Rollerpede

Wooden push toy
for 9-15 months old

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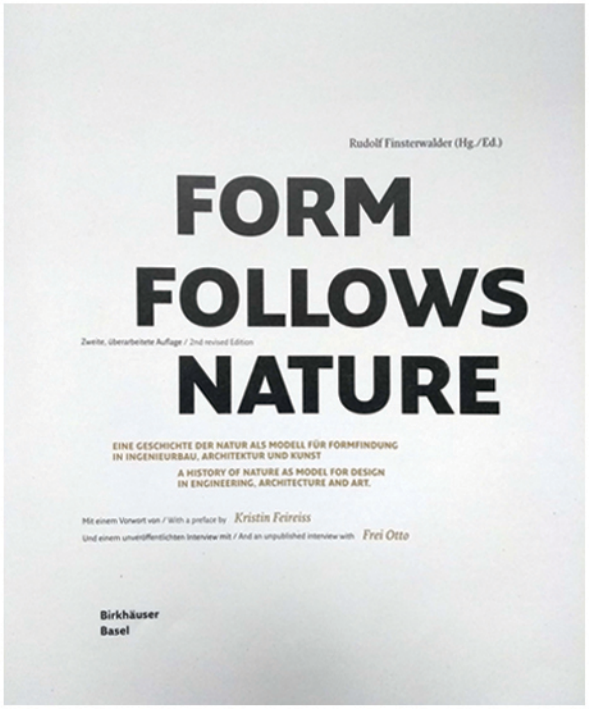
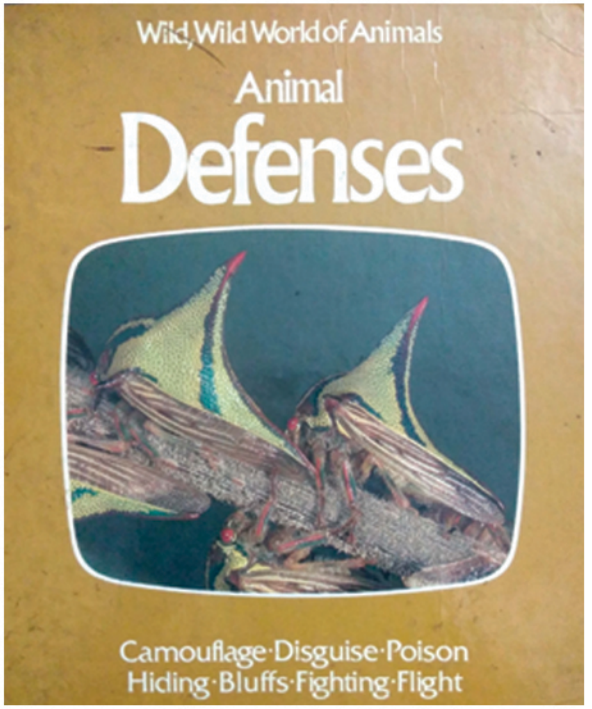
Introduction

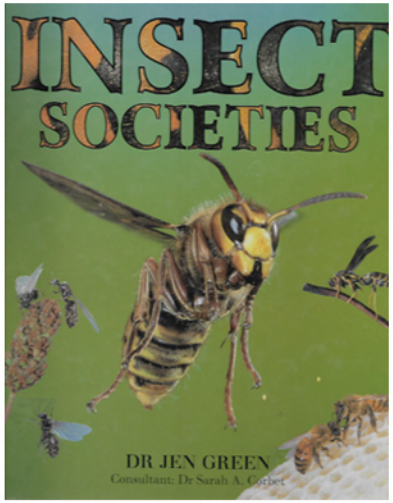
The exercise was given as a part of the Product Design module in second semester of Jr. M. Des. Industrial design course at IDC, IIT Bombay, conducted by Prof. Vijay Bapat. The class of 14 was divided into groups of 7 each with first group given a task to design a push toy for 9-15 months old and another 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.

