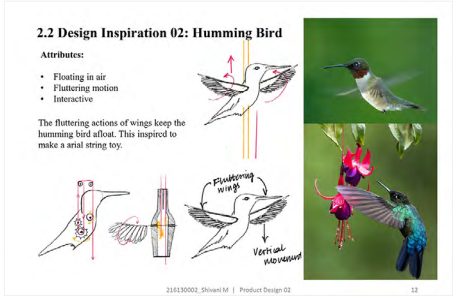

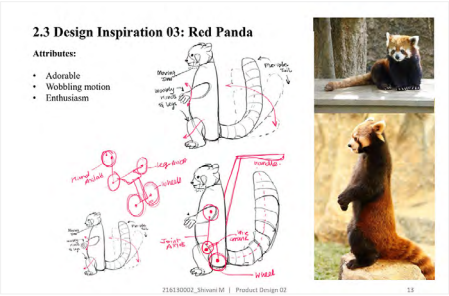

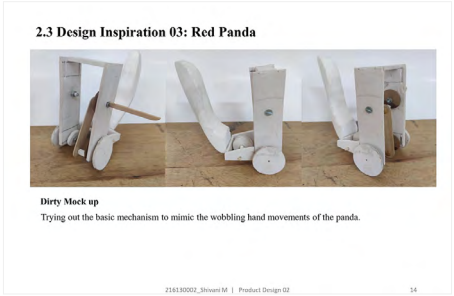

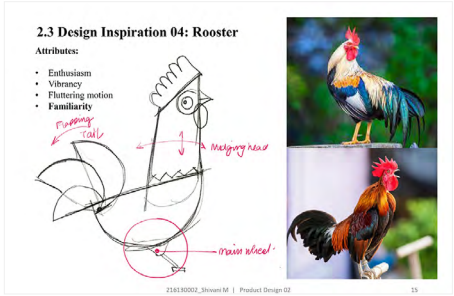

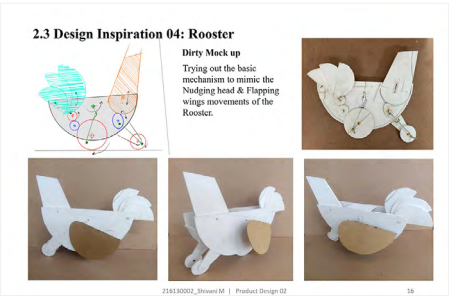

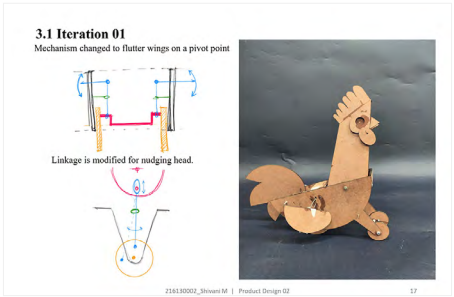

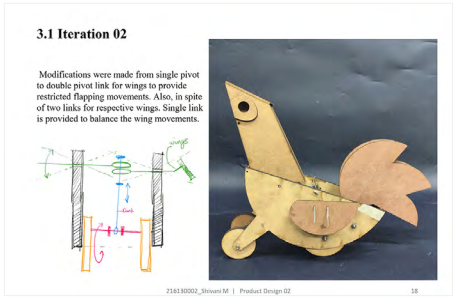

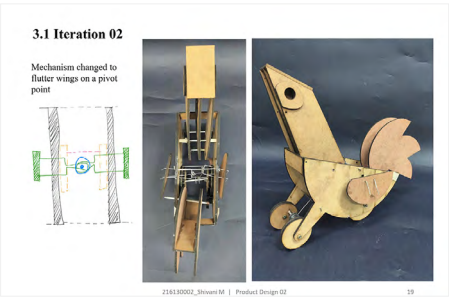

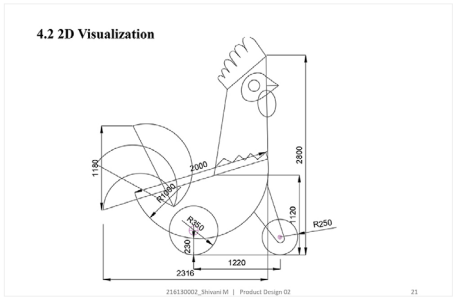

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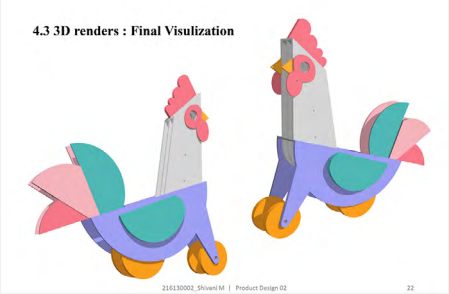

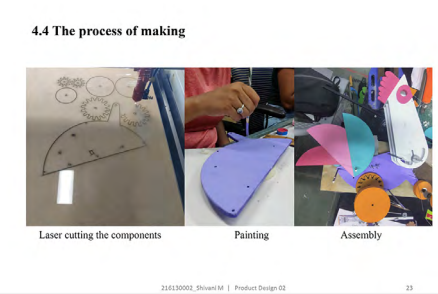

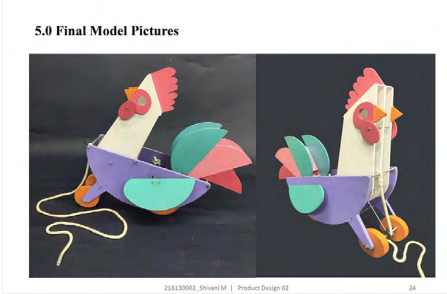

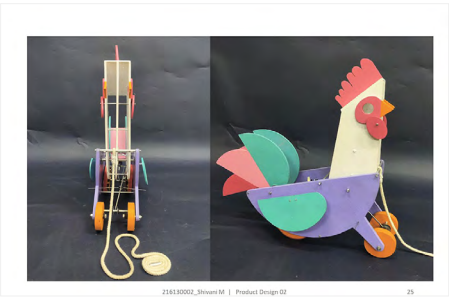

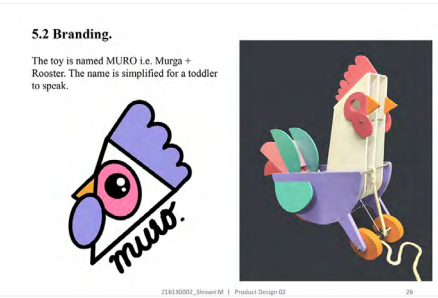

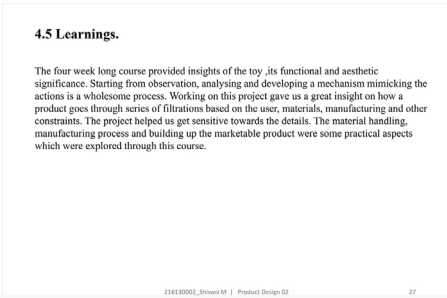

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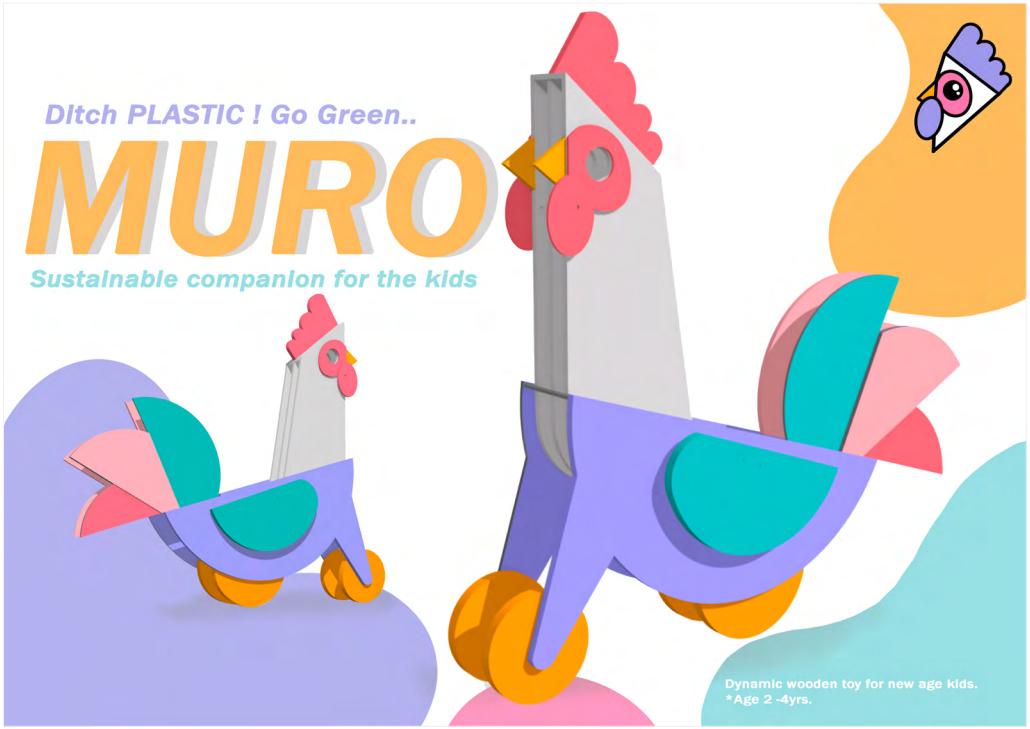

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Prof. Vijay Bapat
IDC, IIT Bombay

Source:
https://dsource.in/course/indian-toy-design/students-presentations/push-toy-group/cunth-snehal-gaikwad

Cunth by Snehal Gaikwad

Children of the age group of 15-24 months have just learned to walk and constantly try to explore the world and seek adventure. They can differentiate shapes, colour textures, sounds etc. Round shapes, bright colours, unique textures and sounds catch their attention. In Indian culture, children are being fed by stories from Panchatantra, Isapniti, etc, so they develop a fascination with different animals. To secure the child's mental and physical development, the curious mind of children needs to be constantly fed by new experiences.

What children of this age group love to do?

- Explore material in many creative ways
- Make discoveries for themselves
- Play out imaginative scenarios from their daily lives

Stage 1 Presentation

Case Study - Slide Show

Poster

Video

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Stage 1 Presentation

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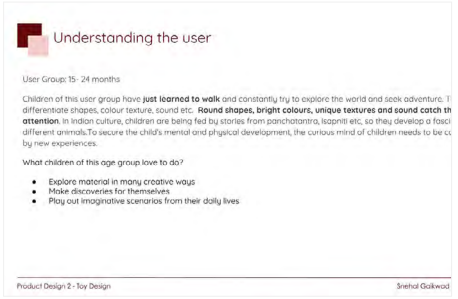
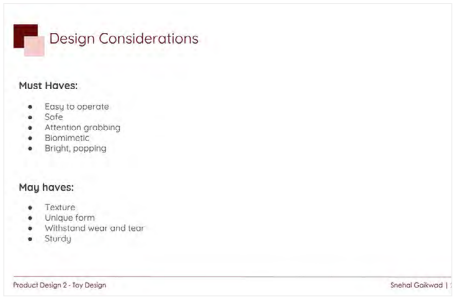
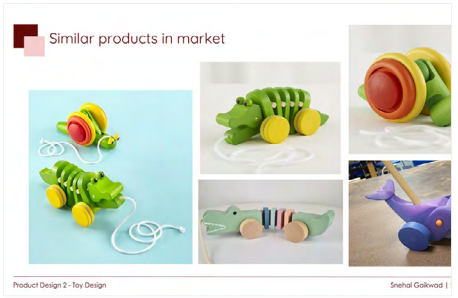
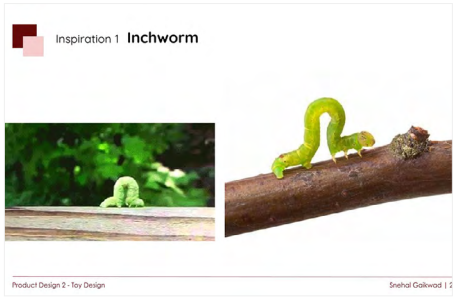
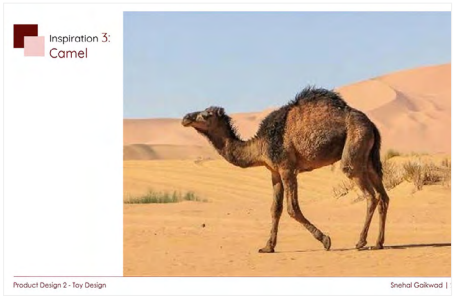
• Cunth_Stage 1 Presentation_by Snehal Gaikwad.....

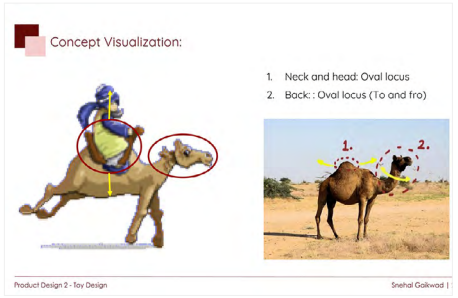












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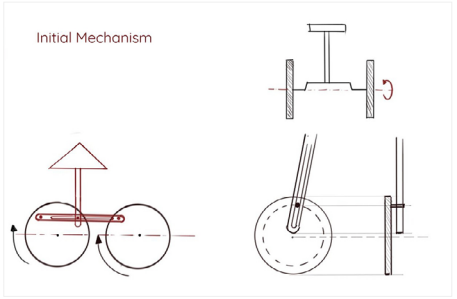

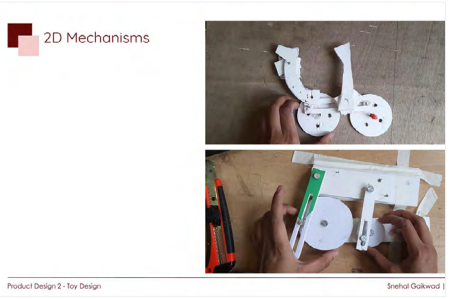

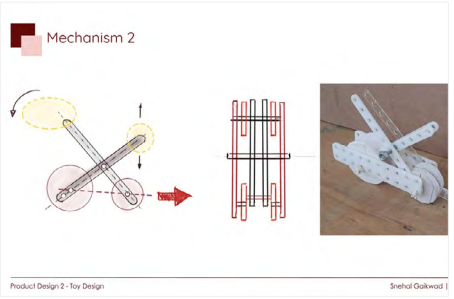

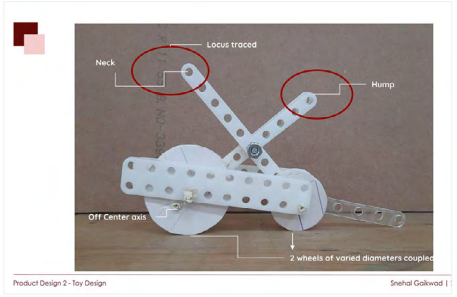

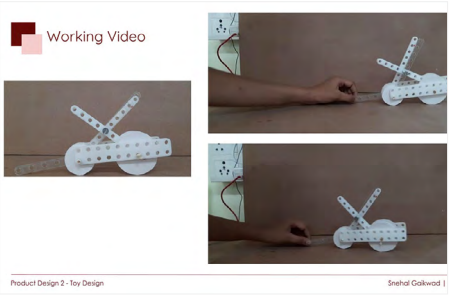

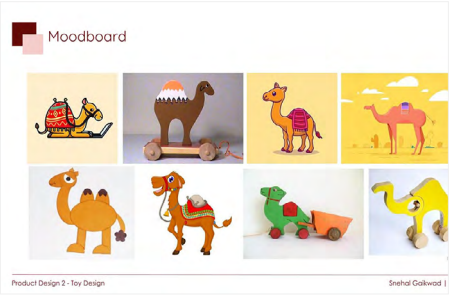

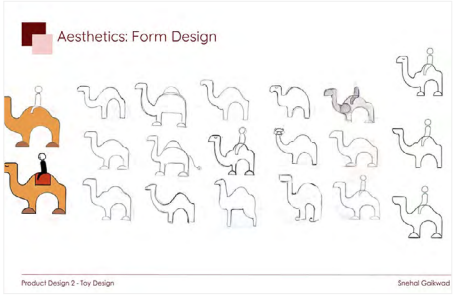

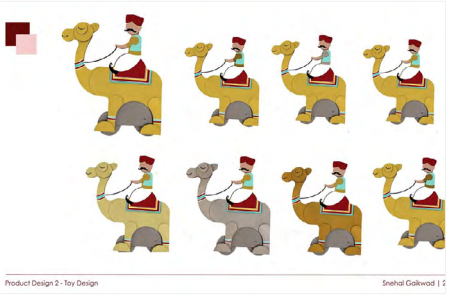

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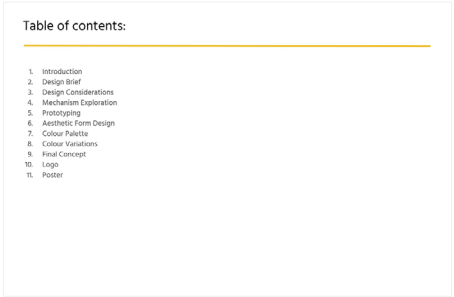
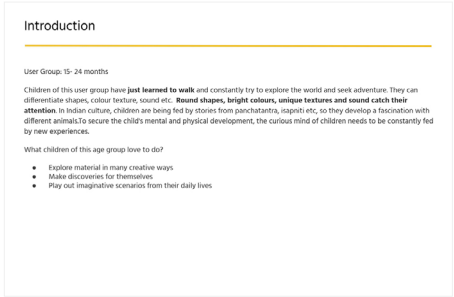
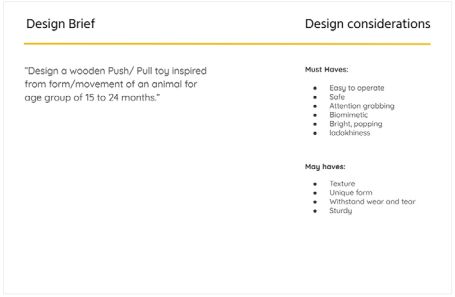
Case Study - Slide Show

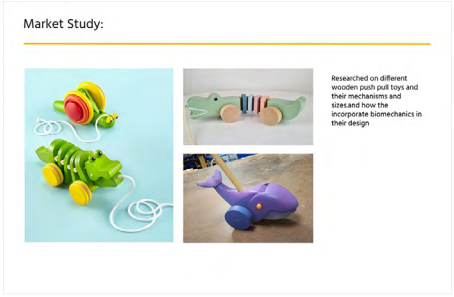
Case Study Download:

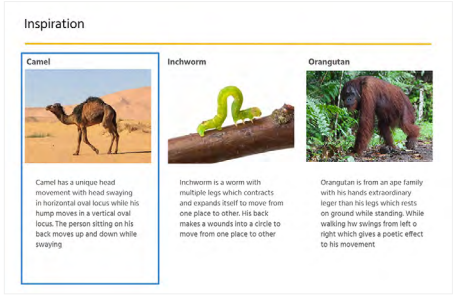
• Cunth_by Snehal Gaikwad.....

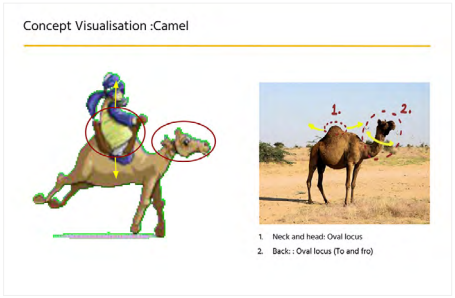


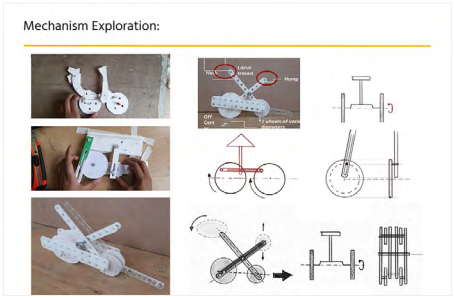


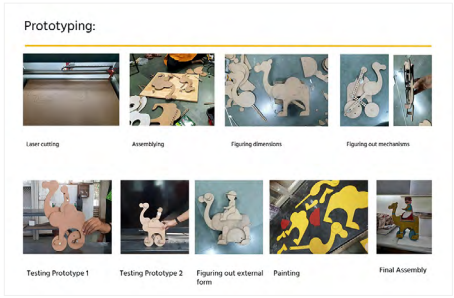












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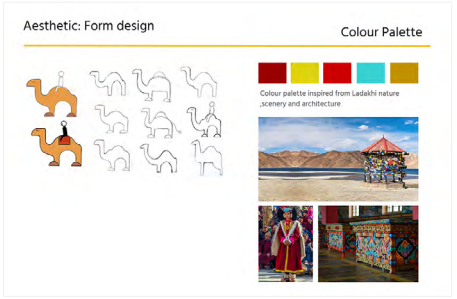

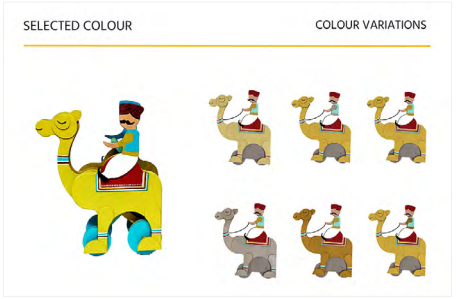

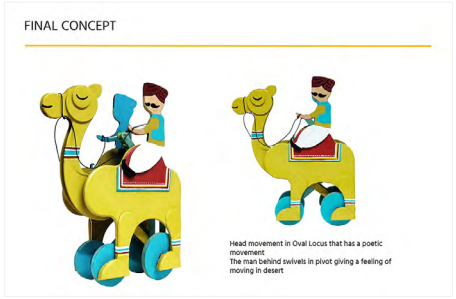

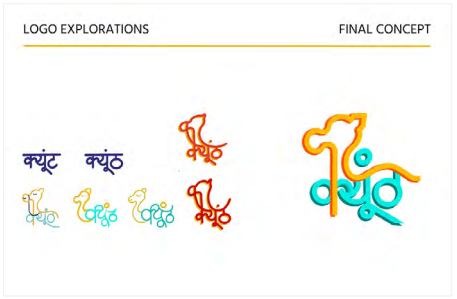

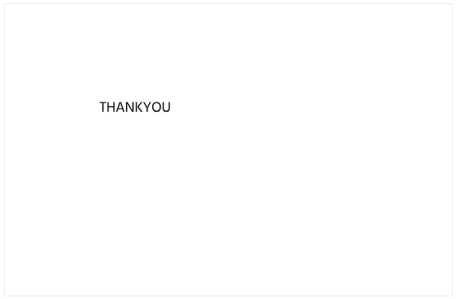

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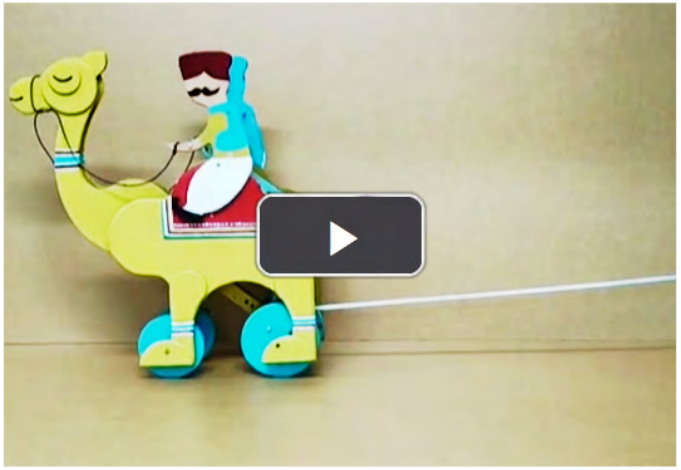
Video

Cunth by Snehal Gaikwad



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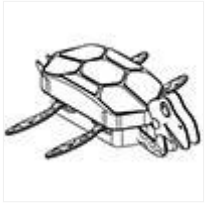
Taco by Susovan Gupta

This project was done under Prof Vijay Bapat as a semester course named Product Design 2 where we had to design a toy for toddlers of the age from 15 months to 24 months. The inspiration for the toy has to come from an animal of our surroundings and a sense of biomimicry has to be given in order to study and appreciate the amazing natural creation by God. We, in search of God, found in details as our sir helped us to see. In this exercise, we had to come up with 3 ideas and then select one to go forward with. Had to develop dirty mock-ups to come up with simpler mechanism options.



Case Study - Slide Show

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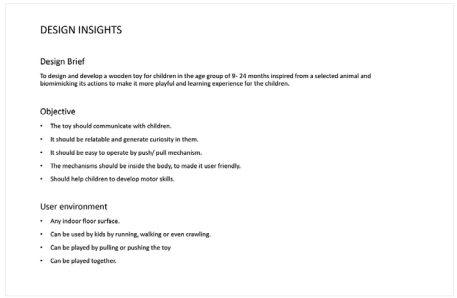

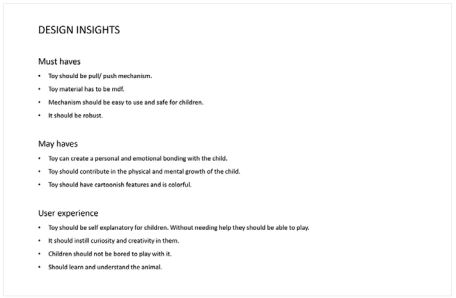

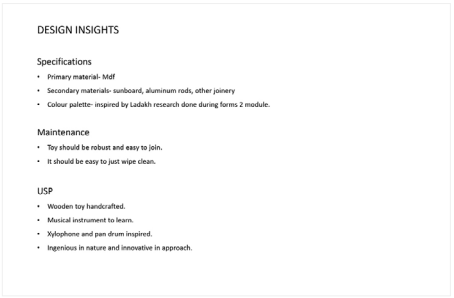

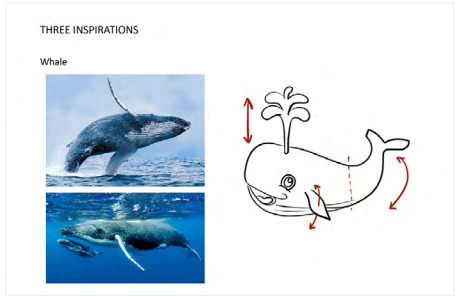

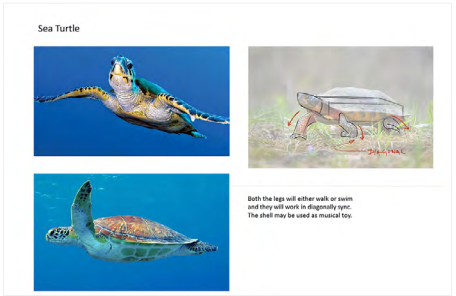

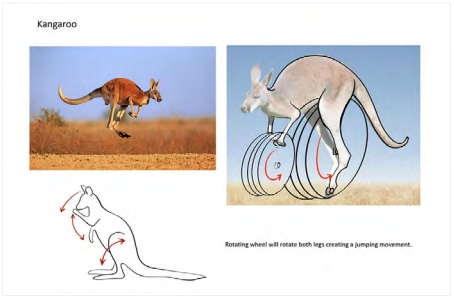

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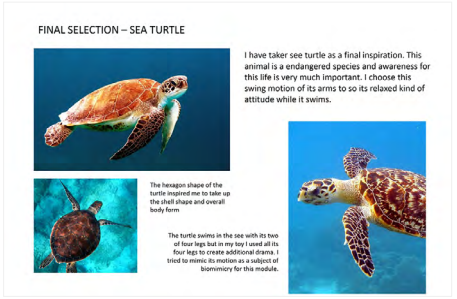

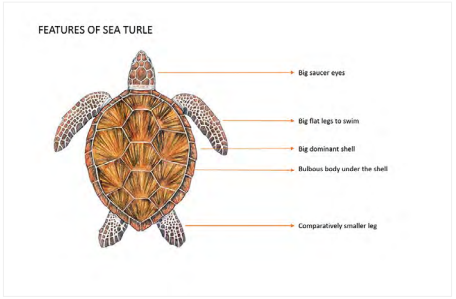

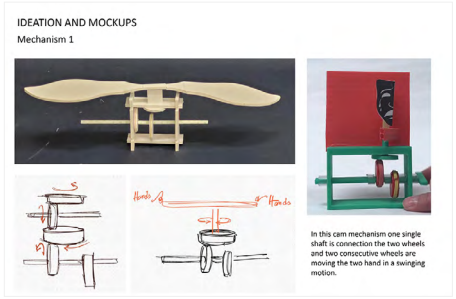

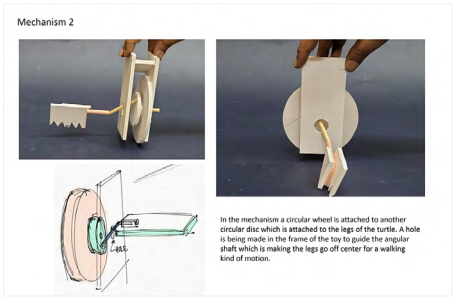

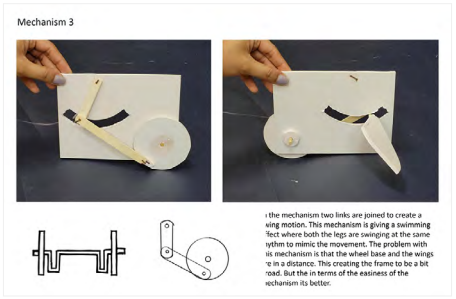

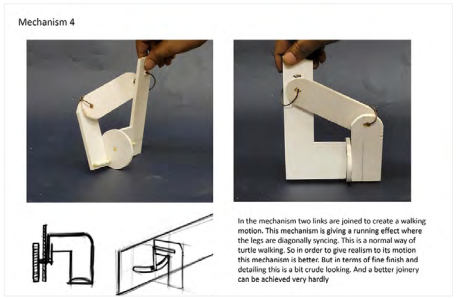

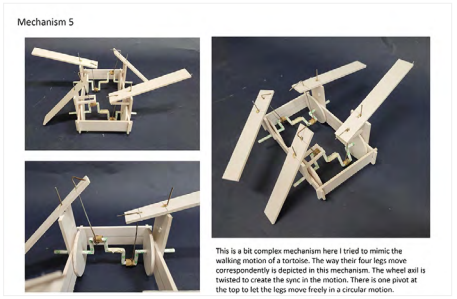

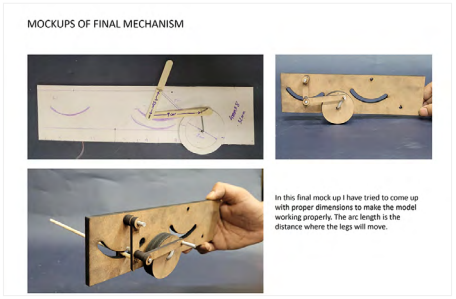

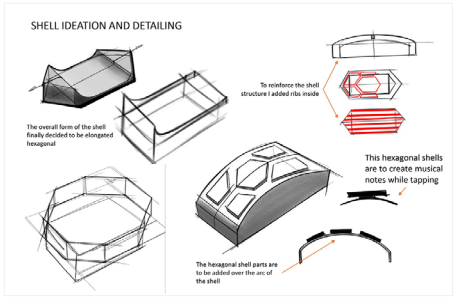

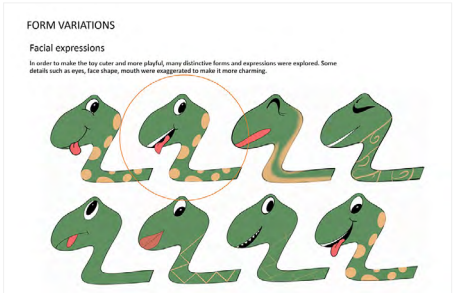

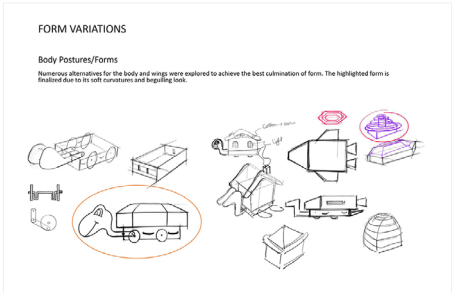

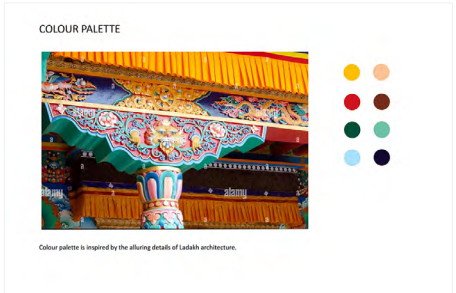

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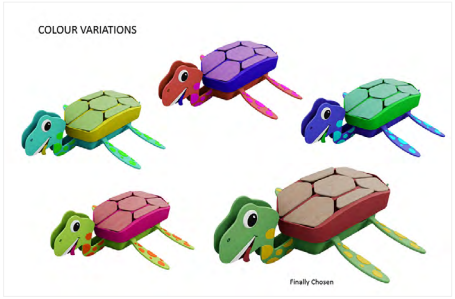

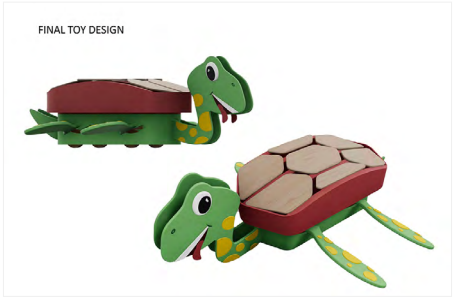

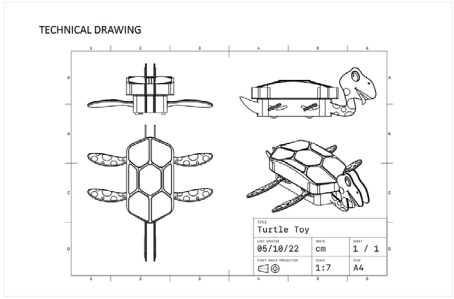

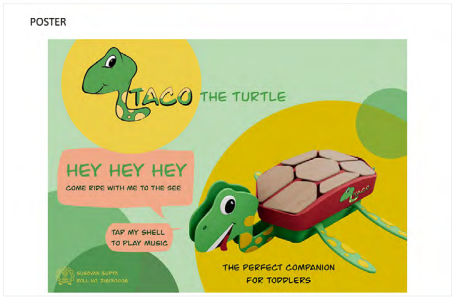

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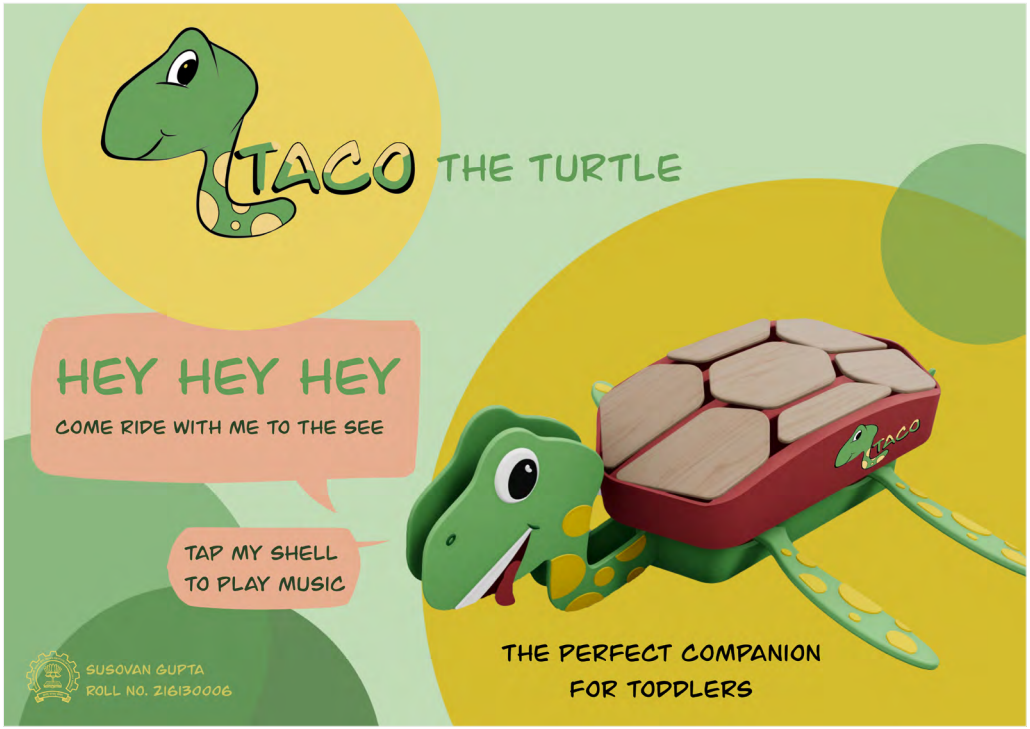

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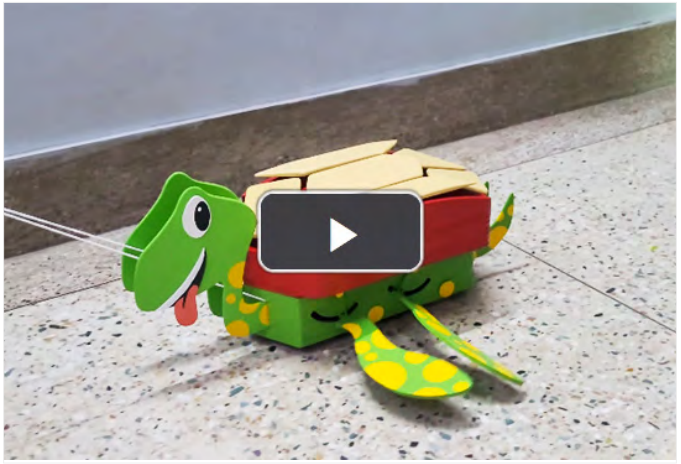
https://dsource.in/course/indian-toy-design/students-presentations/push-toy-group/taco-susovan-gupta/video

Video

Taco by Susovan Gupta



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Source:
https://dsource.in/course/indian-toy-design/students-presentations/push-toy-group/hooti-uppili-nithin-soorya-b

Hooti by Uppili Nithin Soorya B

Design a wooden toy for kids of the age group 9-24 months

Constraints
- Material of the toy should be wood.
- It should be a Push or pull toy.
- The toy should mimic the biomechanical movements.
- It should have attractive colors.

Stage 1 Presentation

Case Study - Slide Show

Poster

Video

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Stage 1 Presentation

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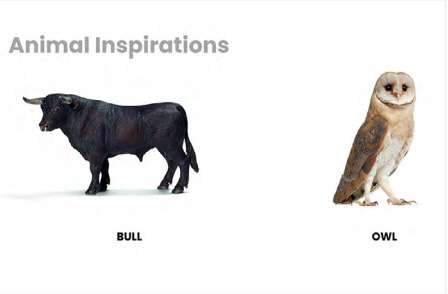
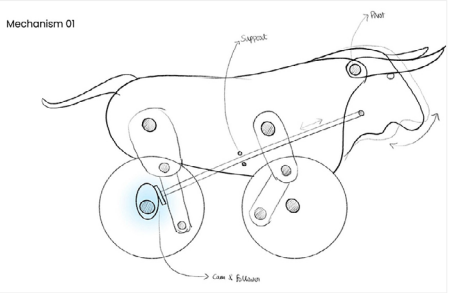
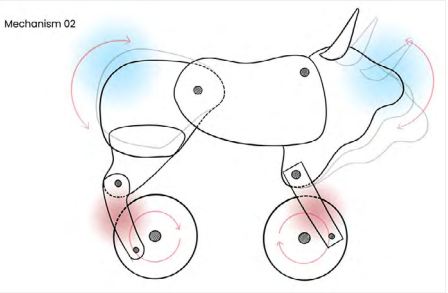
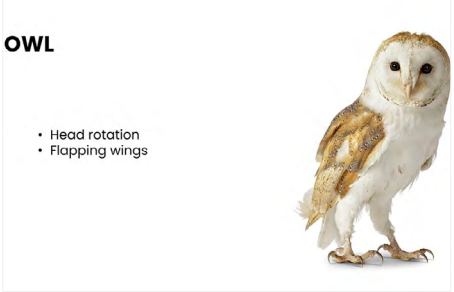
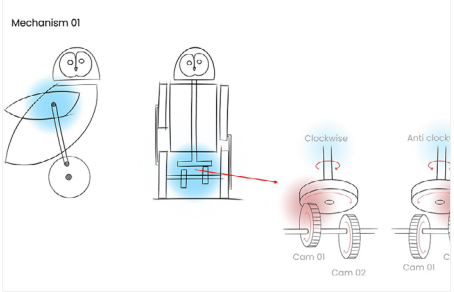
• Hooti_Stage 1 Presentation_by Uppili Nithin Soorya B.....

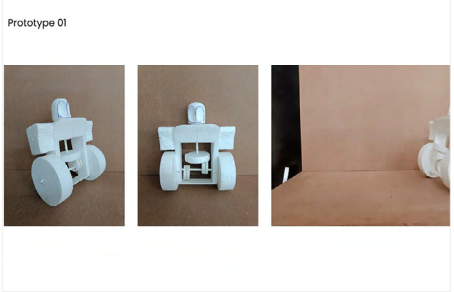












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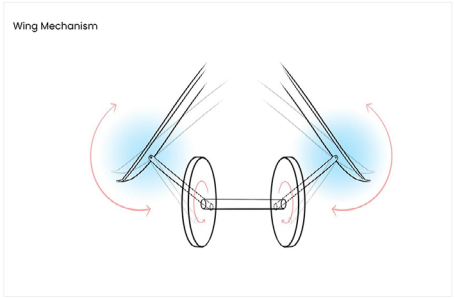

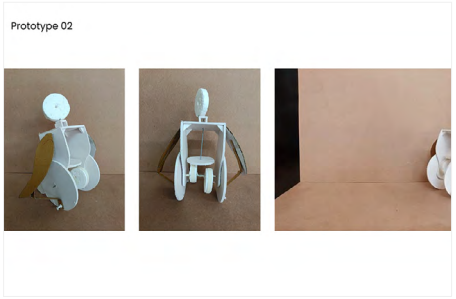

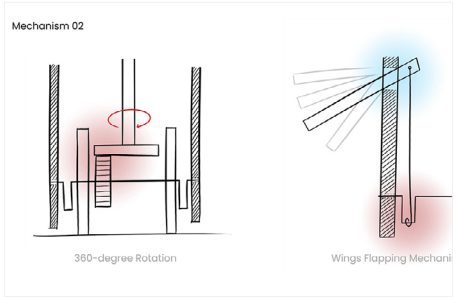

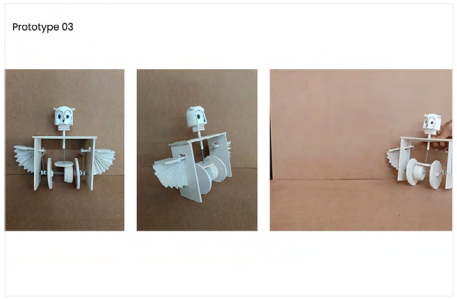

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Source:
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Case Study - Slide Show

Case Study Download:

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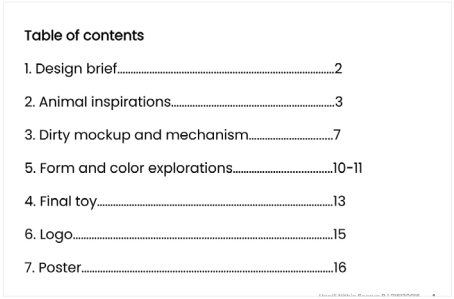

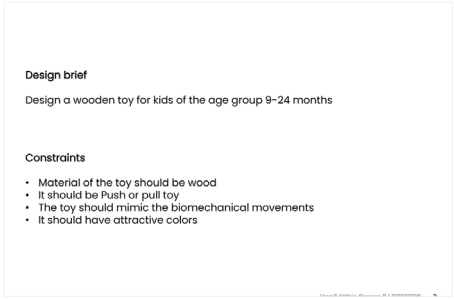

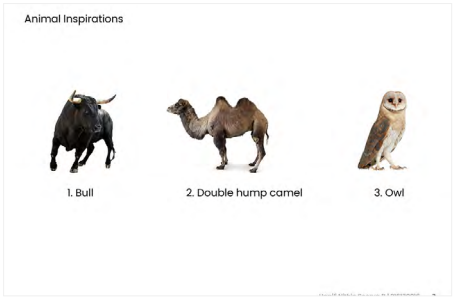

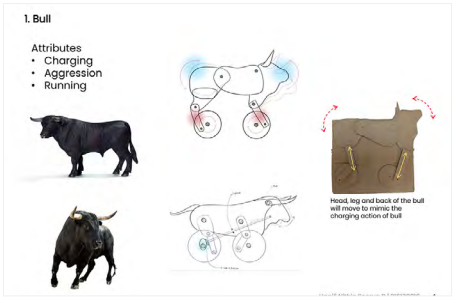

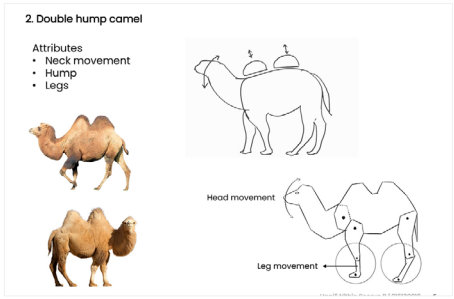

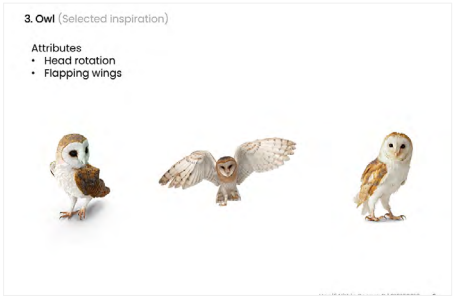

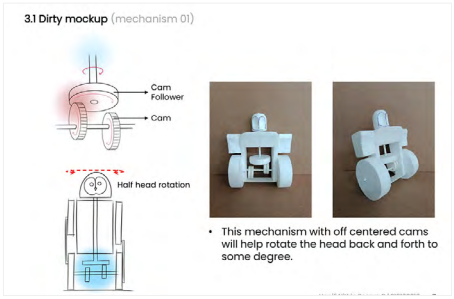

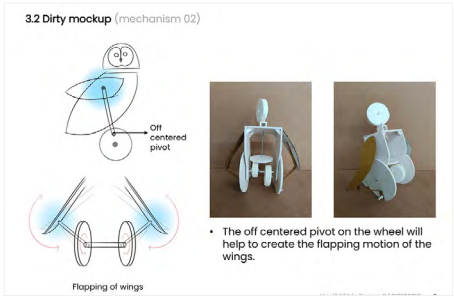

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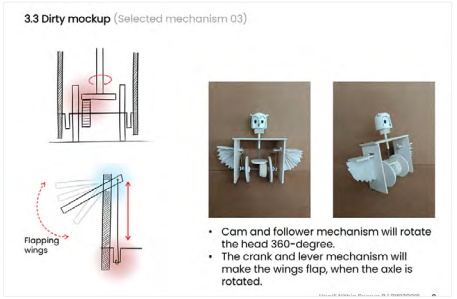

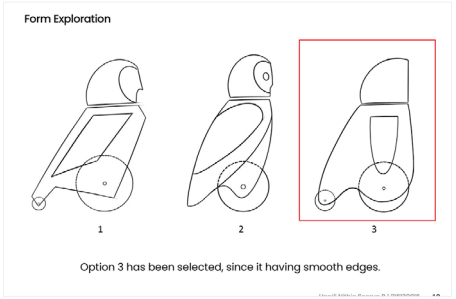

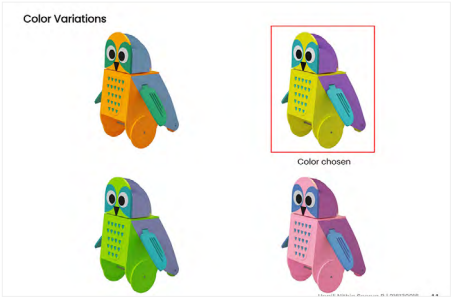

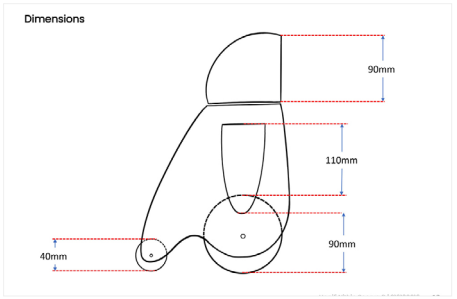

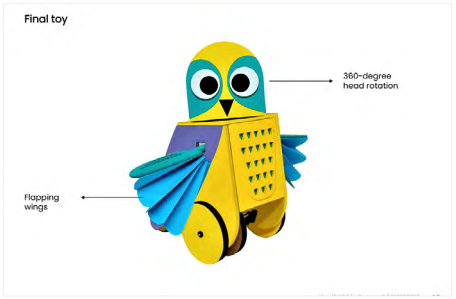

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Video

Hooti by Uppili Nithin Soorya B

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Source:
https://dsource.in/course/indian-toy-design/students-presentations/push-toy-group/piku-vaibhav-watile

Piku by Vaibhav Watile

To design a wooden push/pull type toy for the children of age group 9-15 months

Constraints
- Material used should be wood.
- The toy should not have any sharp elements.
- The mechanism should be such that it mimics the actions of the choosen animals.
- Color theme should reflect the Ladakhiness.

Stage 1 Presentation

Case Study - Slide Show

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Stage 1 Presentation

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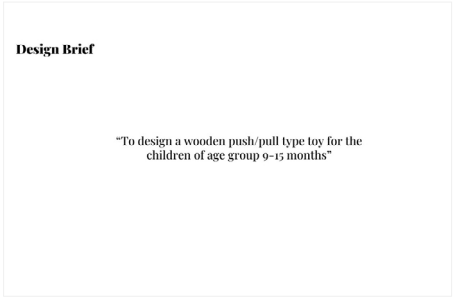
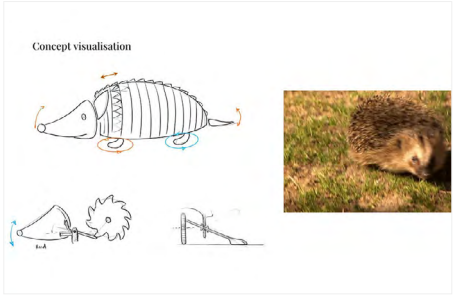
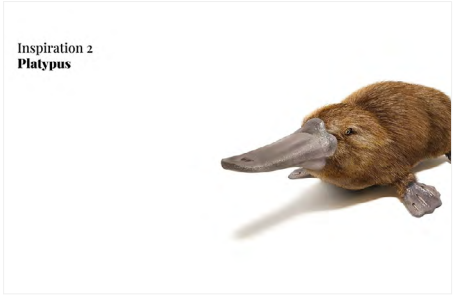
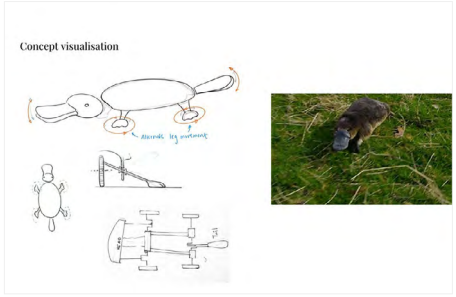
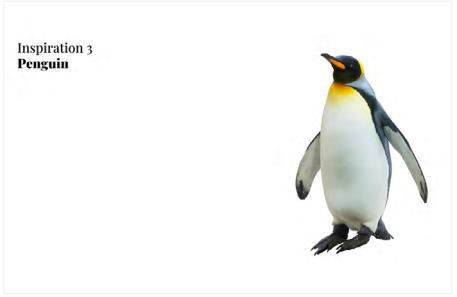
- Piku_Stage 1 Presentation_by Vaibhav Watile.....

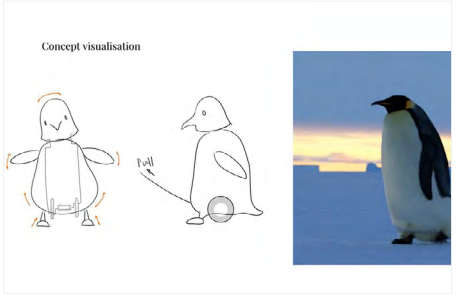


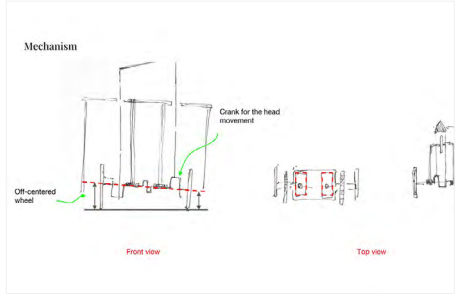












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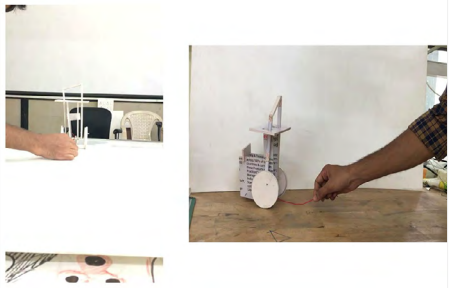

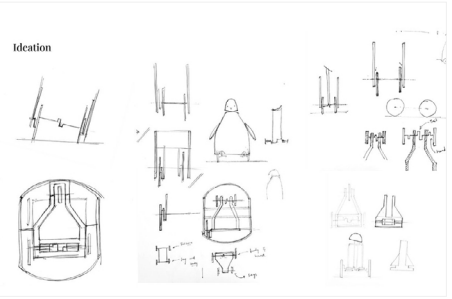

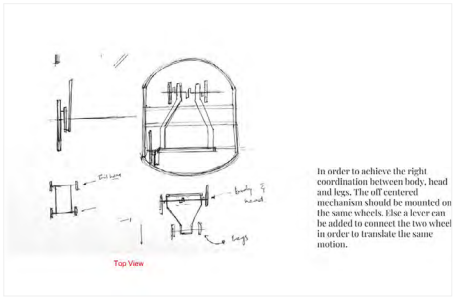

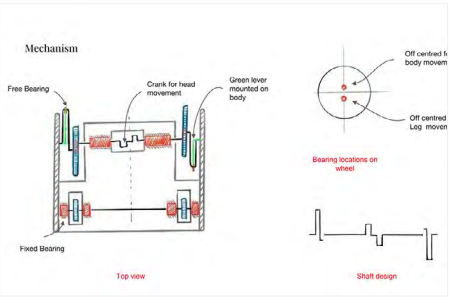

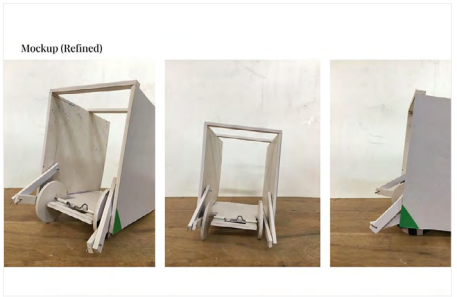

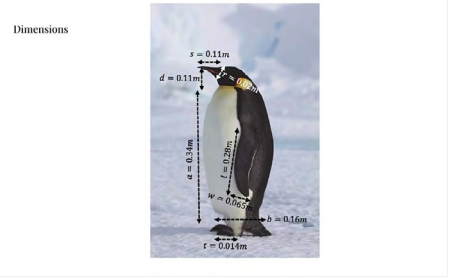

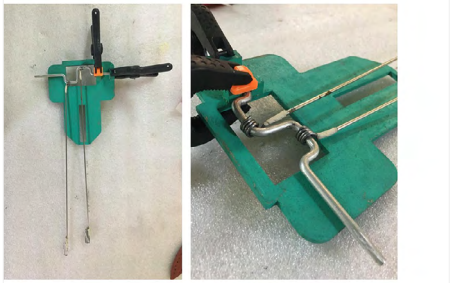

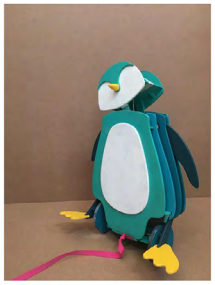

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Case Study - Slide Show

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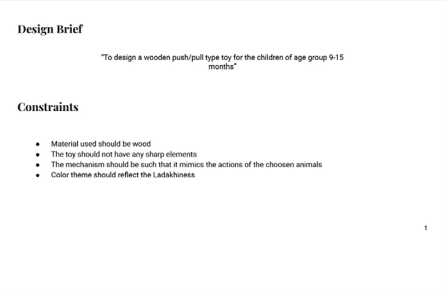

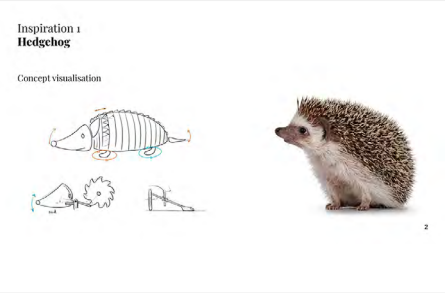

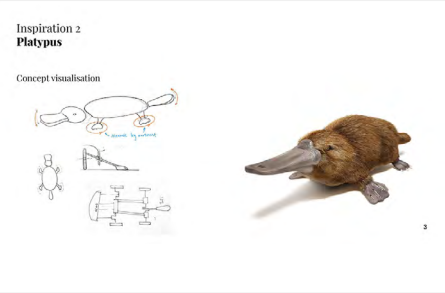

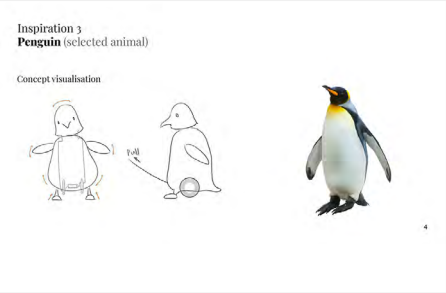

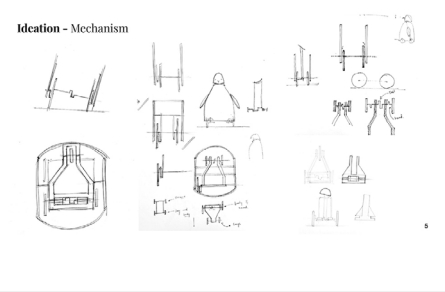

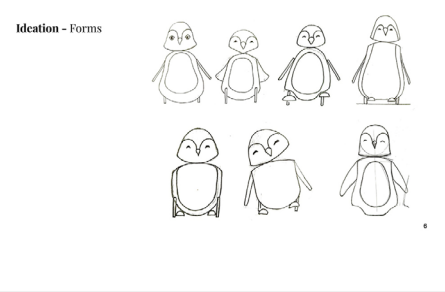

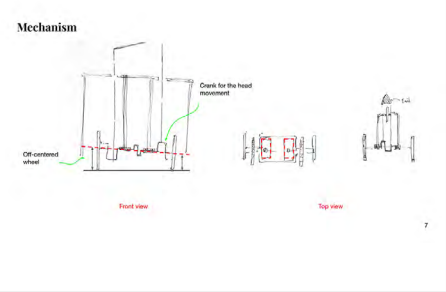

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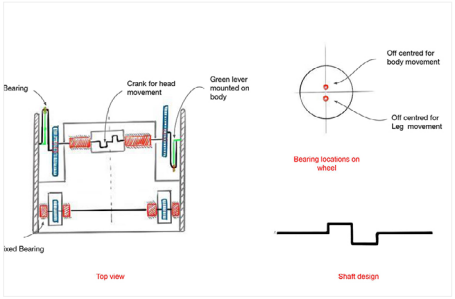

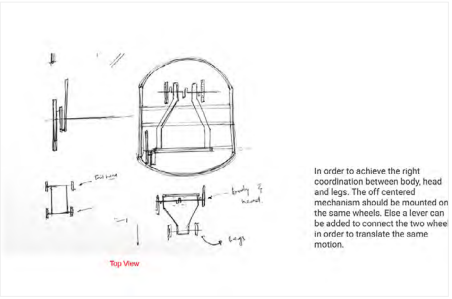

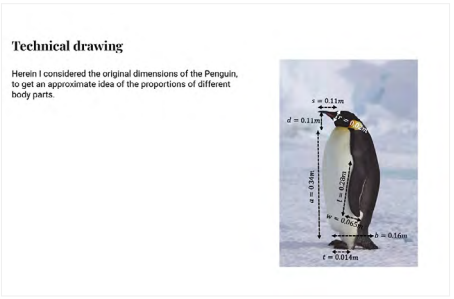

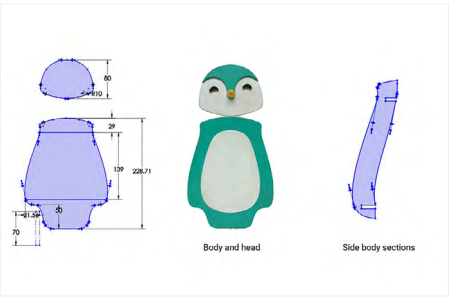

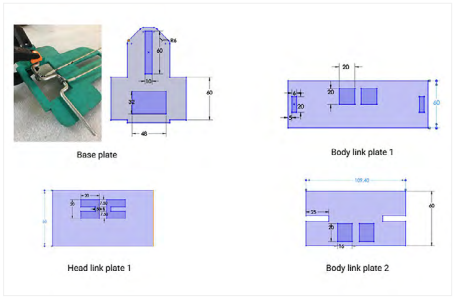

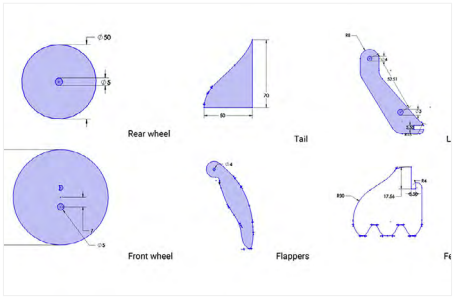

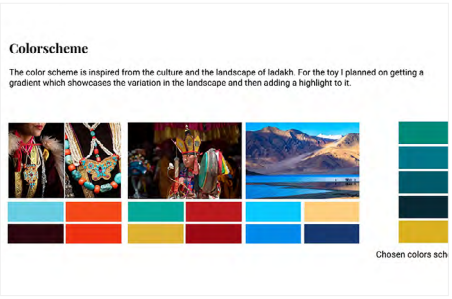

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Ride-on Toy - Group B

The exercise was assigned as part of the Product Design Module during the second semester of the Junior M. Des. Industrial Design course at IDC, IIT Bombay, under the guidance of Prof. Vijay Bapat. The class of 14 students was split into two groups of 7 each. Group A was tasked with designing a push toy for 9-15-month-olds, while Group B was tasked with designing a ride-on toy for 6-12-year-olds. Group A had the additional constraint of using only wood or processed wood as their material. The duration of the module was three weeks.

Group B choose to design ride-on toy. Design Insights followed by Group B.....

Blaze by Apurba Mondal

Crabuggy by Maddu Shravan Murali

Charger by Saijith MS

Hornsby
by Vinod Louis Joseph Swamy

Bobster by Archana

Teerox by Minu

Arcadia
by Sukanta Maharana

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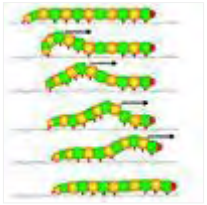
Blaze by Apurba Mondal

Children of all age groups like to play but specifically, children of age groups 6-12 years tend to engage in outdoor activities and use playground equipments such as swings, slides, see-saw, and Monkey bars. The assigned task as part of the Product Design 2 module conducted by Prof. Vijay Bapat was to design a ride-on playground equipment for them that aids in their physical and psychological growth by taking inspiration from Biomimetics and Biomimicry.

The aim of the project is to design playground equipment for children of age group 6-12 years of age for a middle to upper-class settlement. It would be multiplayer equipment with elements of surprise and humor but can also be used by a single user. It must be a ride-on equipment whose movement or/and form emulates an animal or Insect and is in full control of the user. The mechanism involved should be simple for the ease of manufacturing, maintenance and reduction of cost. The usage should be moderately difficult for the cognitive and physical development of the child. There should be an immediate feedback mechanism that aids in instilling confidence in parents as well as the child.


Stage 1 Presentation


Case Study - Slide Show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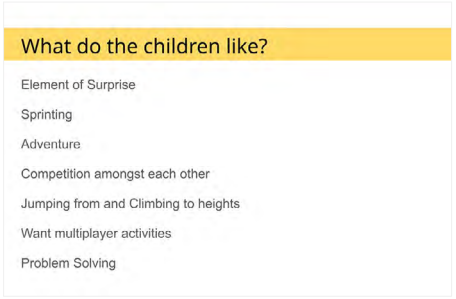

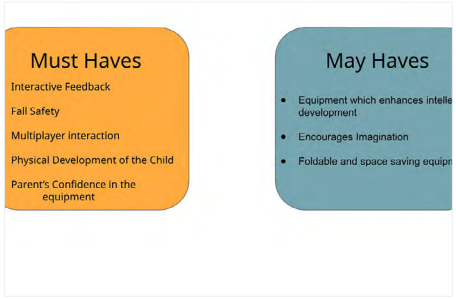

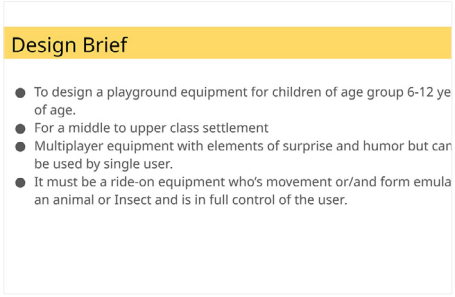

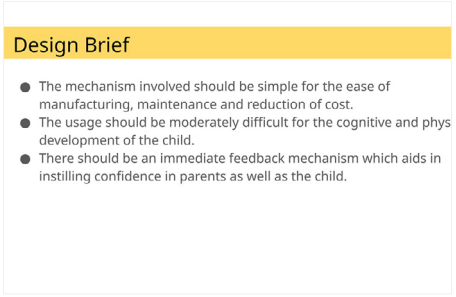

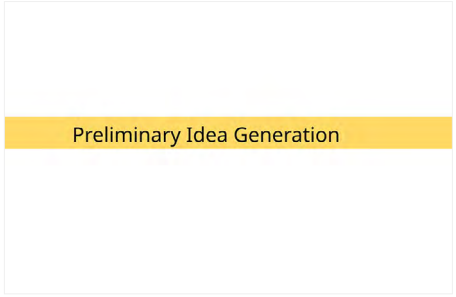

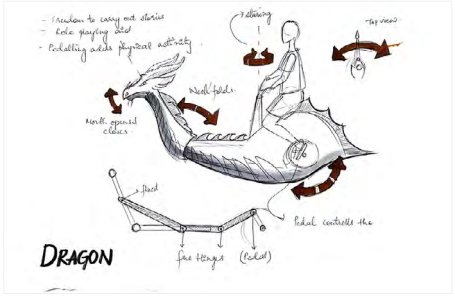

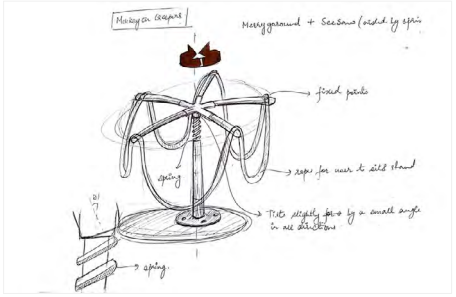

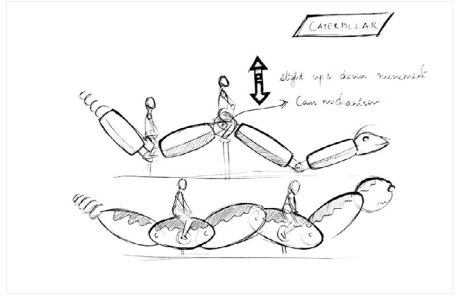

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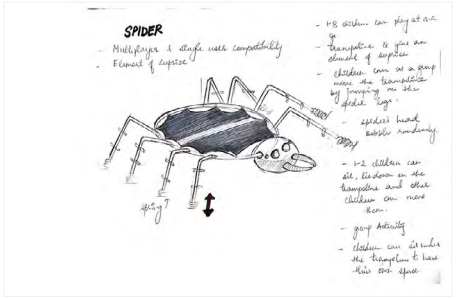

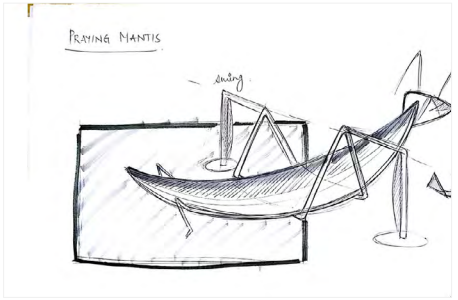

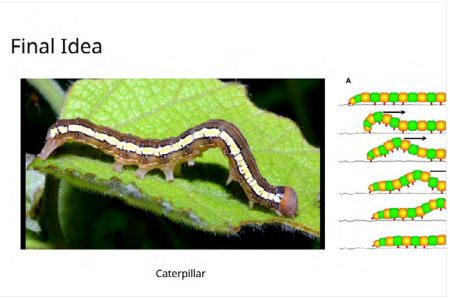

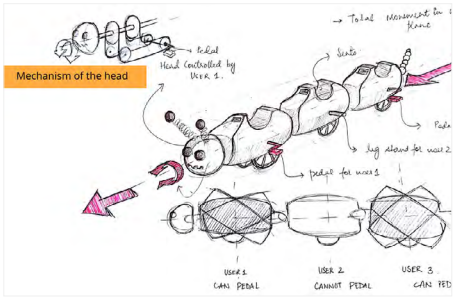

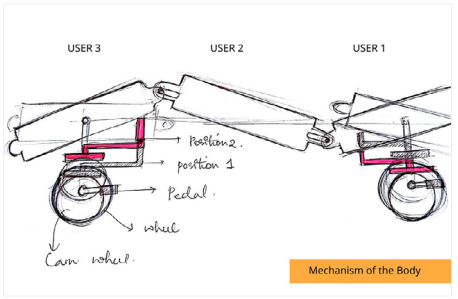

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Case Study - Slide Show

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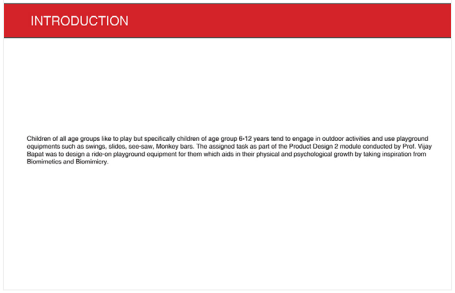

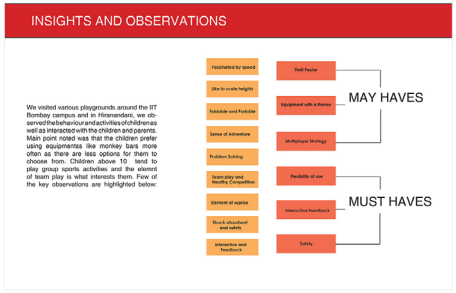

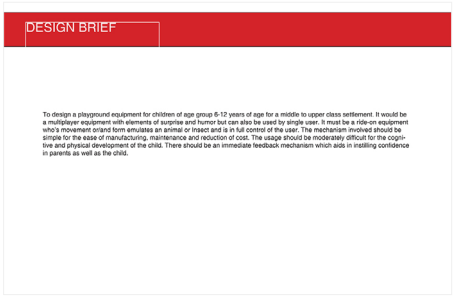

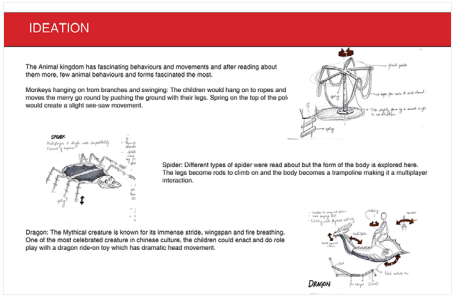

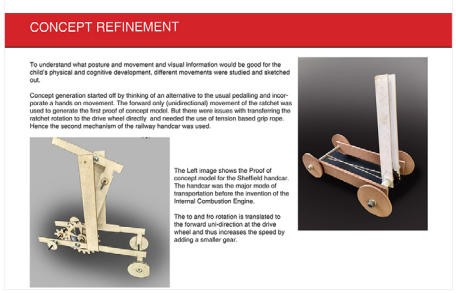

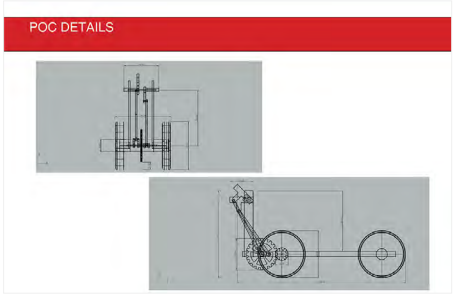

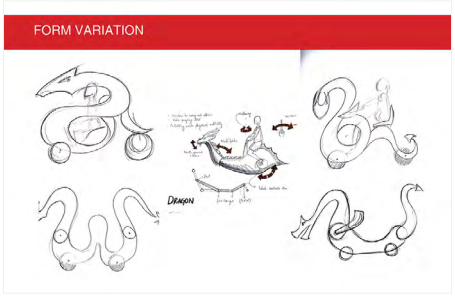

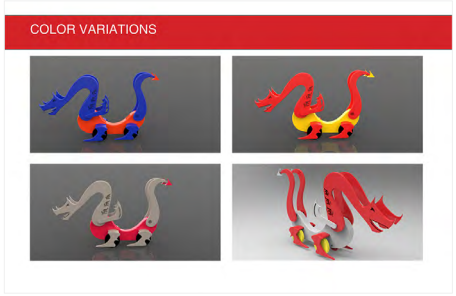

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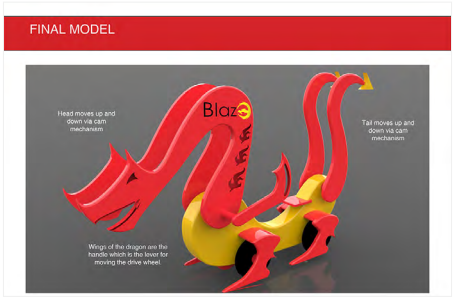

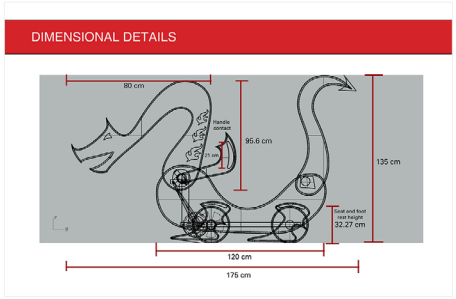

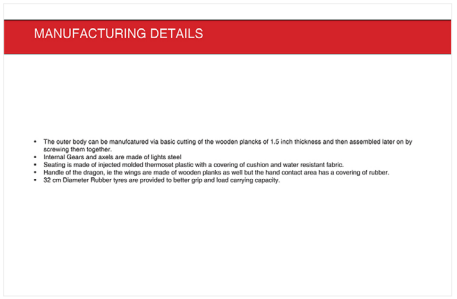

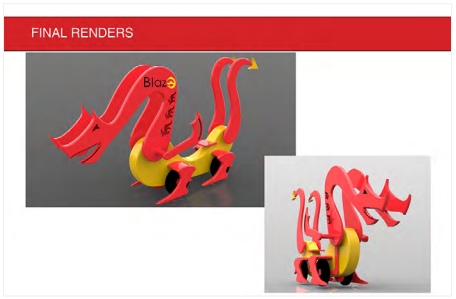

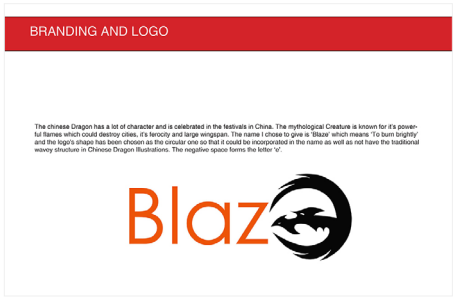

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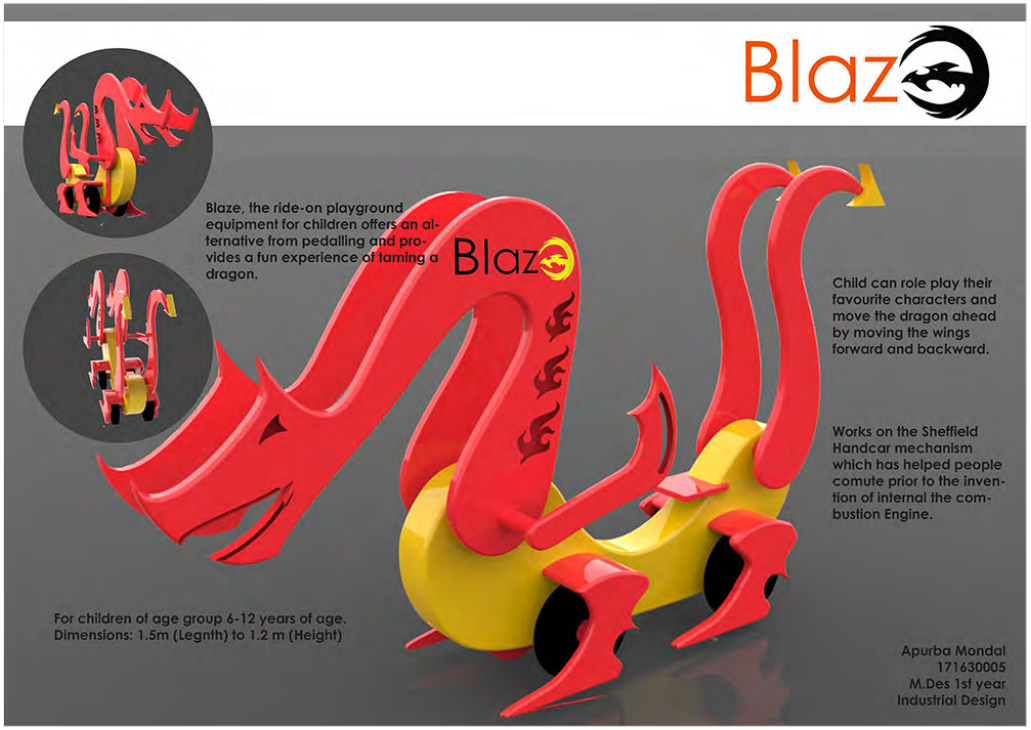

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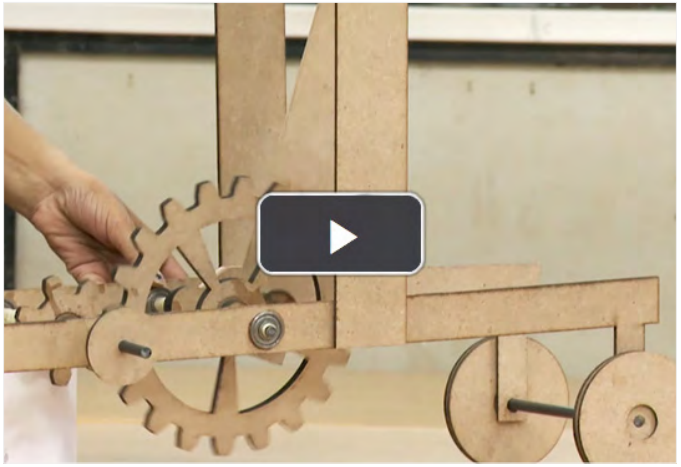
Video

Final Presentation by Apurba Mondal



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Bobster by Archana

The aim of the project is to design an innovative playful ride-on equipment for children of age group 6 – 12 years of age to be used outdoors. The solution should encourage physical and creative development in children while promoting a cohesive play environment.

Stage 1 Presentation

Case Study - Slide Show

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Stage 1 Presentation

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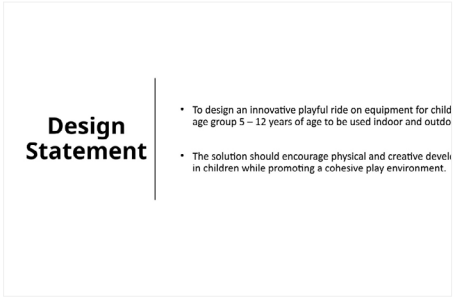

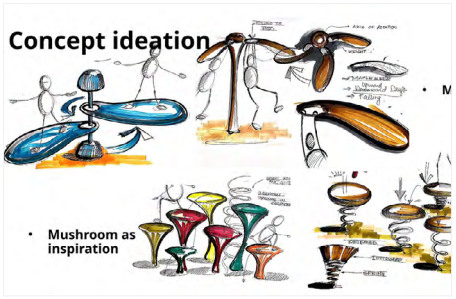

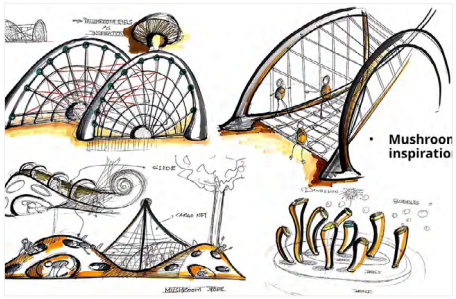

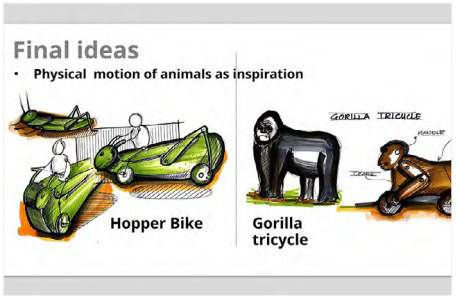

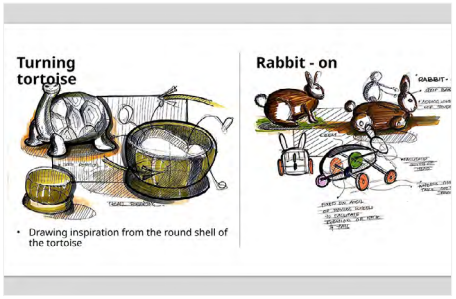

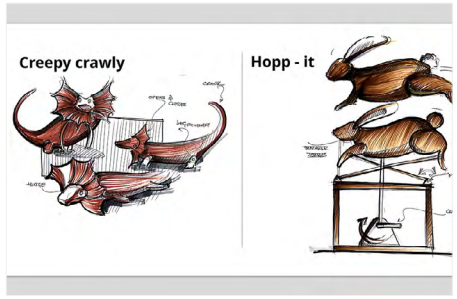

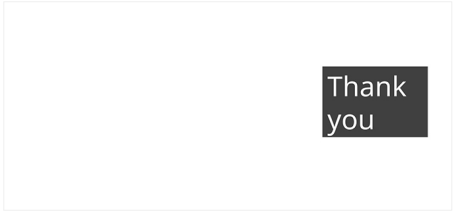

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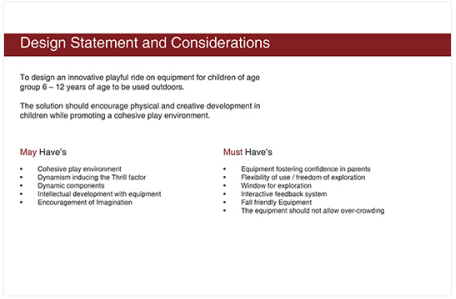

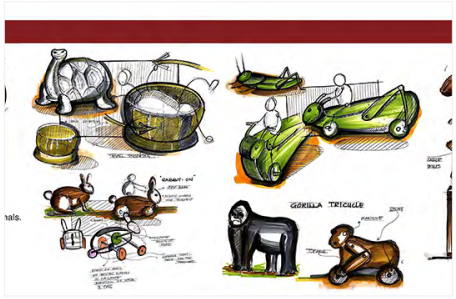

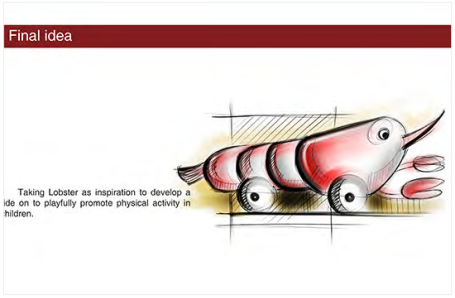

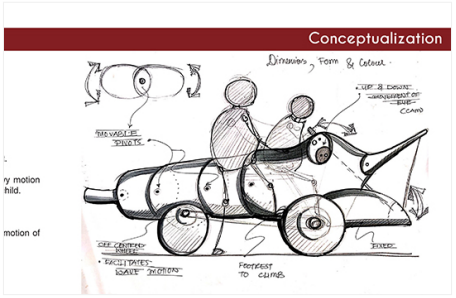

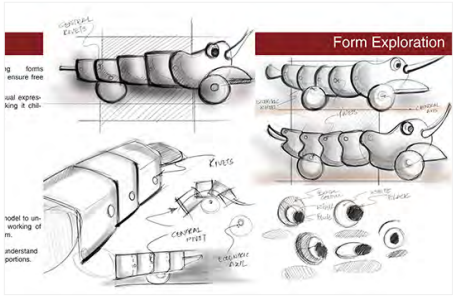

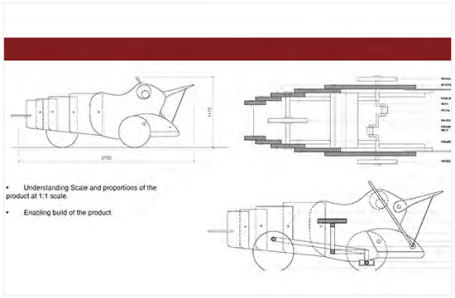

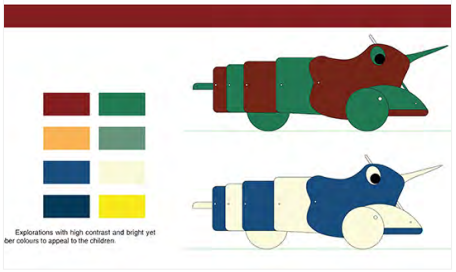

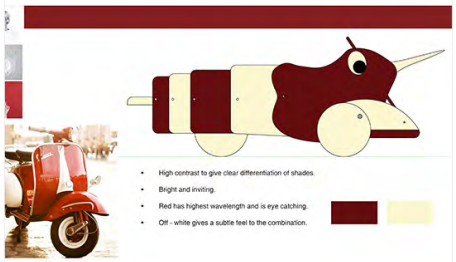

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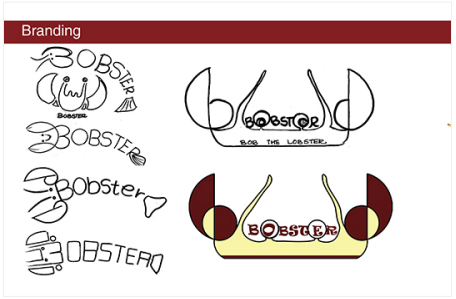

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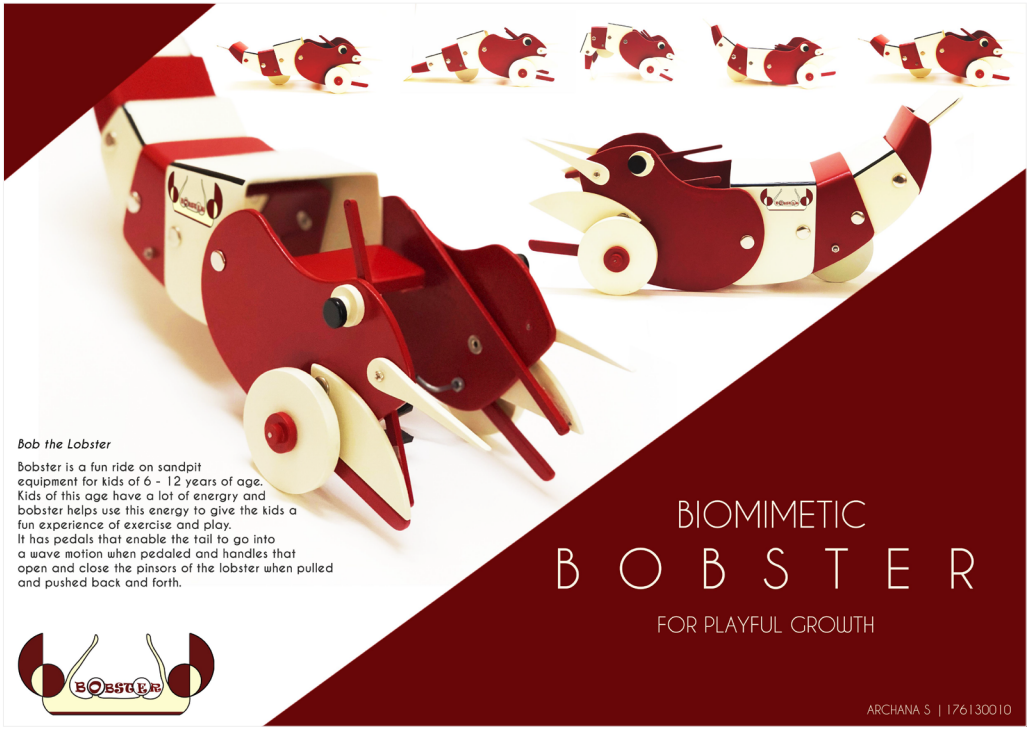

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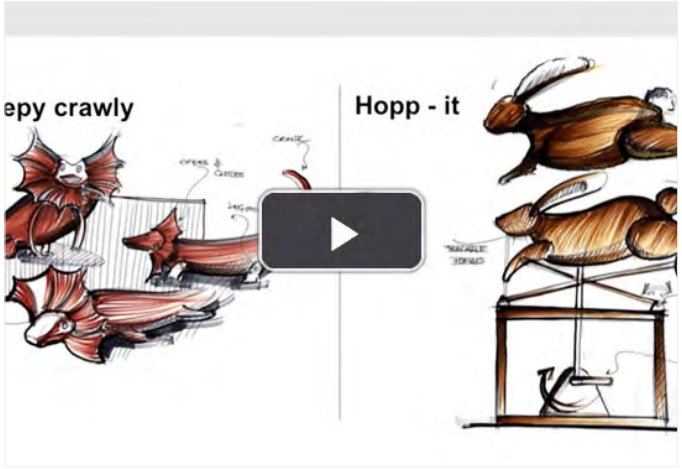
https://dsource.in/course/indian-toy-design/students-presentations/ride-toy-group-b/bobster-archana/video

Video

Presentation Stage 1 by Archana S

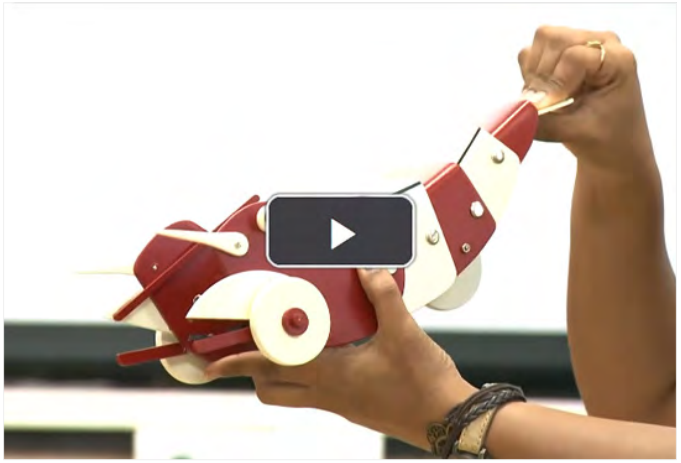


YouTube Video Link.....

Toy Design Mechanism by Archana S

YouTube Video Link.....

Bobster by Archana S



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Crabuggy by Maddu Shravan Murali

A ride-on is more than a toy. It is a tool for the development of physical, mental, cognitive, emotional, and social skills. Pedal-powered ride-on toys can help in the development of children's motor skills and understand simple mechanisms. It also provides an understanding of spatial relations and kinaesthetic senses. It encourage exploration and provides the perfect means for young kids to explore their surroundings environment.

Role playing activities can greatly enhance the cognitive abilities of children. It provides an opportunity to work out their problem solving and analytical skills and to understand complex cause and effect relationships.

Stage 1 Presentation

Case Study - Slide Show

Poster

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Stage 1 Presentation

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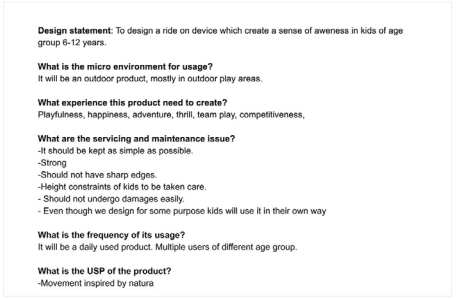
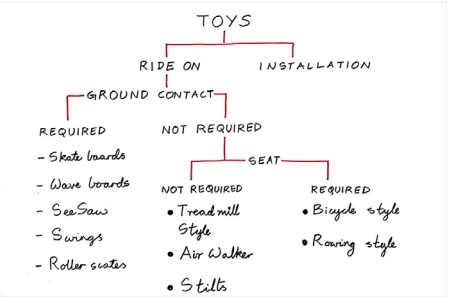
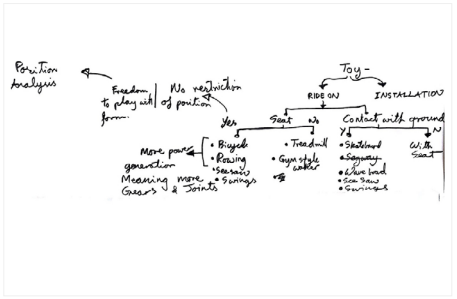
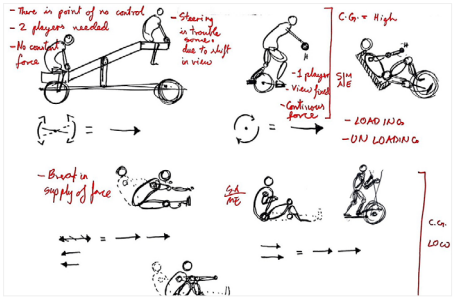
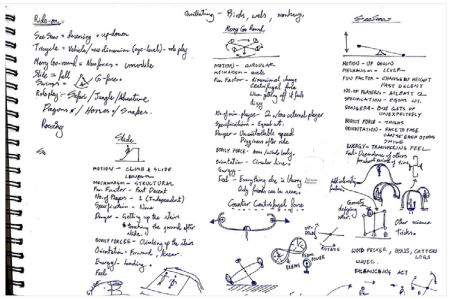
• Crabuggy_Stage 1 Presentation_by Maddu Shravan Murali.....

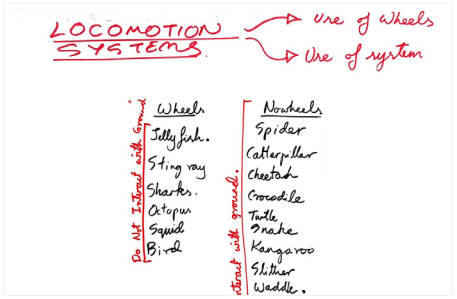


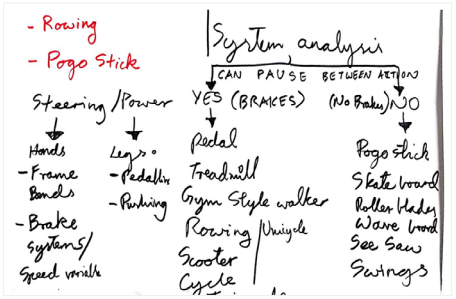


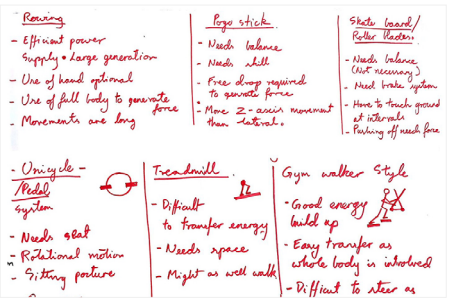












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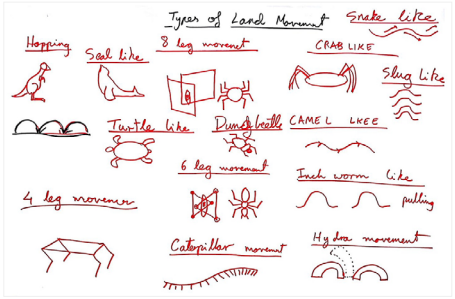

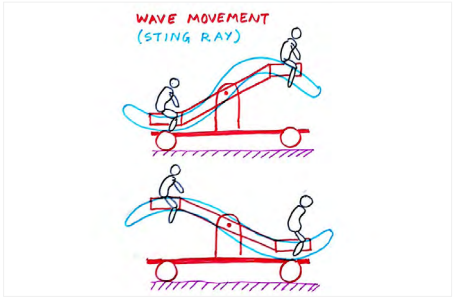

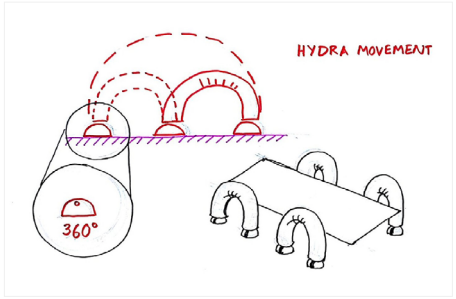

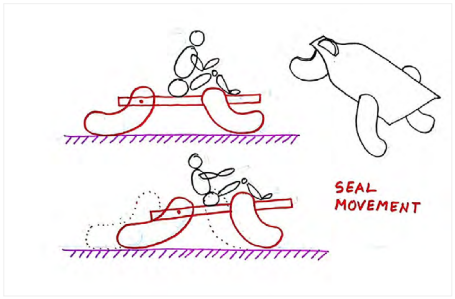

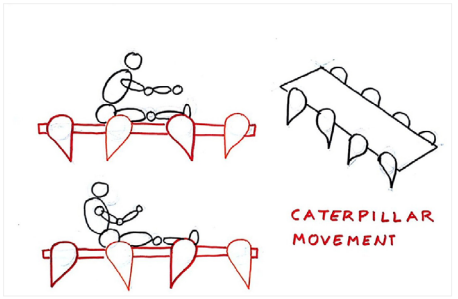

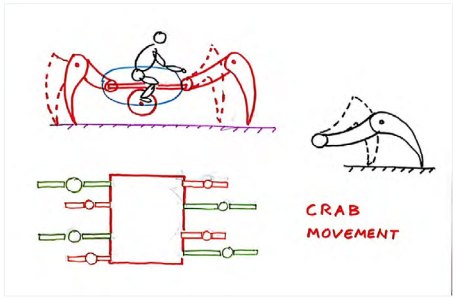

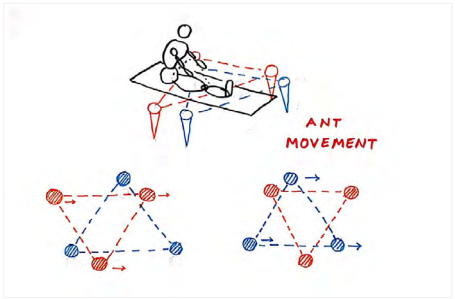

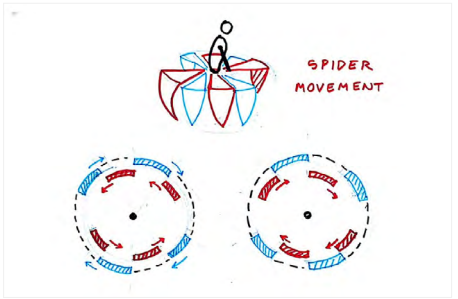

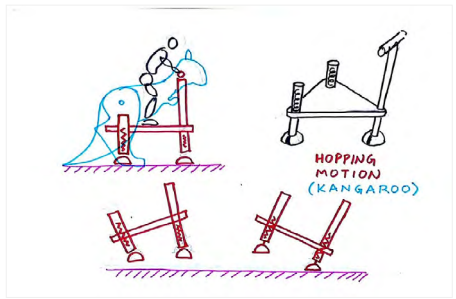

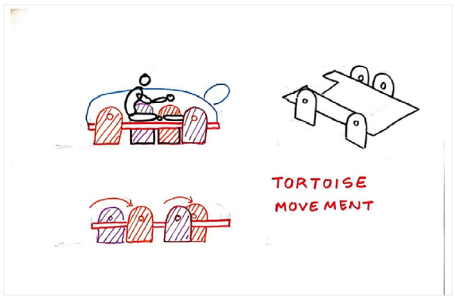

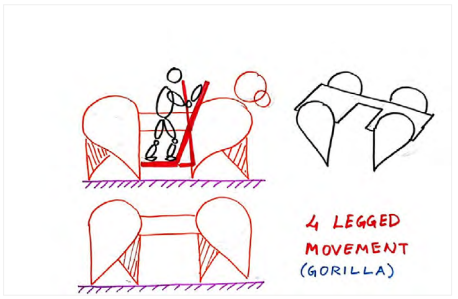

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Case Study - Slide Show

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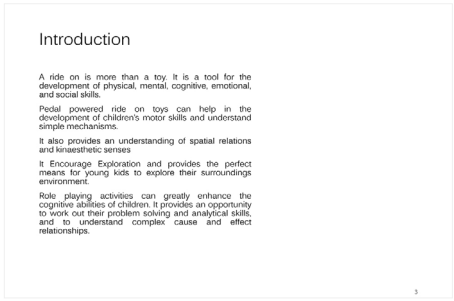

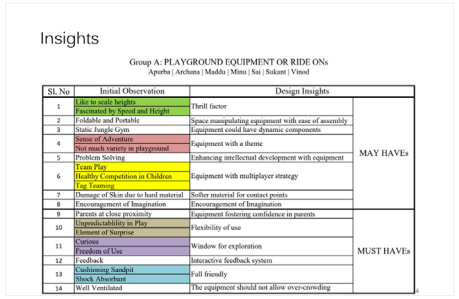

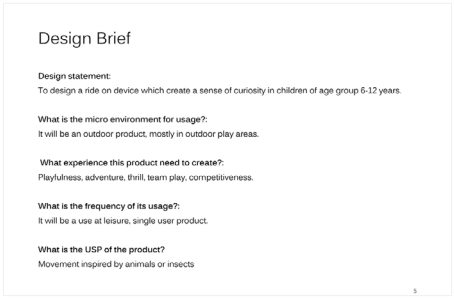

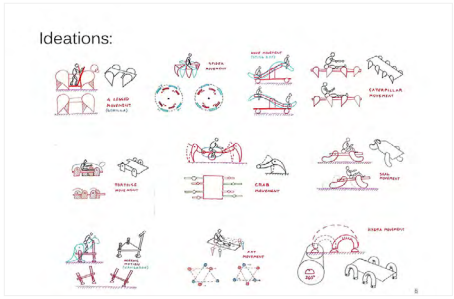

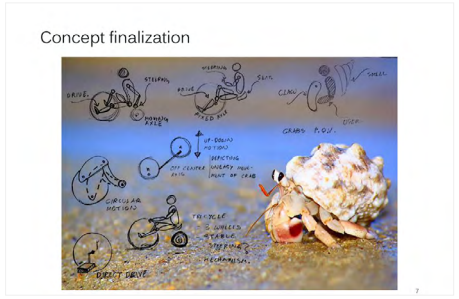

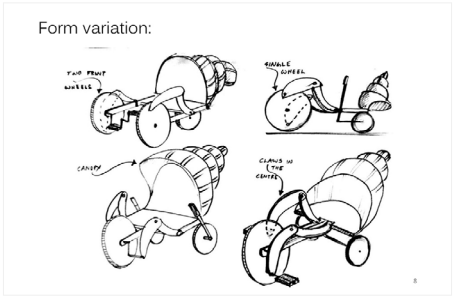

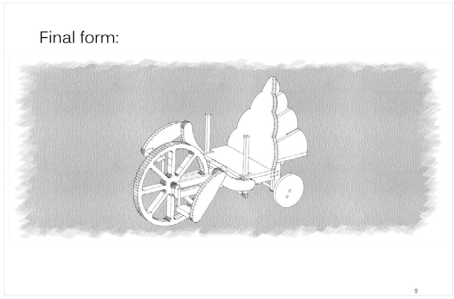

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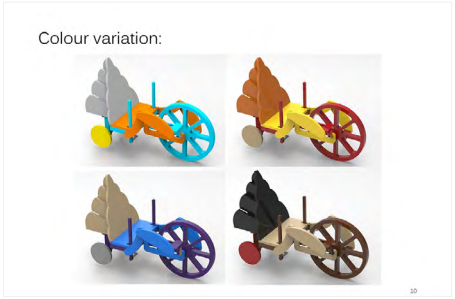

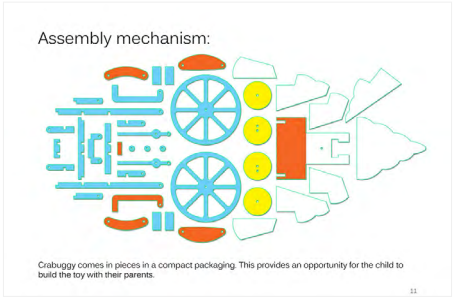

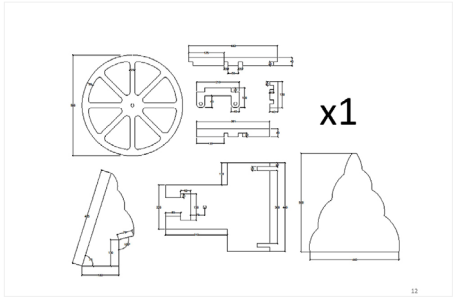

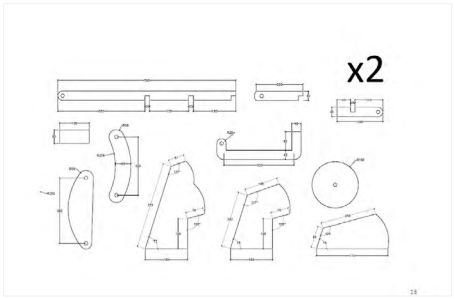

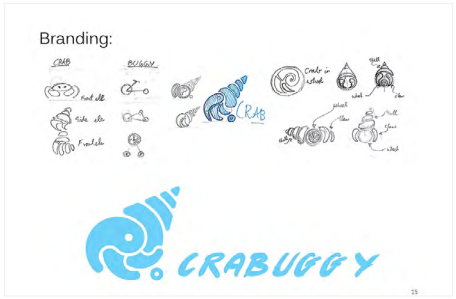

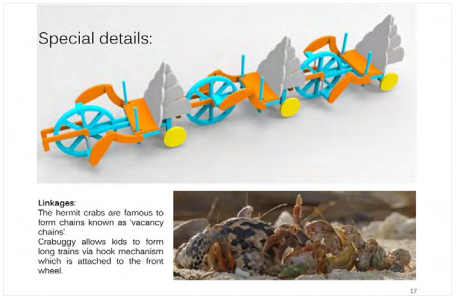

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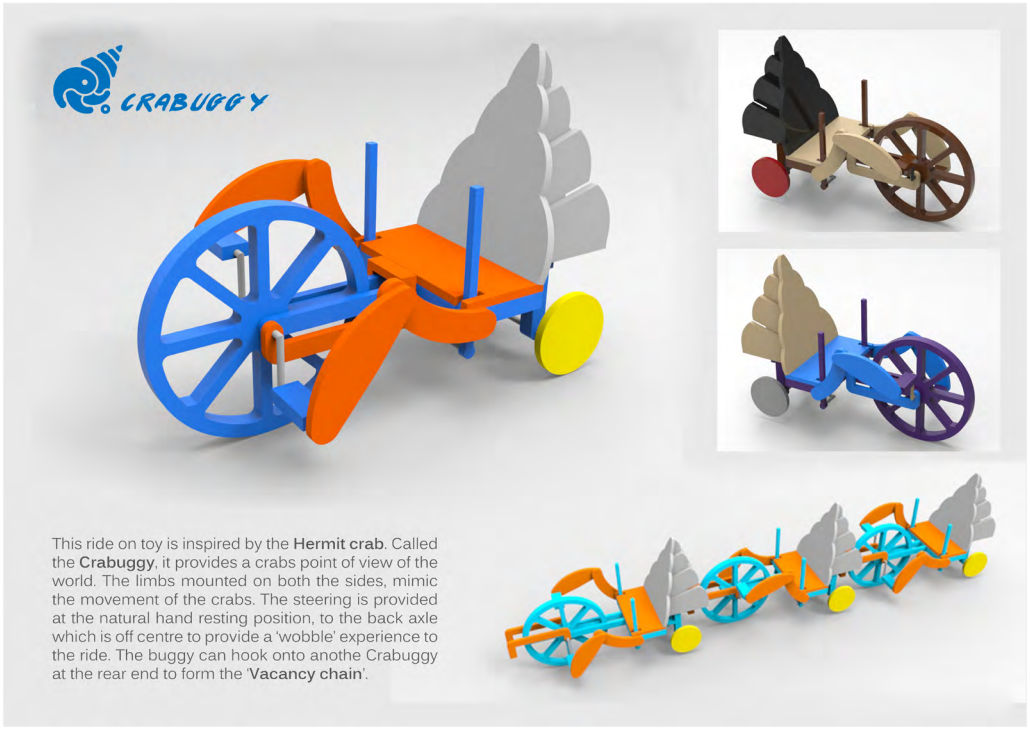

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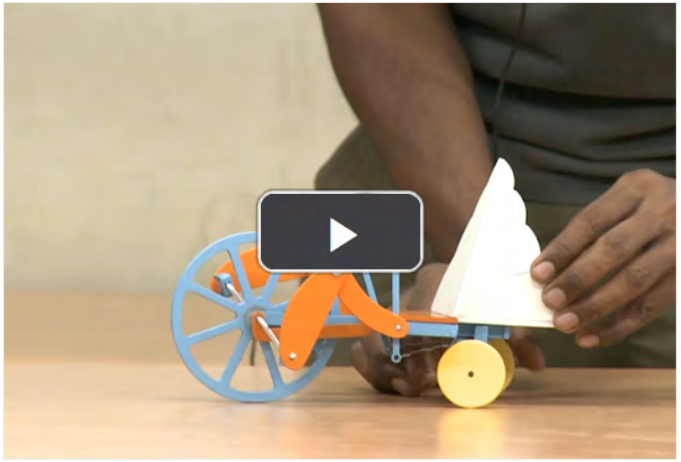
Video

Final Presentation by Maddu Shravan Murali



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Teerox by Minu

Kids are known to be creative and innocent minded. They play and not only enjoy toys but also develop their physical skills subconsciously while playing on outdoor or indoor products. They are known to explore and love adventures. They are very curious and easily get attached to toys and playing devices around them.

Our classroom was divided into two separate groups. Group 'B' was to design playground equipment or ride-on products for the user group of 6 to 12 years while Group 'A' was to design a wooden toy for the user group of 9 to 15 months.

In order to complete the products some of the important methods and approaches were taken which are briefly discussed in this report for Group 'B'.

The aim of the project is to design a playground or ride-on equipment for the user age group of 6-12 years which could help kids - To develop physical skills like pushing or pulling with the involvement of other kids/friends in the ground. The product can be indoor or outdoor.

Stage 1 Presentation

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Poster

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Stage 1 Presentation

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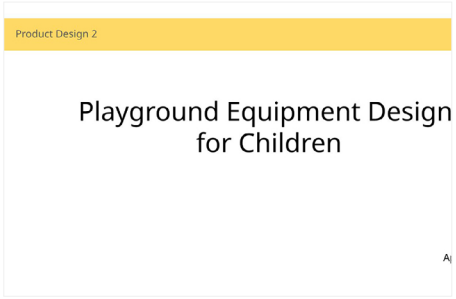

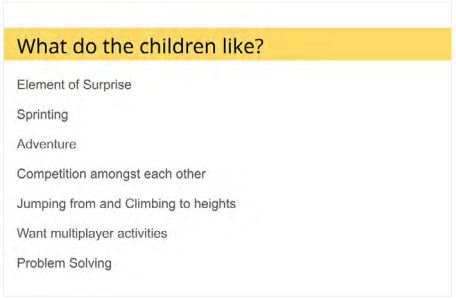

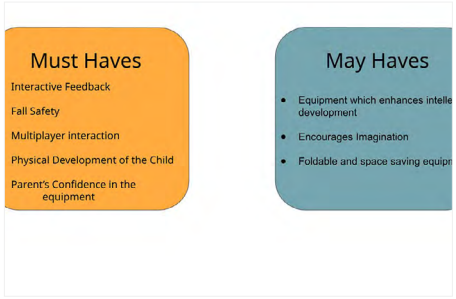

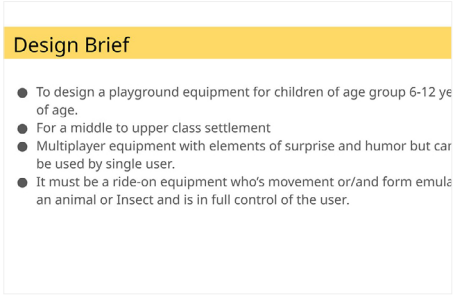

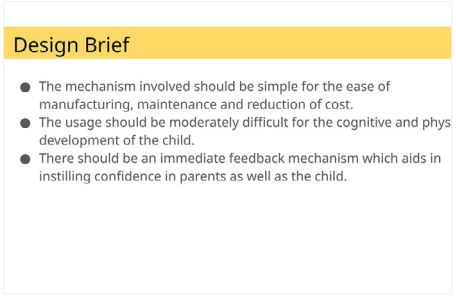

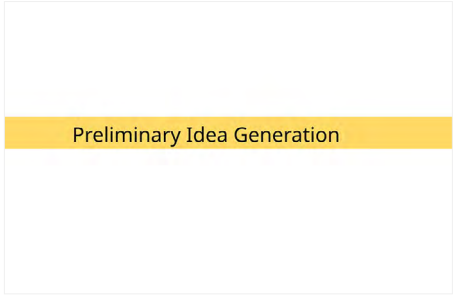

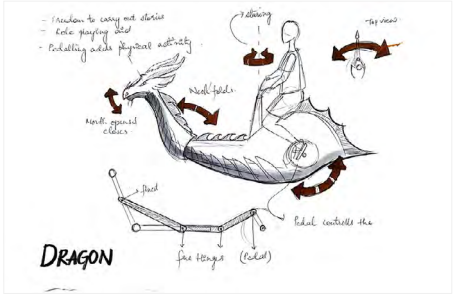

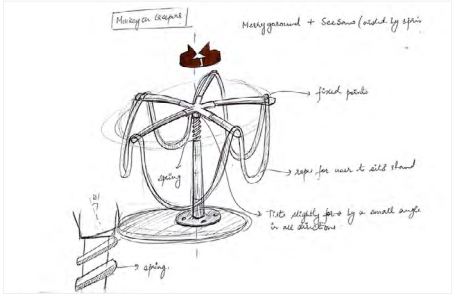

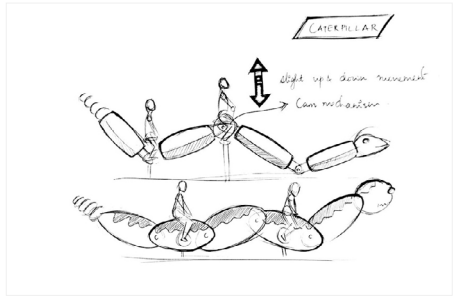

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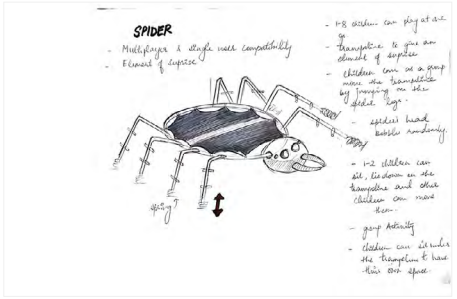

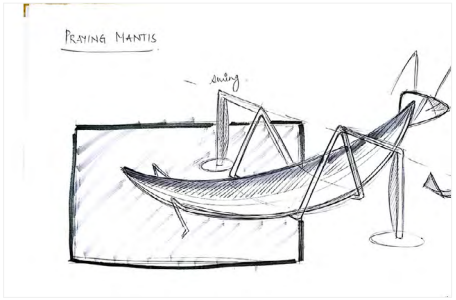

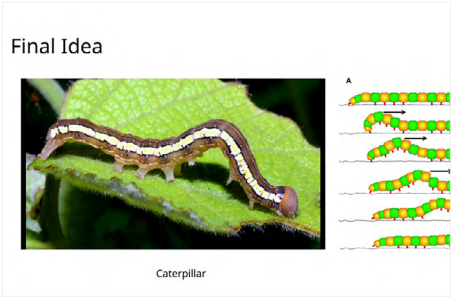

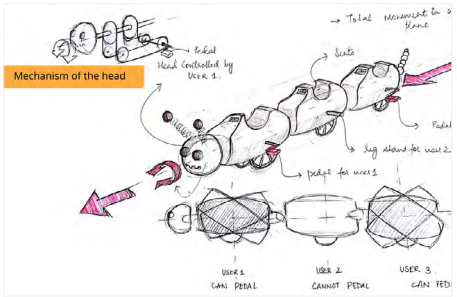

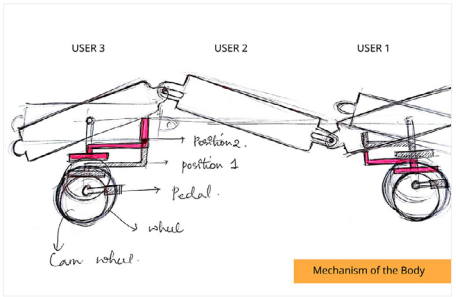

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Case Study - Slide Show

Case Study Download:

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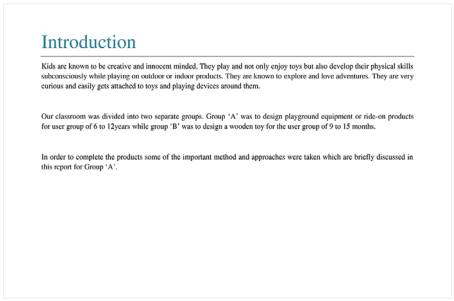
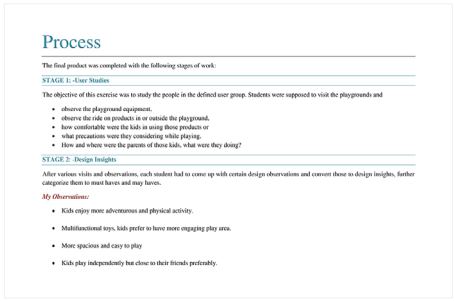
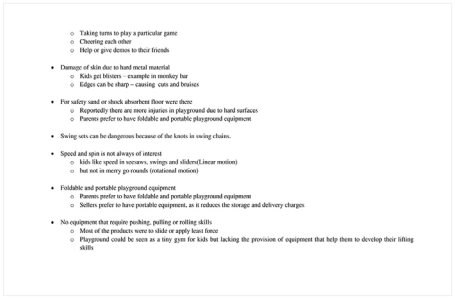
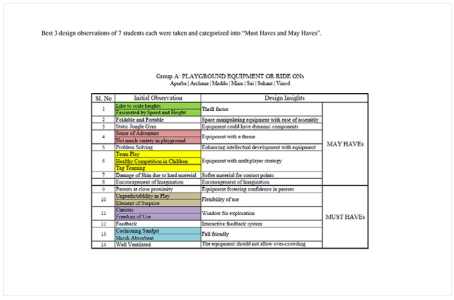
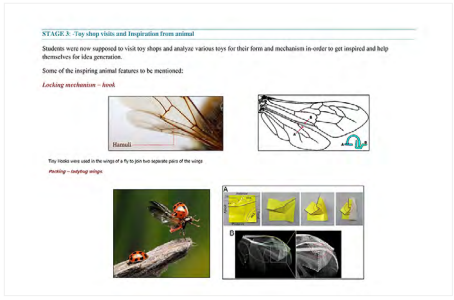
- Teerox by Minu_Report.....

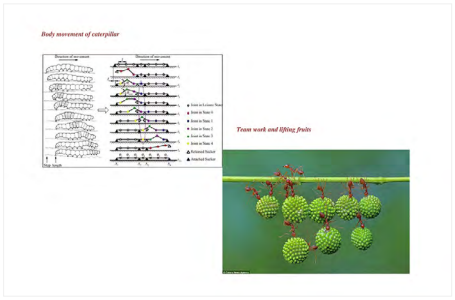


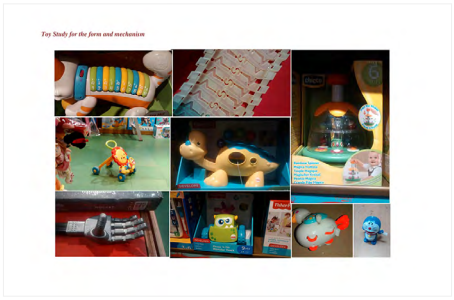


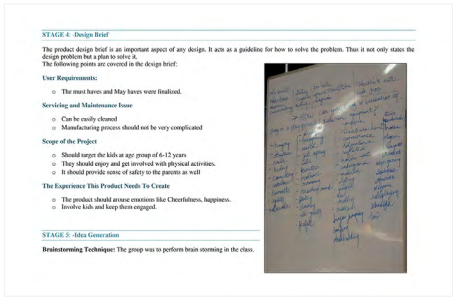












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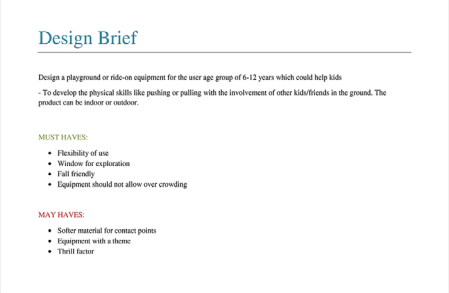

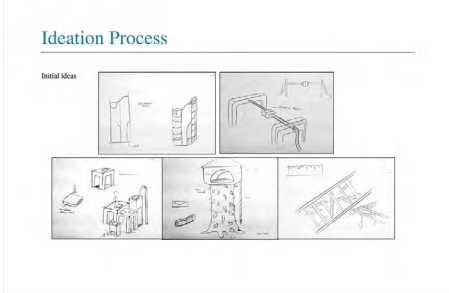

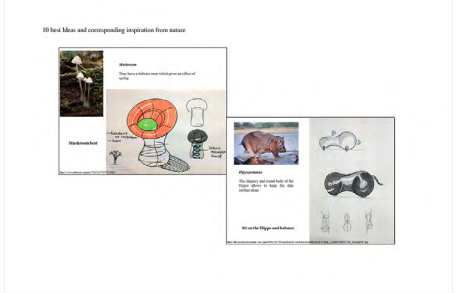

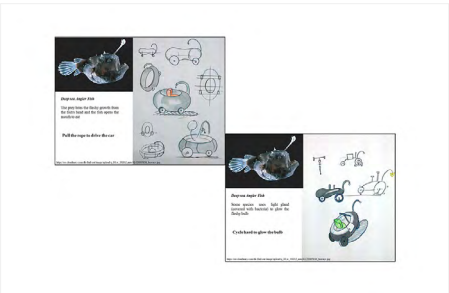

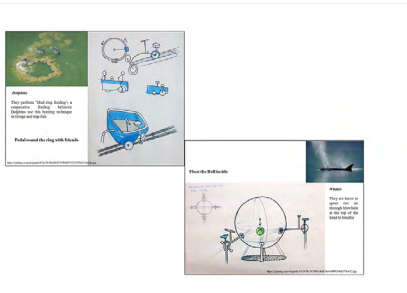

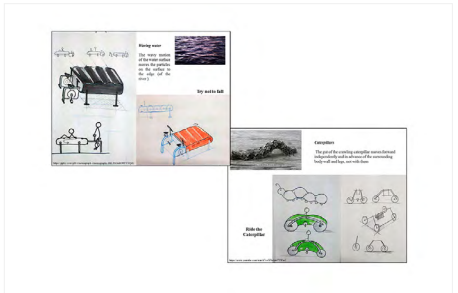

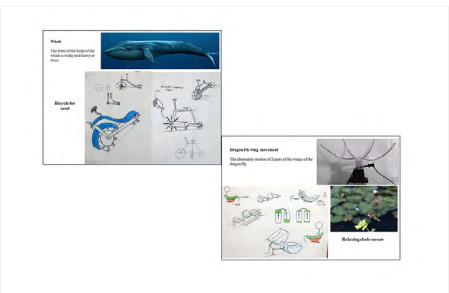

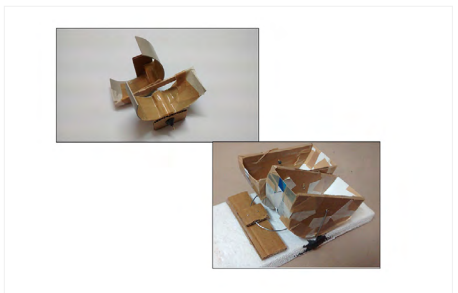

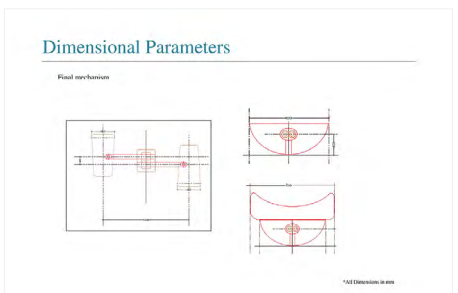

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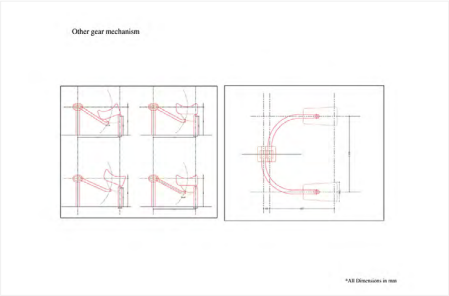

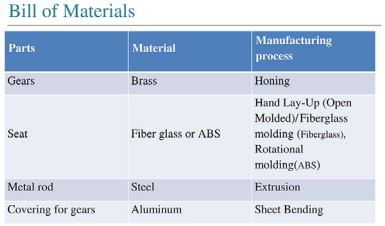

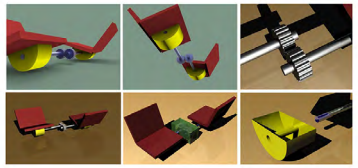

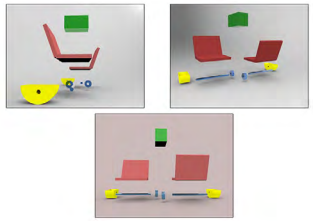

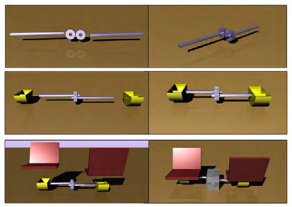

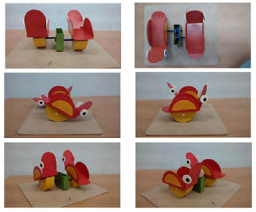

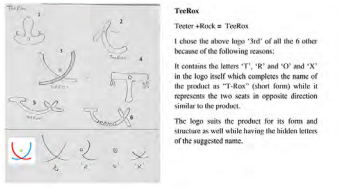

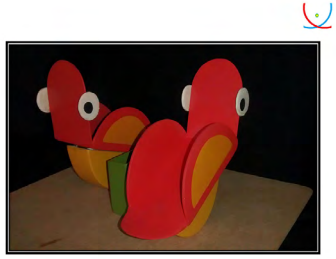

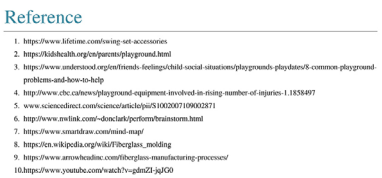

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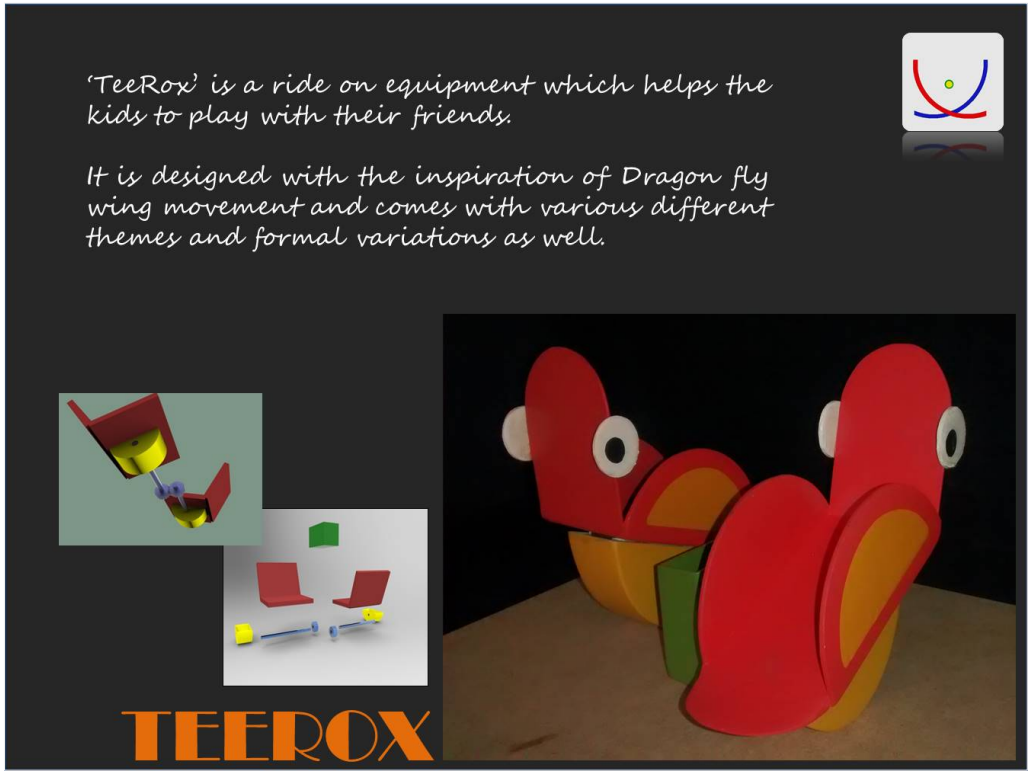

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Video

Presentation Stage 1 by Minu

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Teerox by Minu

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Charger by Saijith MS

Designing For Kids Is Not Child's Play

Children make huge developmental leaps every single year of their lives. They constitute a widely diverse range of behaviors and abilities. In this module of Product Design-2, we were trying to understand the outdoor playing behavior of kids and trying to find out innovative and creative ideas to make the play more useful for them and pleasurable. Six to twelve year old kids were chosen as the user group for this particular project. Biomimetics was given as a theme for the project.

User studies, Field studies, and online case studies were done to understand the user group. Discussions were done in groups about the major observations, analysis and inferences which further led to the formulation of a design brief.

Stage 1 Presentation

Case Study - Slide Show

Poster

Video

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Stage 1 Presentation

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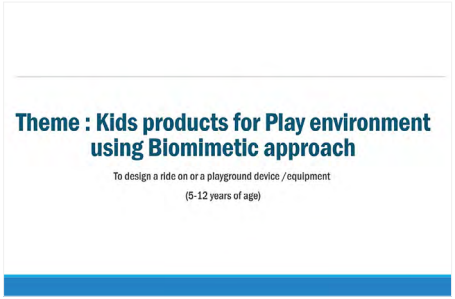
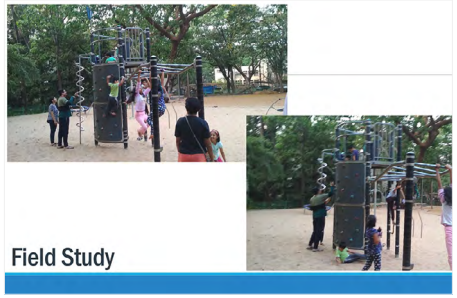
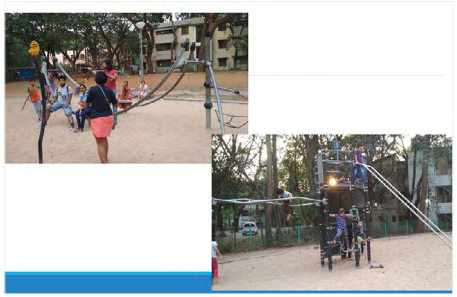
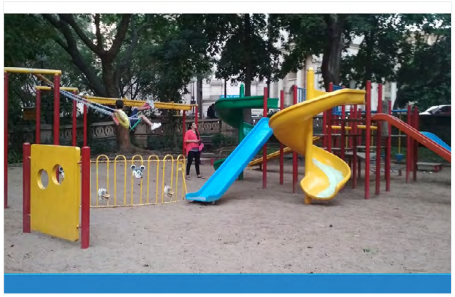
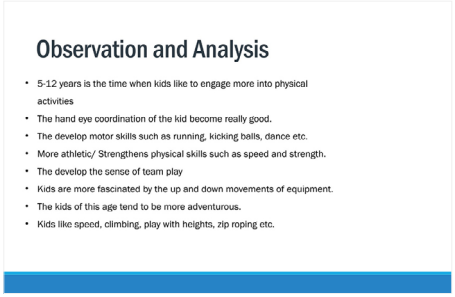
- Charger_Stage 1 Presentation_by Saijith M S.....

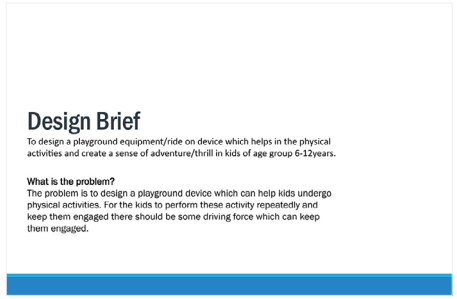












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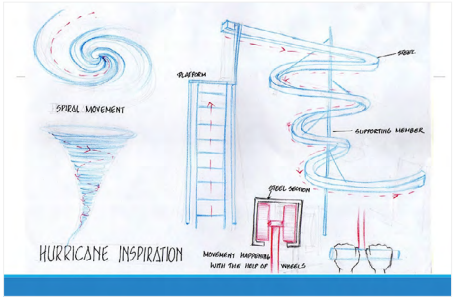

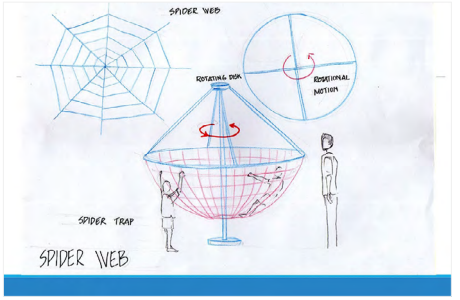

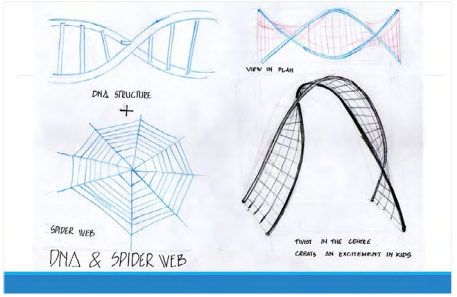

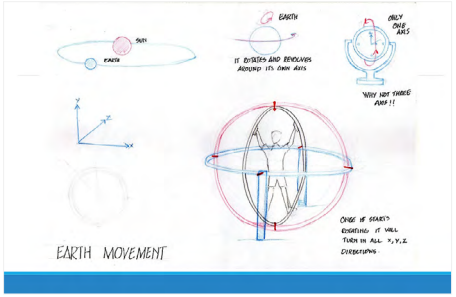

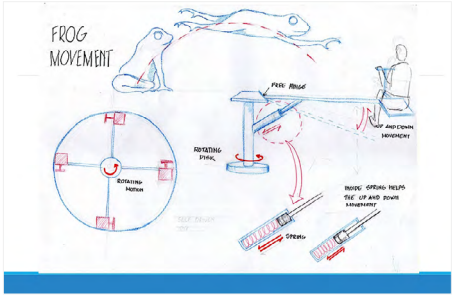

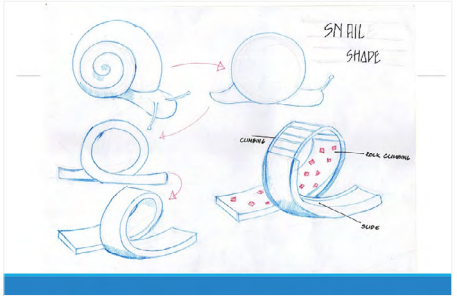

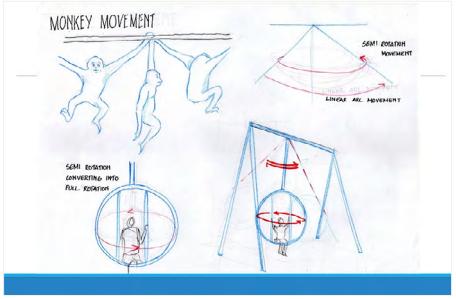

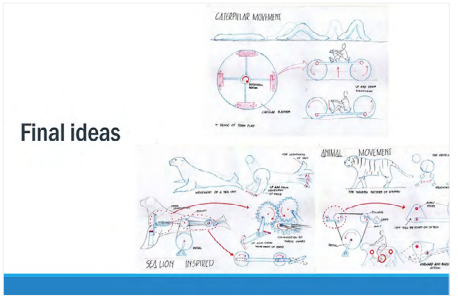

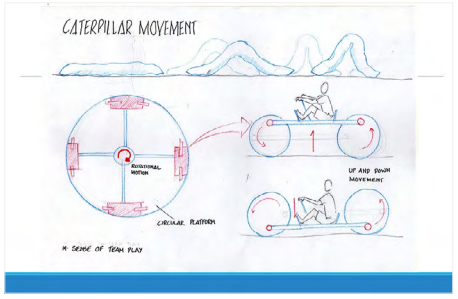

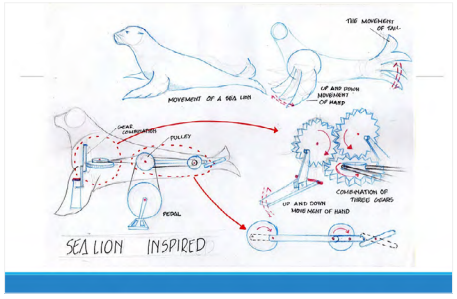

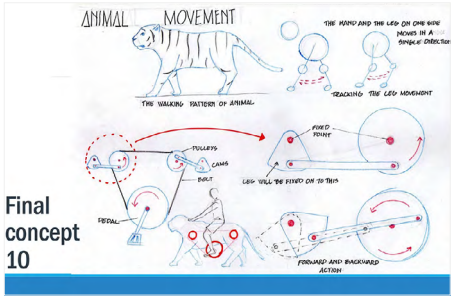

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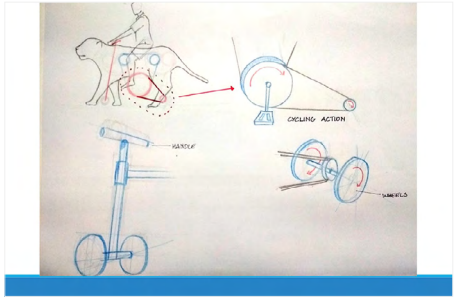

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Case Study - Slide Show

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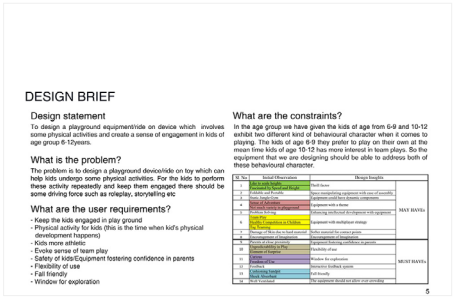

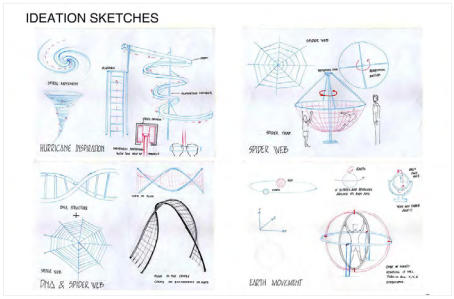

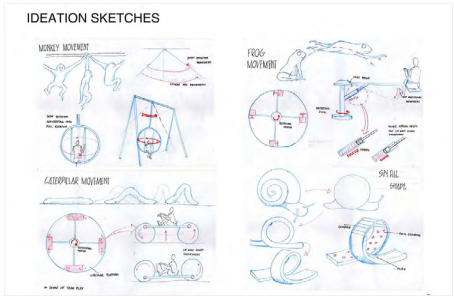

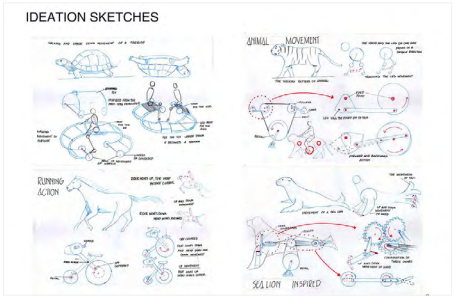

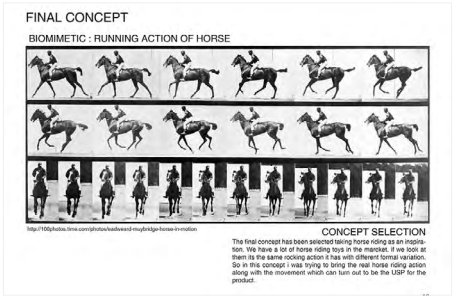

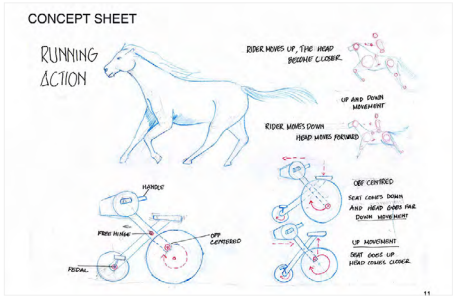

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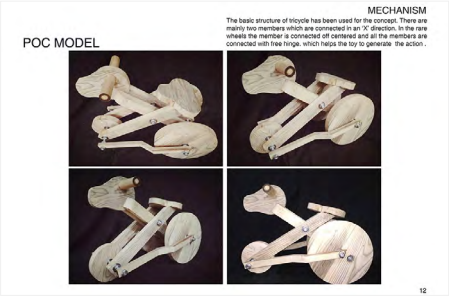

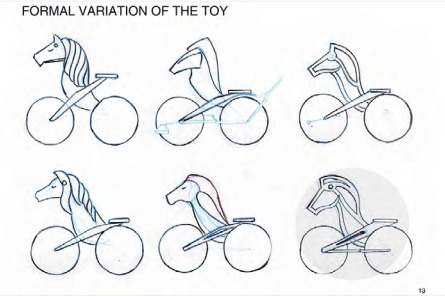

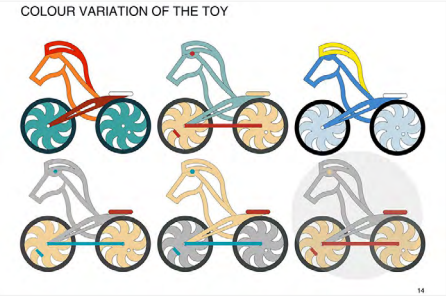

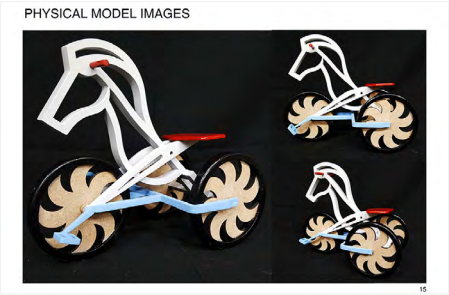

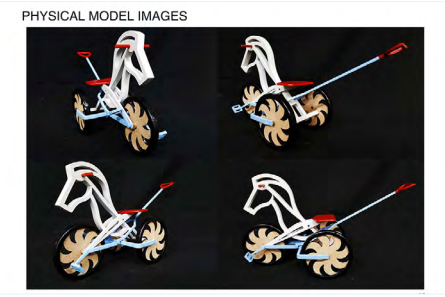

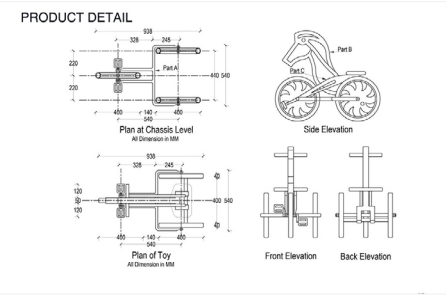

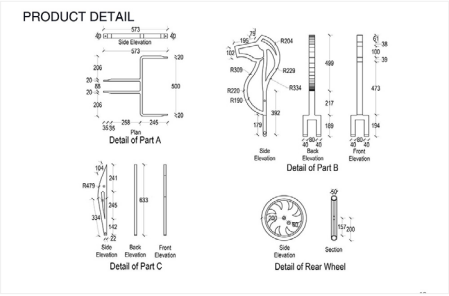

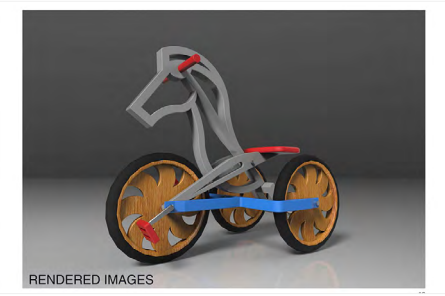

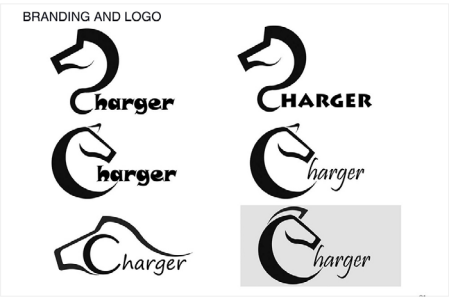

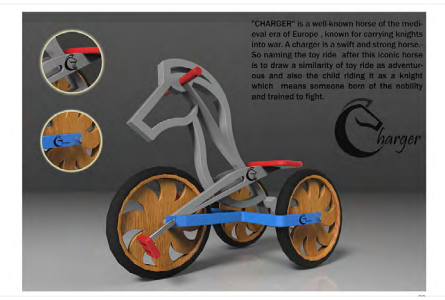

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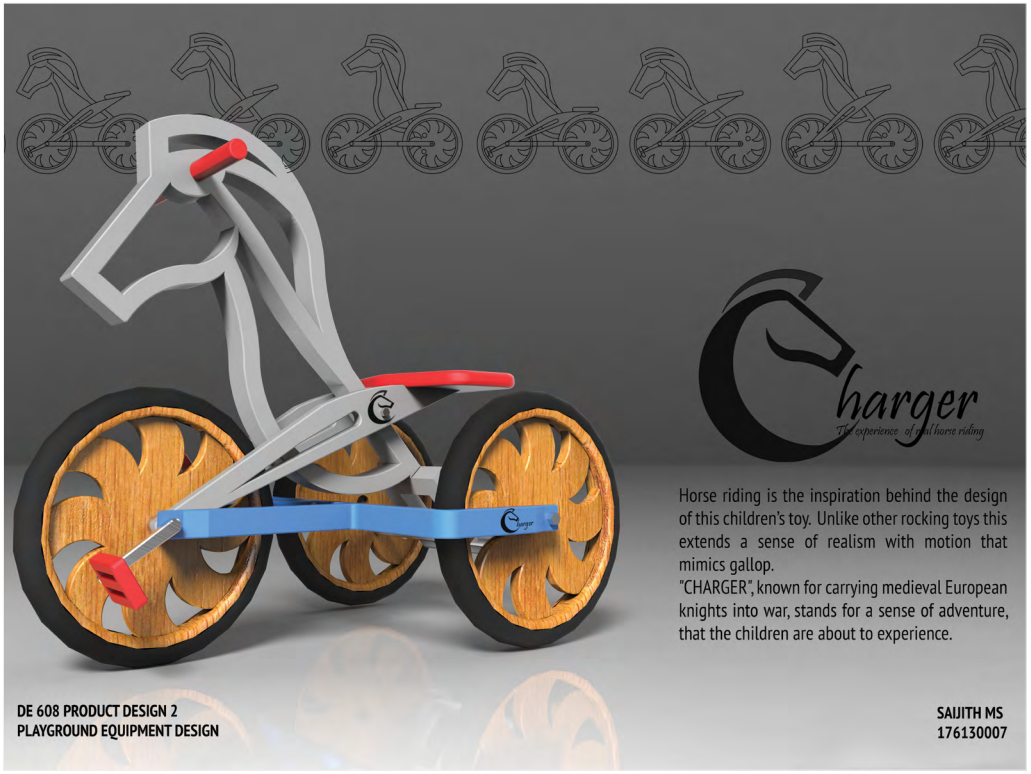

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Video

Presentation Stage 1 by Saijith M S

YouTube Video Link.....

Charger by Saijith M S

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Arcadia by Sukanta Maharana

Ride-on toys are one of the most sought after toys that can help children in their physical, mental, cognitive, emotional, and social development making them better rounded individuals when they grow up. Many child developmentalists recommend getting pedal-powered ride-on toys as these can help in the development of children's motor skills.

Two- and three-wheeled ride-on toys are excellent when it comes to training kids to balance their bodies as well as observe the coordination of their various bodily movements. Bicycles, scooters, skateboards, and even tricycles all require some degree of balancing from children. This calls for a splendid understanding of spatial relations and kinaesthetic senses.

One of the most important benefits of ride-on toys is their ability to enhance the role-playing activities of children. As we all know, role-playing activities can greatly enhance the cognitive abilities of children. It gives them the opportunity to work out their problem-solving skills, their analytical skills, and their understanding of complex cause and effect relationships and their effects on certain situations.

Stage 1 Presentation

Case Study - Slide Show

Poster

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Stage 1 Presentation

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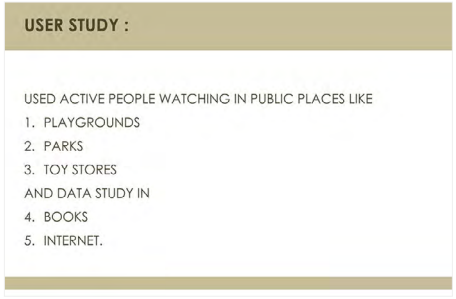
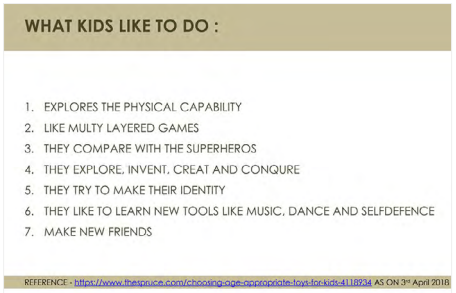
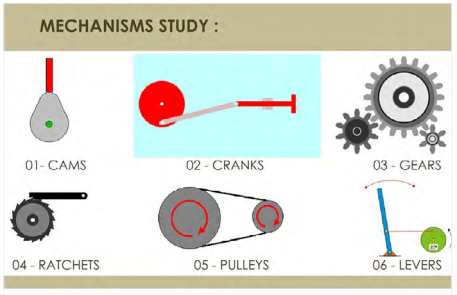
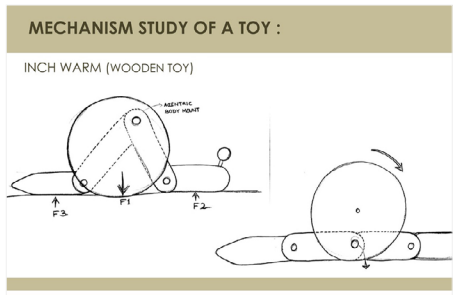
- Arcadia_Stage 1 Presentation_by Sukanta Maharana.....









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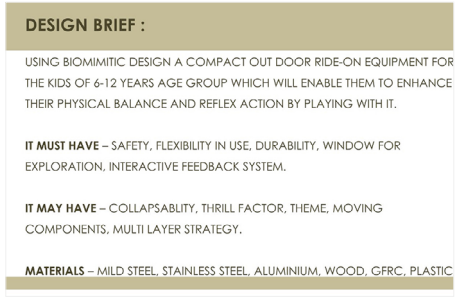

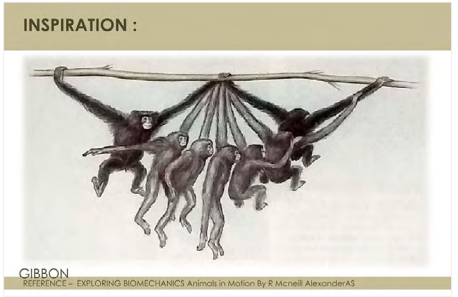

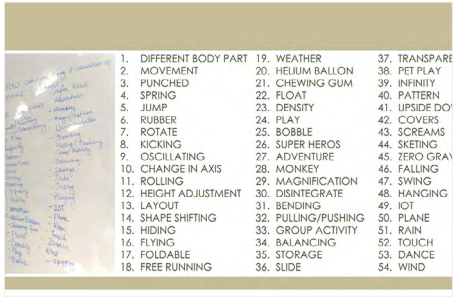

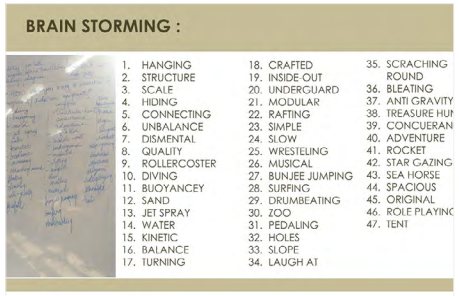

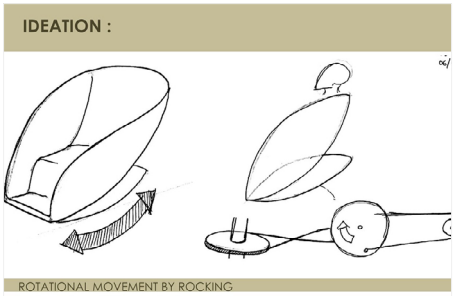

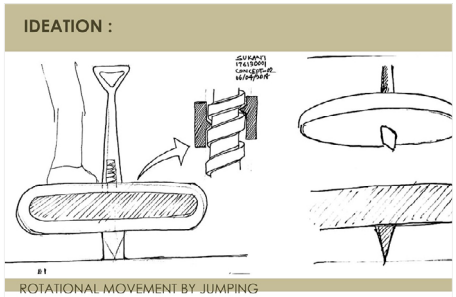

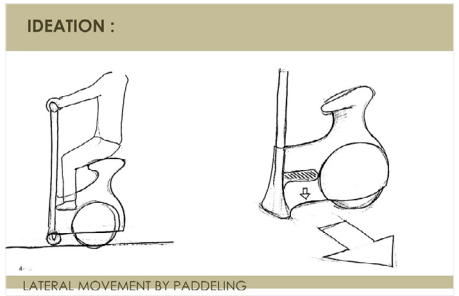

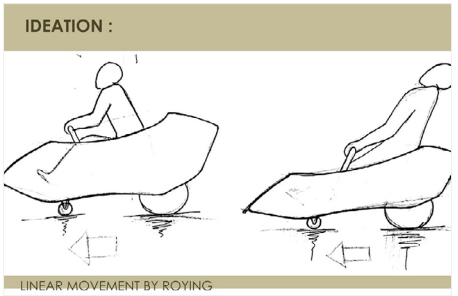

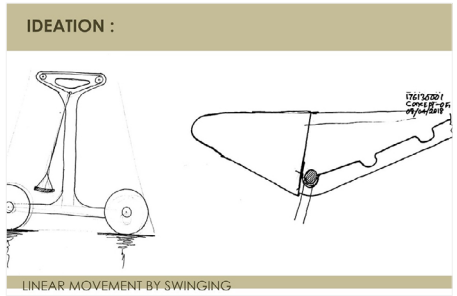

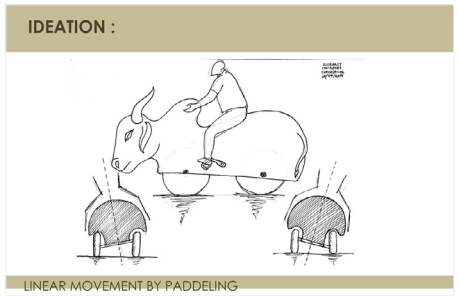

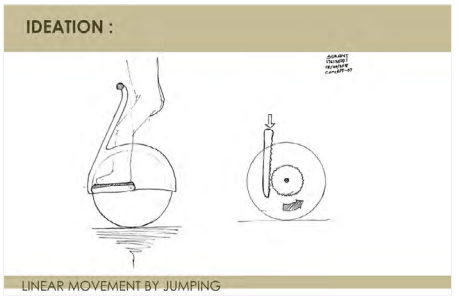

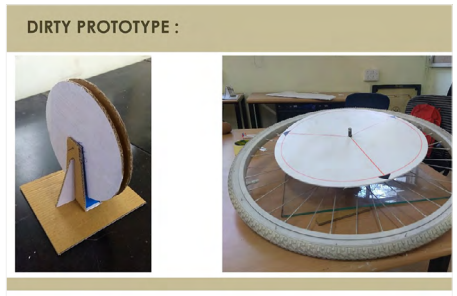

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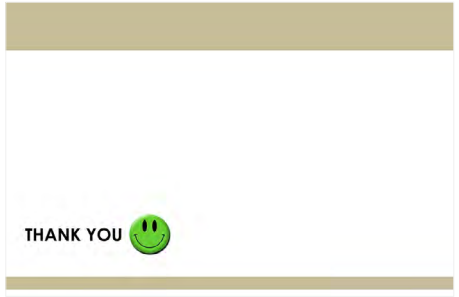

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Case Study - Slide Show

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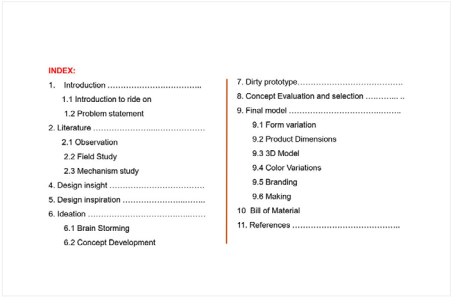

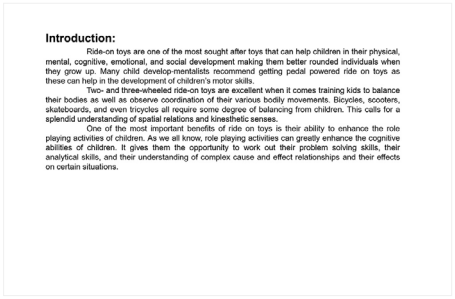

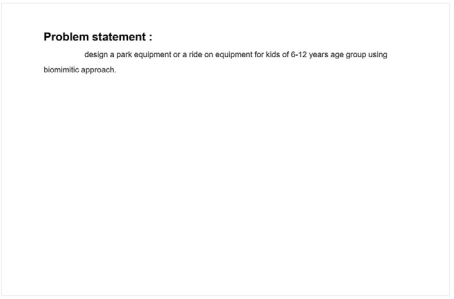

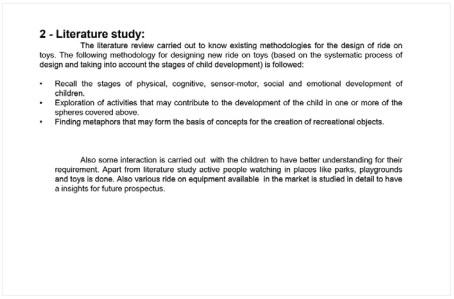

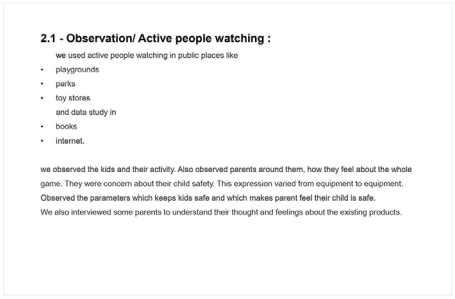

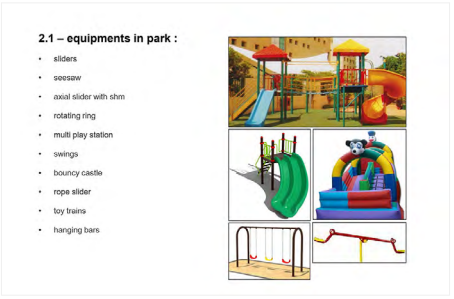

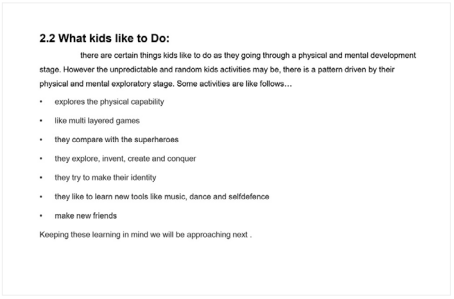

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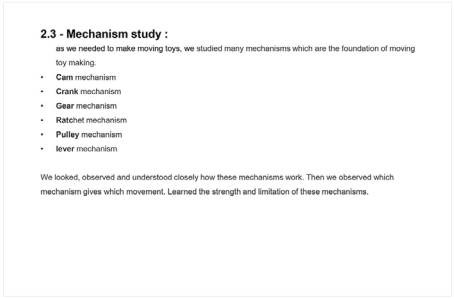

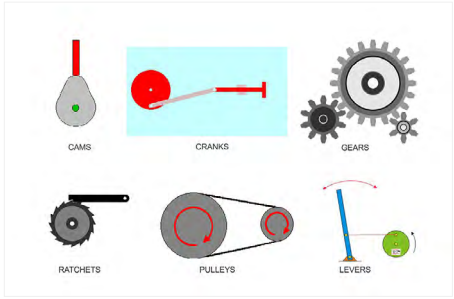

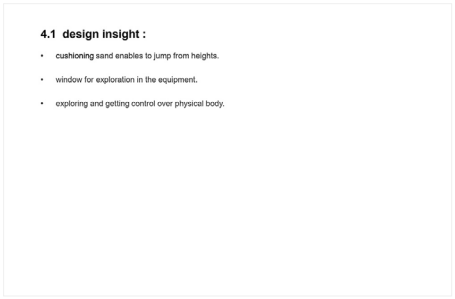

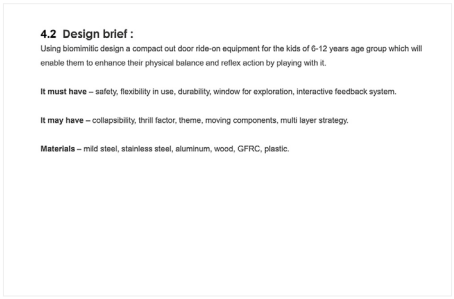

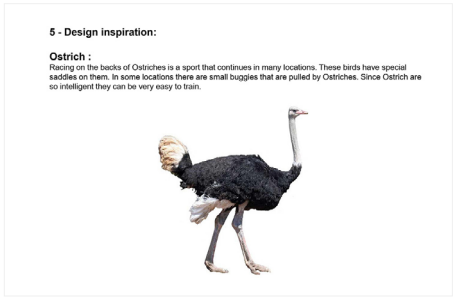

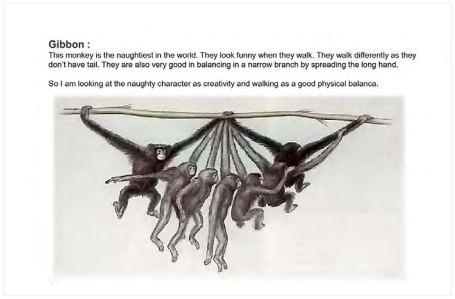

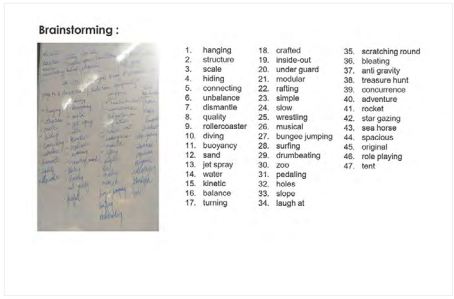

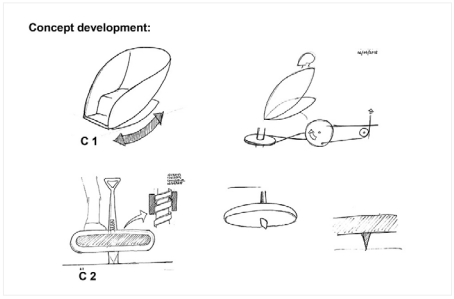

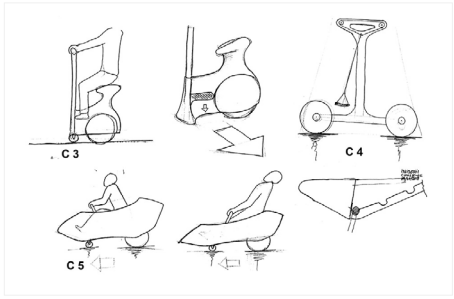

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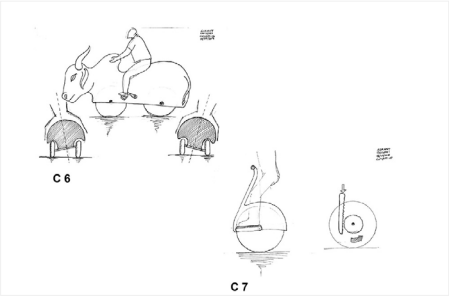
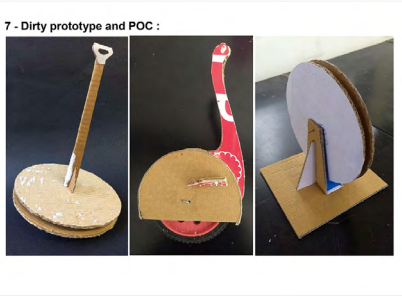


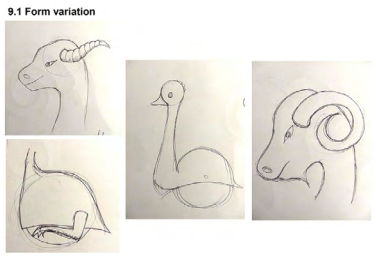


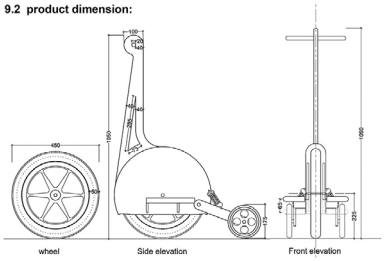
8 – concept evaluation :

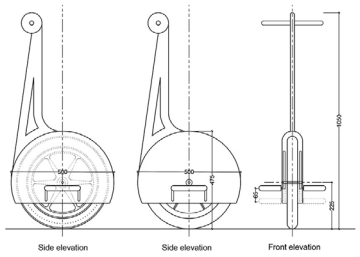
Selection criteria	C 1	C 2	C 3	C 4	C 5	C 6	C 7
Ease of handle	2	4	3	1	3	2	3
Ease of use	4	3	3	4	3	3	4
Number readability	3	3	4	3	2	2	4
Does metering	2	2	3	2	3	2	3
Load handling	4	2	4	3	4	4	5
Ease of making	2	3	4	2	3	3	4
portability	1	3	3	1	3	2	5
total	18	20	24	16	21	18	28

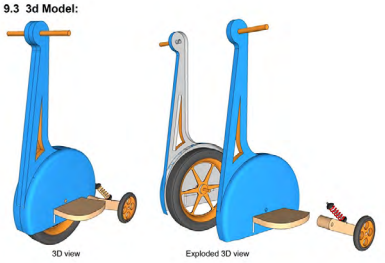
•C1, C2, C3.....Cn are concepts and we marked them out of 5.
•Here I am selecting c 3 and c7. I will combine these two concepts to make final concept

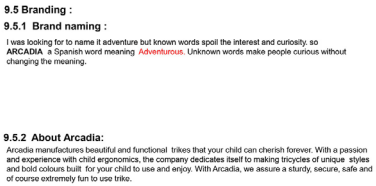
9. Final model :

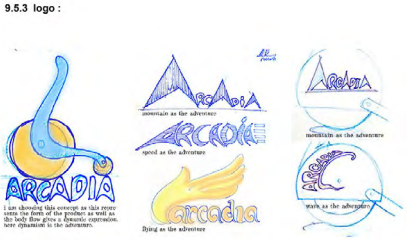












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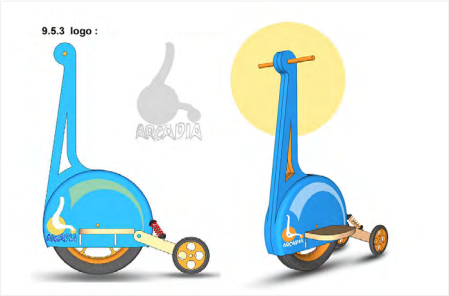
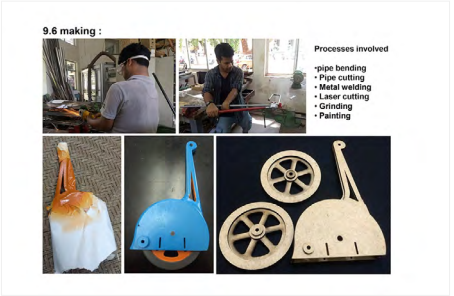
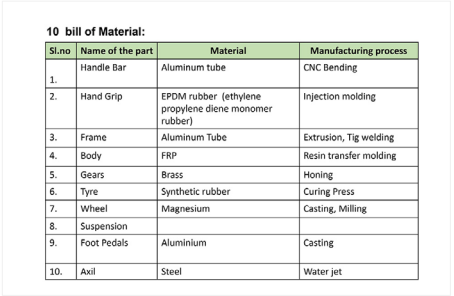
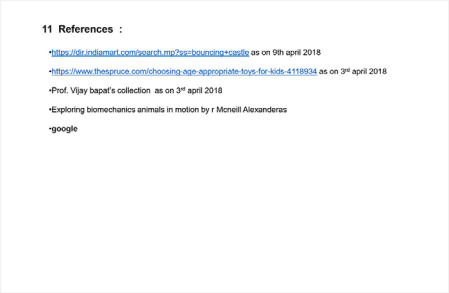






10 bill of Material:

Sl.no	Name of the part	Material	Manufacturing process
1.	Handle Bar	Aluminum tube	CNC Bending
2.	Hand Grip	EPDM rubber (ethylene propylene diene monomer rubber)	Injection molding
3.	Frame	Aluminum Tube	Extrusion, Tig welding
4.	Body	FRP	Resin transfer molding
5.	Gears	Brass	Honing
6.	Tyre	Synthetic rubber	Curing Press
7.	Wheel	Magnesium	Casting, Milling
8.	Suspension		
9.	Foot Pedals	Aluminium	Casting
10.	Axil	Steel	Water jet



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•https://dir.indiamart.com/search.mp?ss=bouncing+castle as on 9th april 2018
•https://www.thespruce.com/choosing-age-appropriate-toys-for-kids-4118934 as on 3rd april 2018
•Prof. Vijay bapat's collection as on 3rd april 2018
•Exploring biomechanics animals in motion by r Mcneill Alexanderas
•google

Source:
https://dsource.in/course/indian-toy-design/students-presentations/ride-toy-group-b/arcadia-sukanta-maharana/case-study

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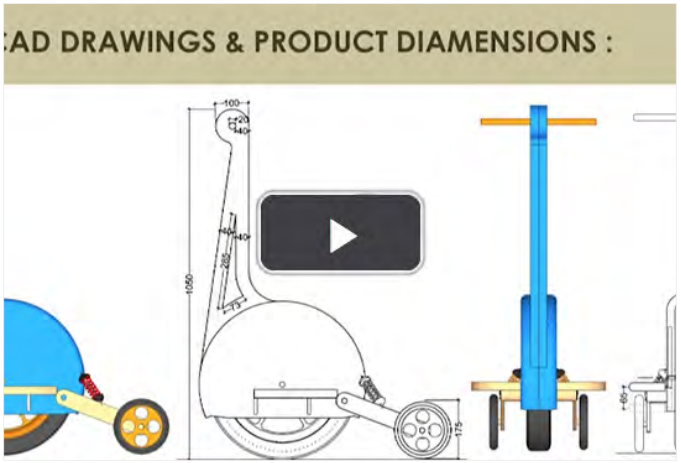
Video

Presentation Stage 1 by Sukanta Maharana

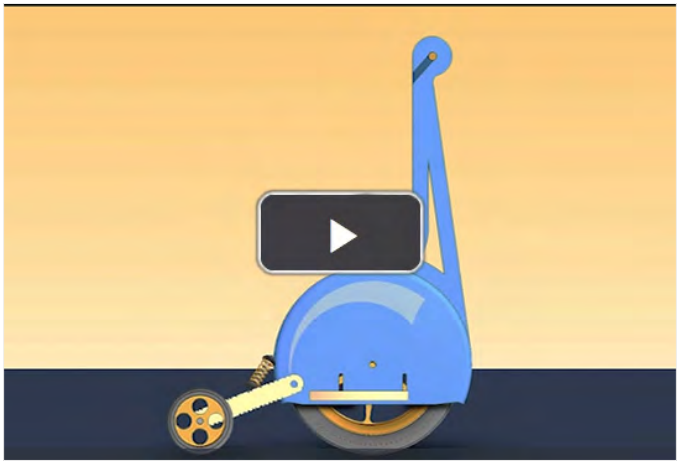


YouTube Video Link.....

Final Presentation by Sukanta Maharana

YouTube Video Link.....

Arcadia by Sukanta Maharana



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Hornsby by Vinod Louis Joseph Swamy

The aim of the project is to design a playful and engaging ride-on for children aged 6-10 for indoor and outdoor usage by using biomimetic as a tool for inspiration.

Project Brief

1. The device should have dynamic components that are easily operable by the children while riding.
2. It should evoke a sense of thrill for the children by mimicking the motion of the animal.
3. It should appeal to either of the genders and to the older segment of the target user group.

Stage 1 Presentation

Case Study - Slide Show

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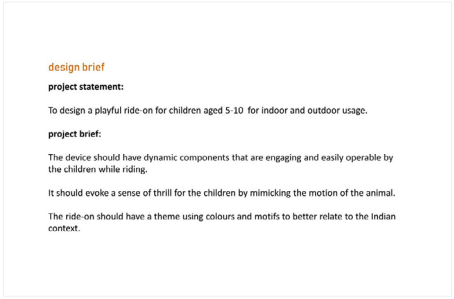
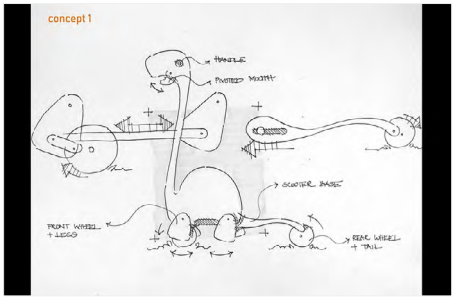
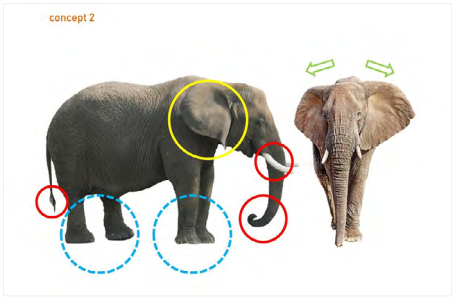
Stage 1 Presentation

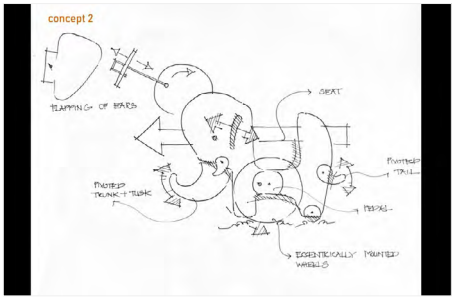
Download:

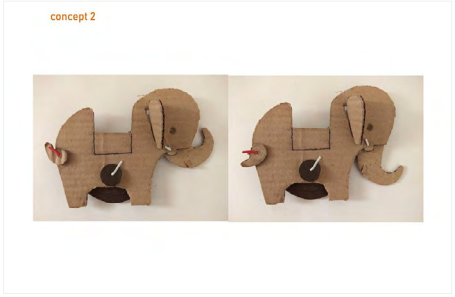
- Hornsby_Stage 1 Presentation_by Vinod Louis Joseph Swamy.....

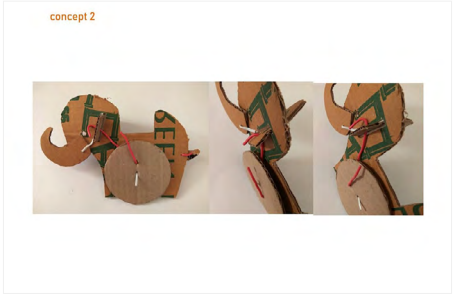


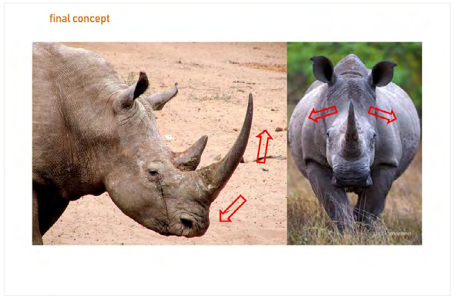












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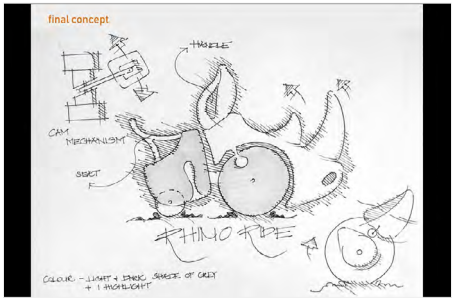

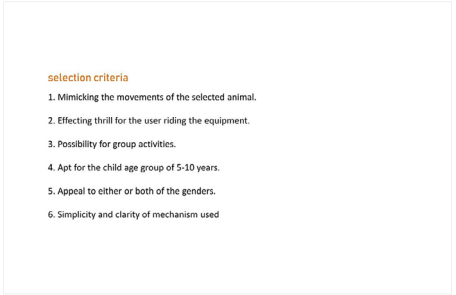

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Case Study - Slide Show

Case Study Download:

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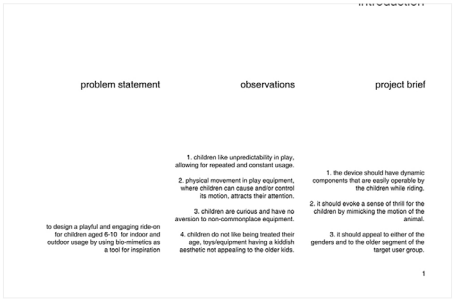
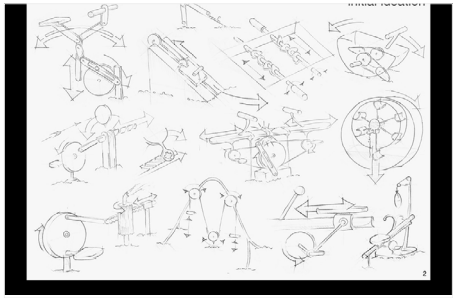
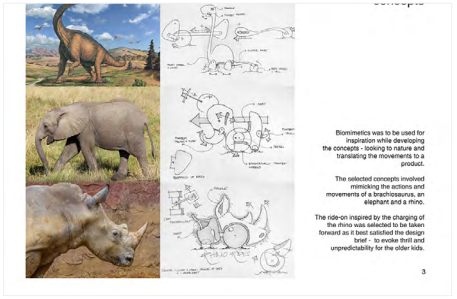
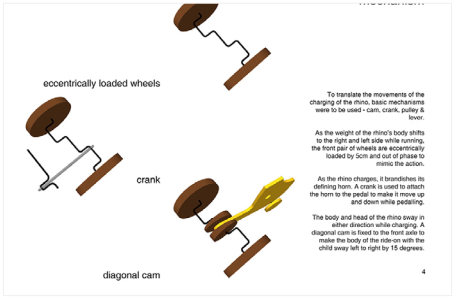
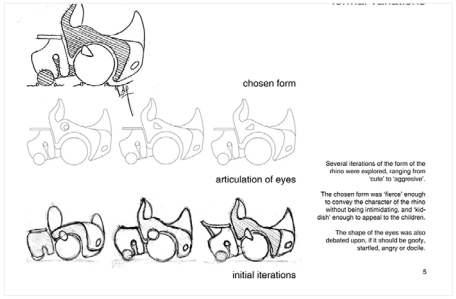
- Hornsby_by Vinod Louis Joseph Swamy_Report.....

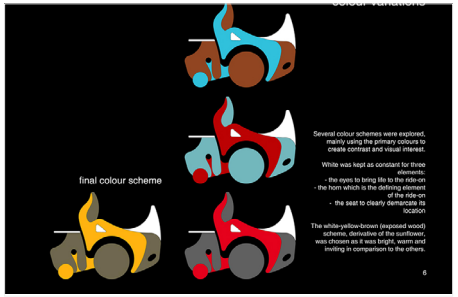


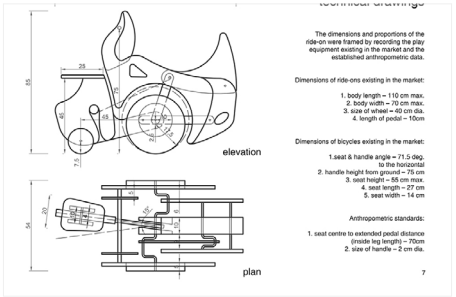


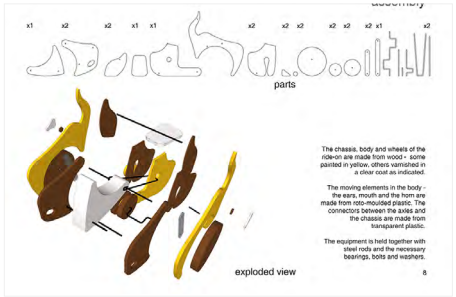












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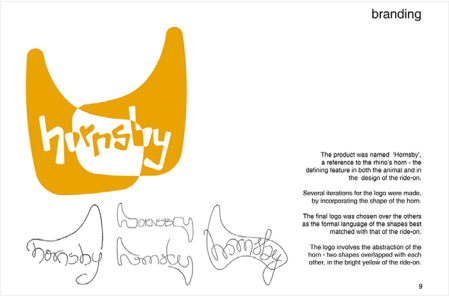

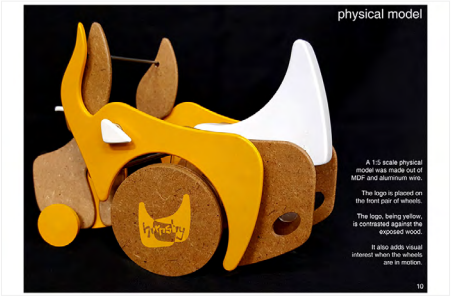

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Video

Presentation Stage 1 by Vinod Louis Joseph Swamy

YouTube Video Link.....

Hornsby by Vinod Louis Joseph Swamy

YouTube Video Link.....

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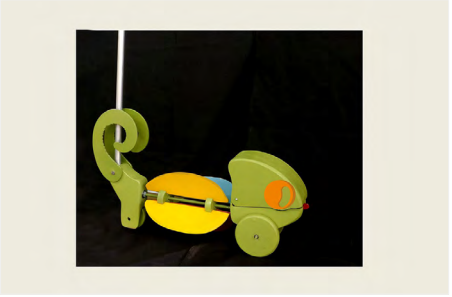
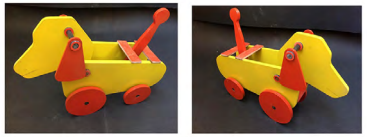
Toys

The course culminated in the creation of innovative toys that seamlessly integrated biomimetic principles with playful design. The journey from observation to product involved critical thinking and constant refinement, enabling students to design toys that were not only inspired by nature but also supported children's physical and cognitive development. In conclusion, the course provided an enriching experience that went beyond traditional design thinking. By embracing biomimicry, students learned to harness nature's wisdom, resulting in sustainable, fun toys. They gained a deep understanding of how integrating nature into product design leads to functional, environmentally harmonious innovations.

Push Toy - Group A

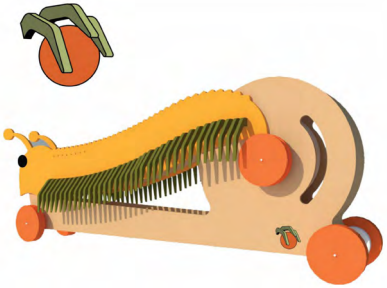


Catchy by Anushree Banerjee



Roxy by Hari

Pakhi by Minal Agarwal



Rollerpede by Mridul Jain

Totter by Nikita Fatarpekar

Waliz by Nirmal P J

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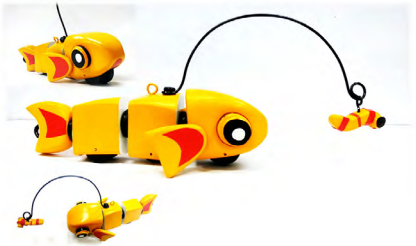
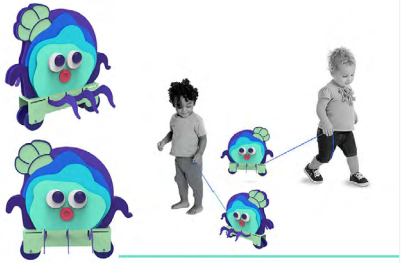
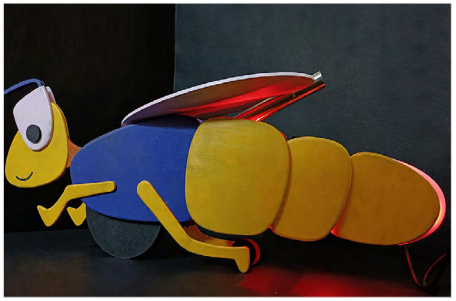

Toto by Rajat

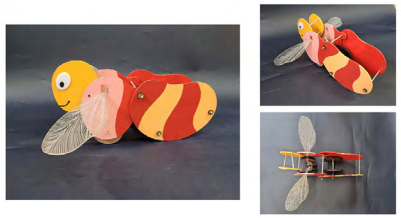

Chani by Aamod Narkar


Rolly by Ashuj Chawda


Chef Olie by Athira E


Sting Ray by Infant Bibin I


Akira by Mohammed Hazique Kola


Buzz by Mugdha Dengle


Tooti by Naiga Catherine


Go Bananas by Parth Rathod

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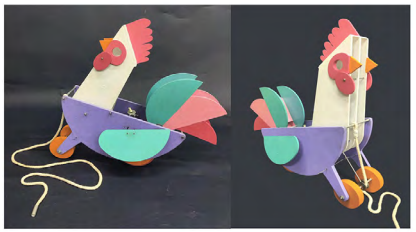
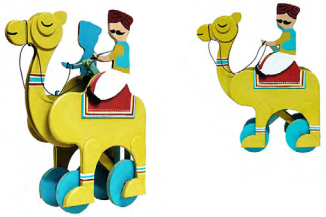
Buba by Prathmesh Pedamkar

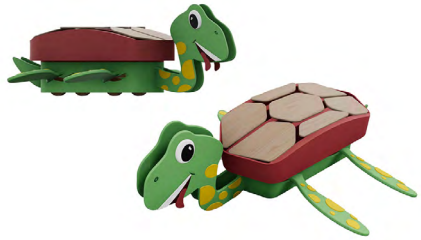
Pambo by Sagar D Dabherao



Muro by Shivani M



Cunth by Snehal Gaikwad



Taco by Susovan Gupta

Hooti by Uppili Nithin Soorya B

Piku by Vaibhav Watile

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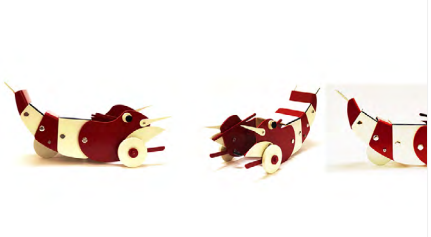
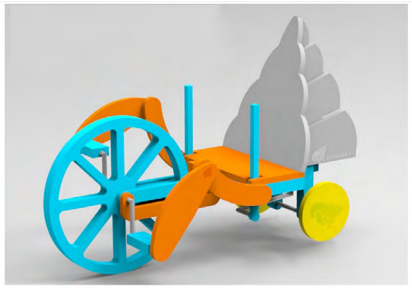
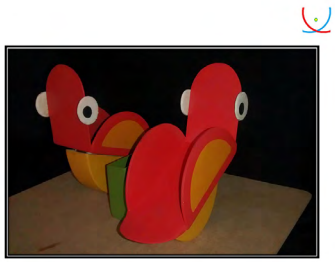
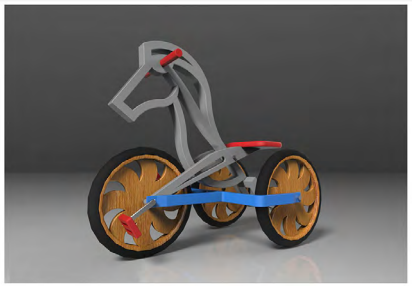
Ride-on Toy - Group B

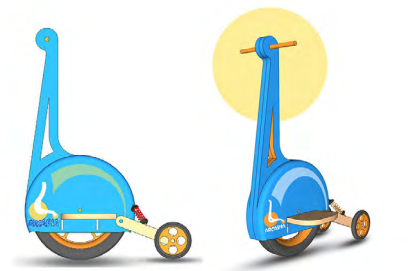
Blaze by Apurba Mondal


Bobster by Archana


Crabuggy by Maddu Shravan Murali


Teerox by Minu


Charger by Saijith MS


Arcadia by Sukanta Maharana


Hornsby by Vinod Louis Joseph Swamy

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Links

References:

Push Toy - Group A

Roxy

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• http://www.beautifulbeasties.com/learning-to-speak-dog-part-4-reading-a-dogs-body

Totter

• https://www.google.co.in/aclk?sa=l&ai=DChcSEwjG3rGZpaHaAhWECysKHS04B9gYABArGgJzZg&sig=AOD64_0QUEBze4CKV68kFBvACZQOzQvPZg&ctype=5&q=&ved=0ahUKEwilqqyZpaHaAhUBqI8KHdxMD9QQ9aACCHc&adurl=

Chef Olie

• https://www.youtube.com/watch?v=ebeNeQFUMa0
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• https://www.youtube.com/watch?v=QFoskwfaRI8
• https://www.youtube.com/watch?v=OA xLQGaQn4&t=23s
• https://www.youtube.com/watch?v=12h64|EE7IQ
• https://www.verifiedmarketresearch.com/product/toys-market/
• https://www.imarcgroup.com/indian-toys-market#:~:text=The%20Indian%20toys%20market%20reached,12.6%25%20during%202022%2D2027

Akira

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• https://vistapointe.net/firefly.html
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• https://wifflegif.com/tags/14107-giraffe-gifs?page=5
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• https://www.youtube.com/watch?v=WFkGPT0gKiM&ab_channel=TechInsider

Go Bananas
• https://i.pinimg.com/736x/51/b5/ff/51b5ffa2dbbd9c42ec4083199cade06d.jpg
• https://cff2.earth.com/uploads/2019/05/21190400/deep-sea-anglerfish.jpg
• https://i.pinimg.com/originals/e9/68/62/e96862386d33effcbb97bf3ad9627ec7.jpg

Ride-on Toy - Group B

Teerox
• https://www.lifetime.com/swing-set-accessories
• https://kidshealth.org/en/parents/playground.html
• https://www.understood.org/en/friends-feelings/child-social-situations/playgrounds-playdates/8-common-playgroundproblems-and-how-to-help
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• https://www.arrowheadinc.com/fiberglass-manufacturing-processes/
• https://www.youtube.com/watch?v=gdmZI-jqJG0

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Arcadia

- https://dir.indiamart.com/search.mp?ss=bouncing+castle as on 9th april 2018
- https://www.thespruce.com/choosing-age-appropriate-toys-for-kids-4118934 as on 3rd april 2018
- Prof. Vijay bapat's collection as on 3rd april 2018
- Exploring biomechanics animals in motion by r Mcneill Alexanderas
- google

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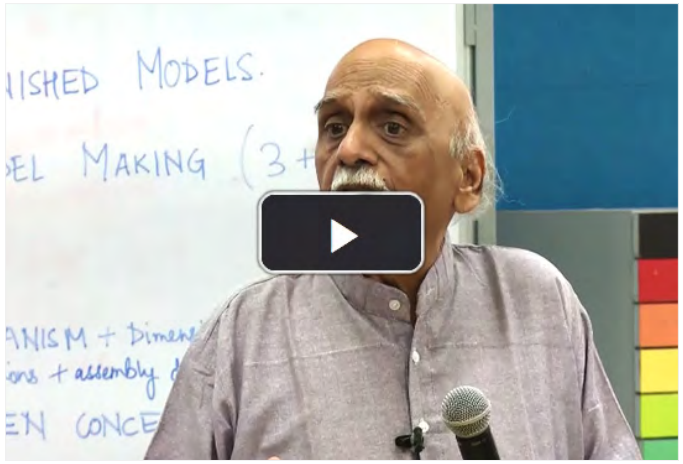
Videos

Introduction - User Centric Product Design

Theme of the Course - Toy Design Task



Difference Between Idea and Concept

Product Design Insights

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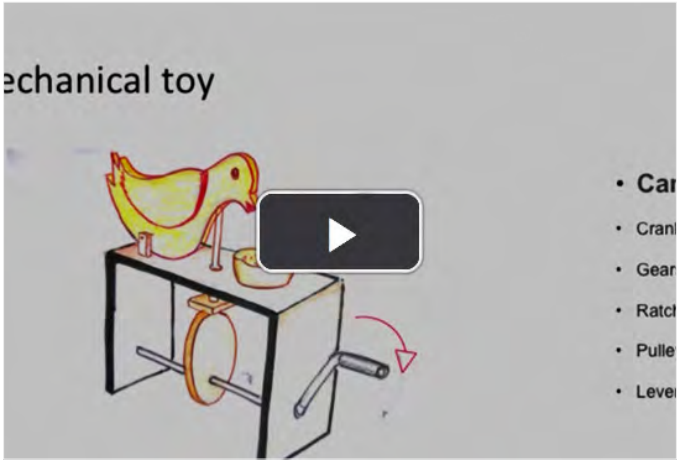
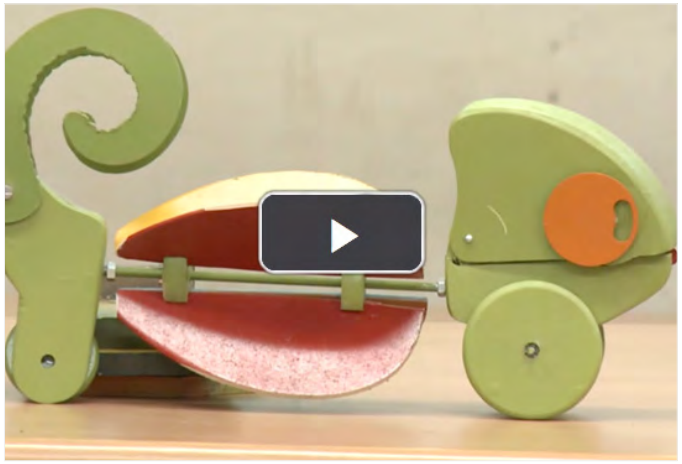


Understanding Toy Mechanism

Presentation Stage 1
by Anushree Banerjee

Toy Design Mechanism
by Anushree Banerjee



Catchy
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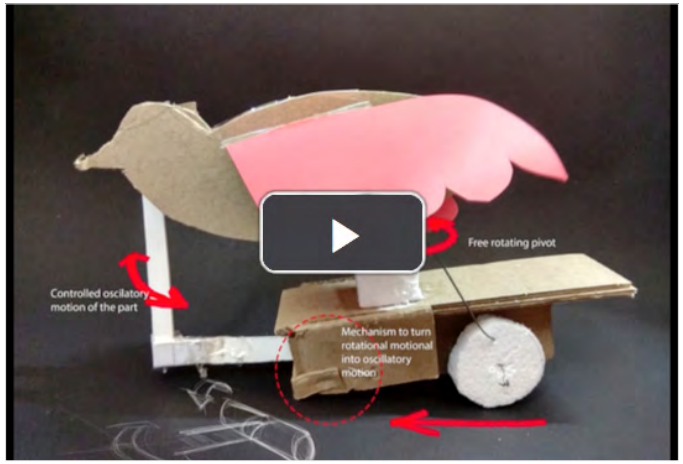
Presentation Stage 1
by Hari

Final Presentation
by Hari



Presentation Stage 1
by Minal Agarwal

Toy Design Mechanism
by Minal Agarwal

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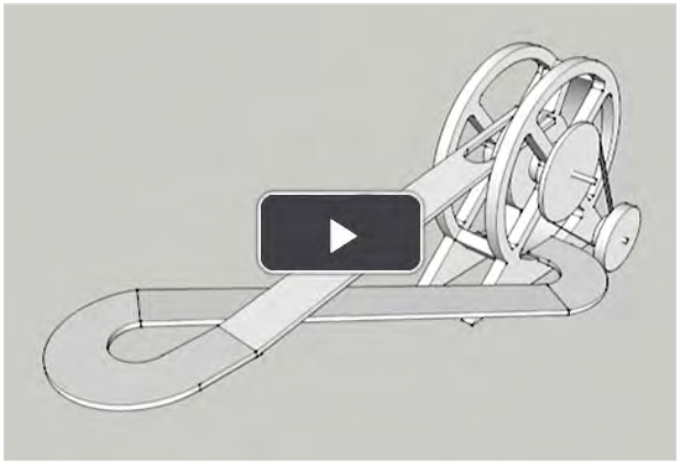
Pakhi by Minal Agarwal

Presentation Stage 1 by Mridul Jain



Final Presentation
by Mridul Jain

Presentation Stage 1
by Nikita Fatarpekar

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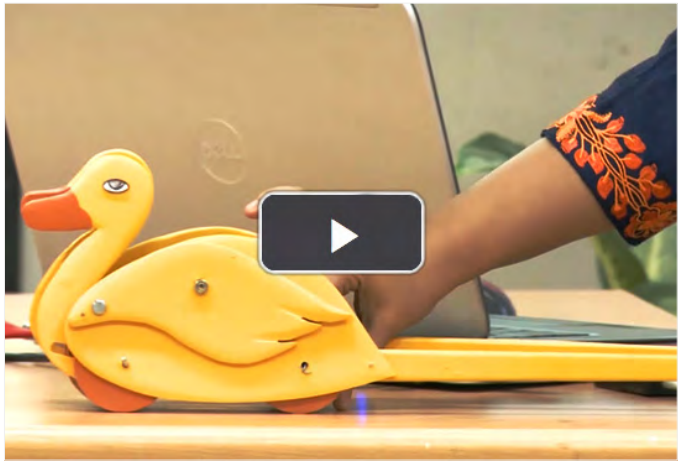
Toy Design Mechanism
by Nikita Fatarpekar



Totter
by Nikita Fatarpekar

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by Nirmal P J

Toy Design Mechanism
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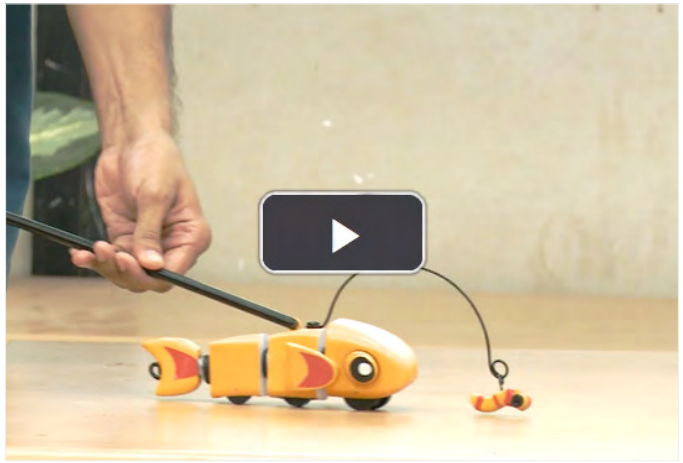
Waliz by Nirmal P J

Presentation Stage 1
by Rajat



Final Presentation
by Rajat

Chani
by Aamod Narkar

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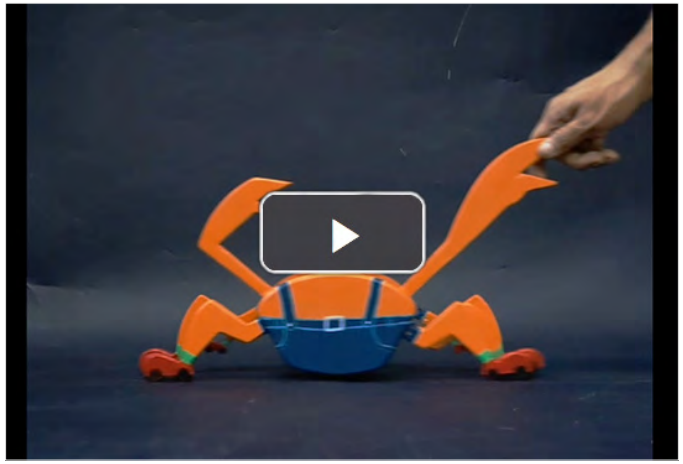

Rolly
by Ashuj Chawda

Akira
by Mohammed Hazique Kola

Tooti
by Naiga Catherine

Go Bananas
by Parth Rathod

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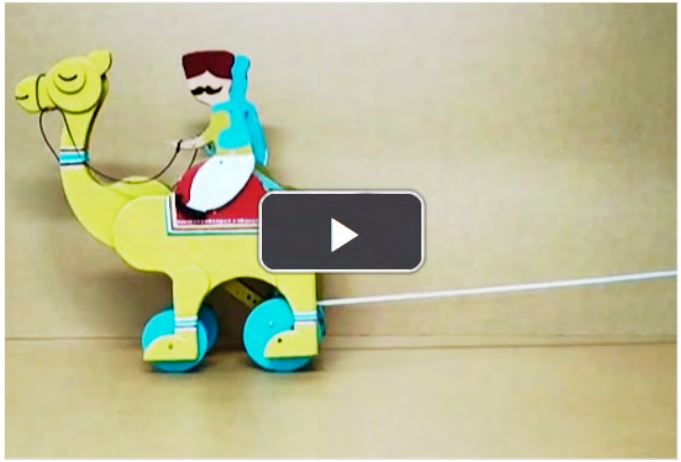
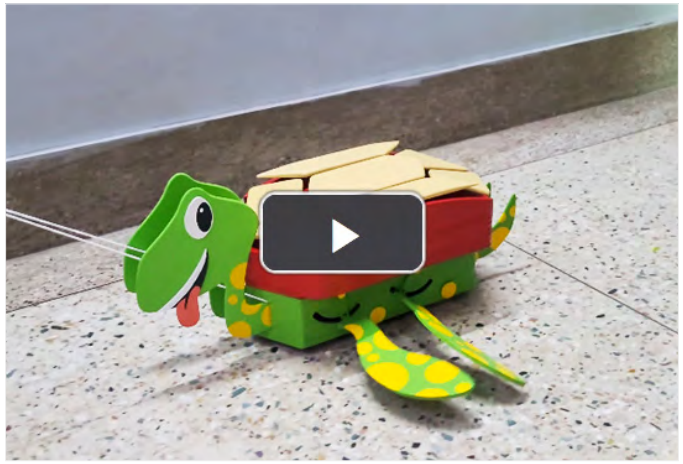
Pambo
by Sagar D Dabherao



Cunth by Snehal Gaikwad



Taco by Susovan Gupta

Hooti
by Uppili Nithin Soorya B

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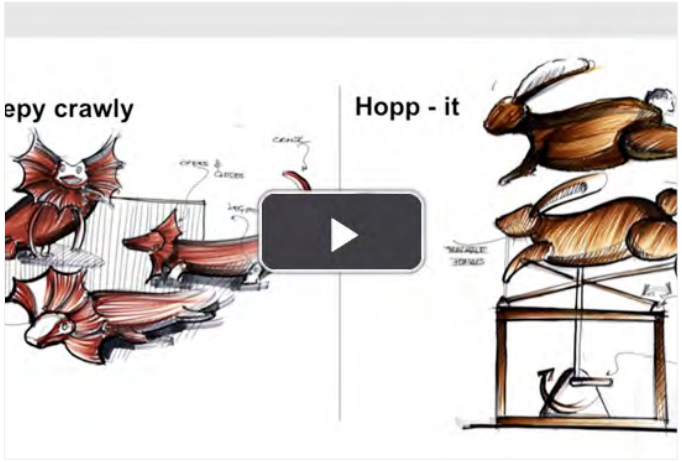
Final Presentation
by Apurba Mondal



Presentation Stage 1
by Archana S

Toy Design Mechanism by Archana S

Bobster
by Archana S

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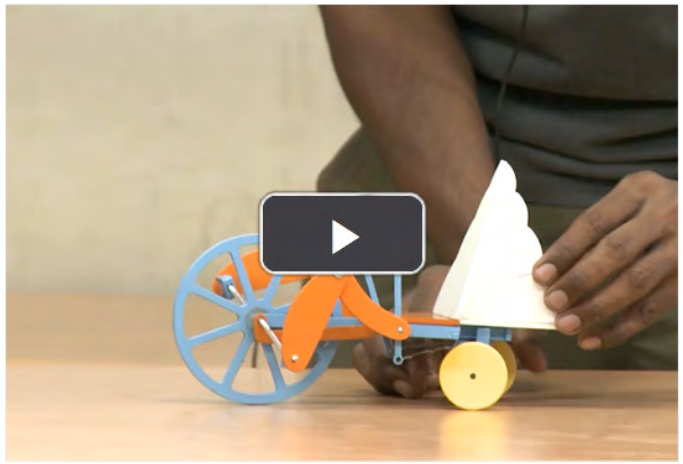
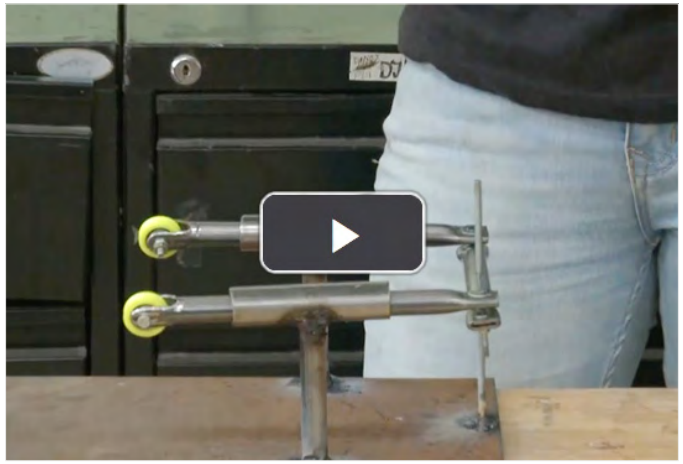


Final Presentation
by Maddu Shravan Murali

Presentation Stage 1
by Minu



Toy Design Mechanism
by Minu

Teerox
by Minu

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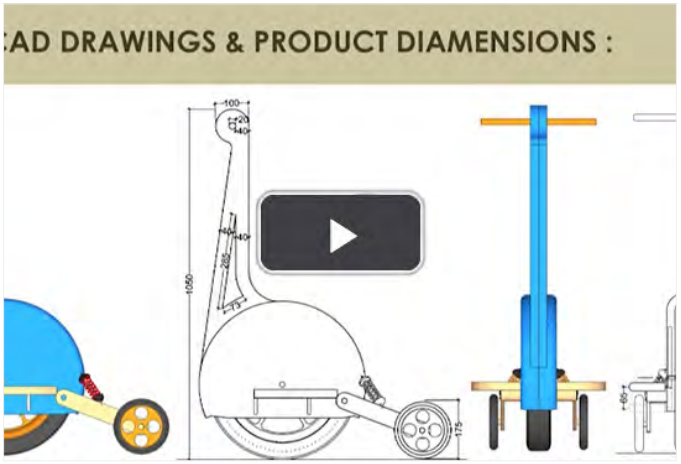
by Saijith M S

Charger
by Saijith M S



Presentation Stage 1
by Sukanta Maharana

Final Presentation
by Sukanta Maharana

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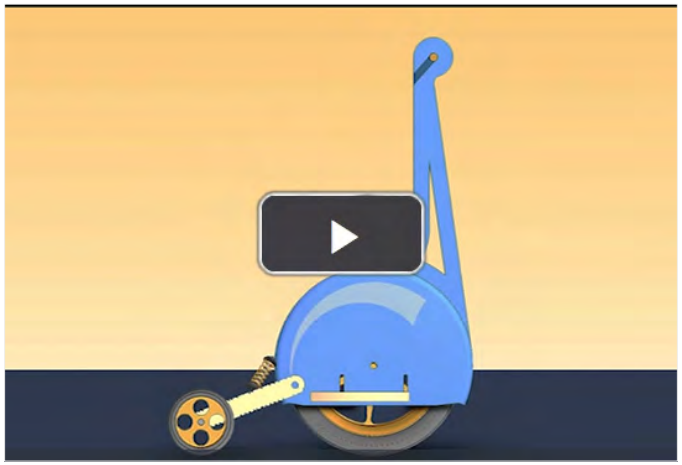

Arcadia
by Sukanta Maharana

Presentation Stage 1
by Vinod Louis Joseph Swamy

Hornsby
by Vinod Louis Joseph Swamy

Students Presentations and Feedback

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Contact Details

This documentation for the course was done by Professor Vijay P Bapat, faculty at IDC, IIT Bombay.

You can get in touch with him at bapat[at]iitb.ac.in

You can write to the following address regarding suggestions and clarifications:

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Industrial Design Centre
IIT Bombay
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