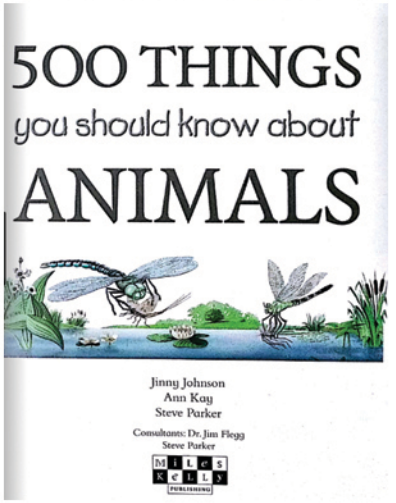
Biomimicry was given as a concept for design. Everyone has to take inspiration or derive their ideas from nature. Prof. Bapat gave us books regarding nature and nature inspired designs from his collection to give us a start. The initial days we spent looking for ideas and inspiration, conducting market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

**Books provided by Prof. Bapat*





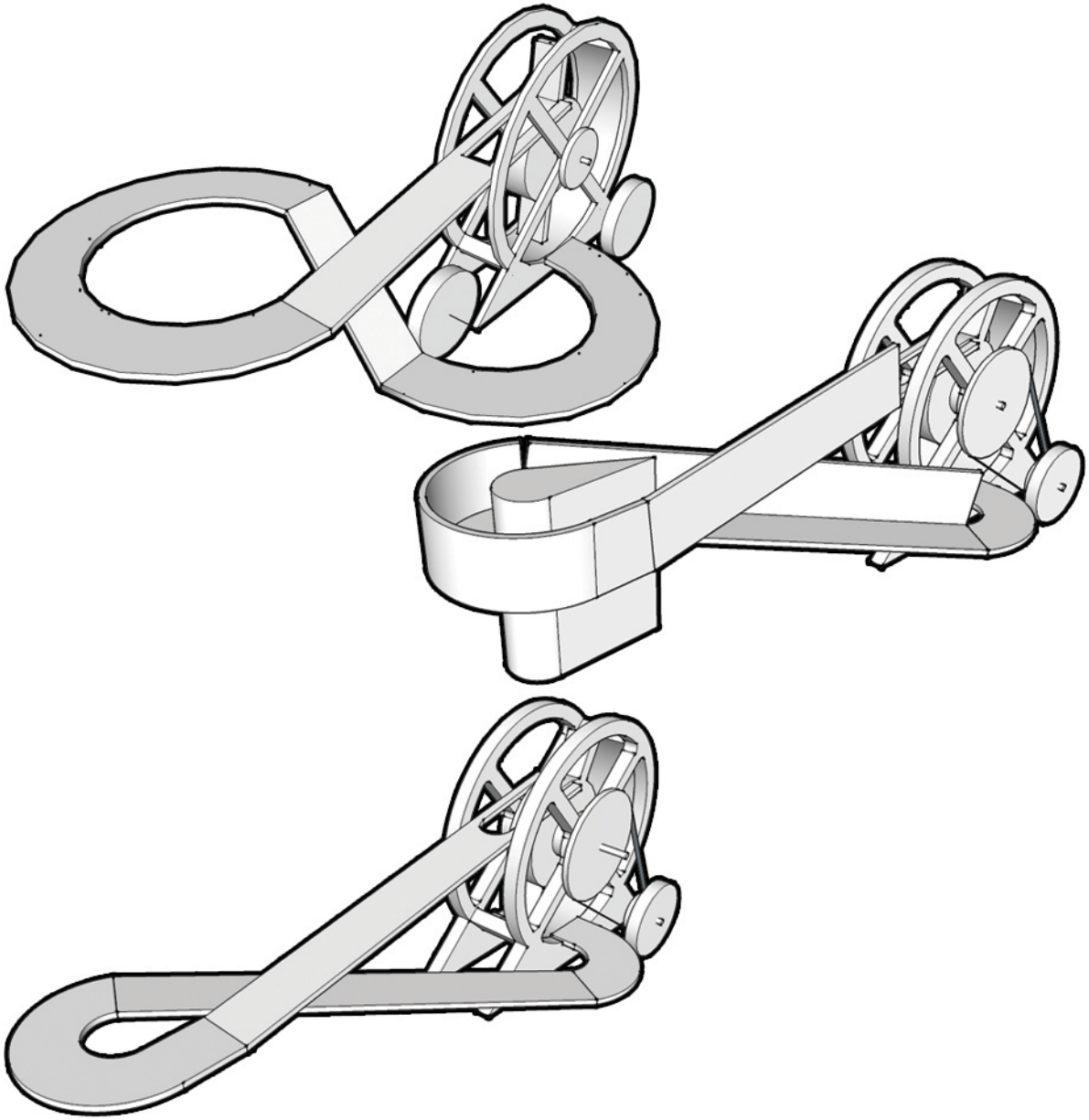


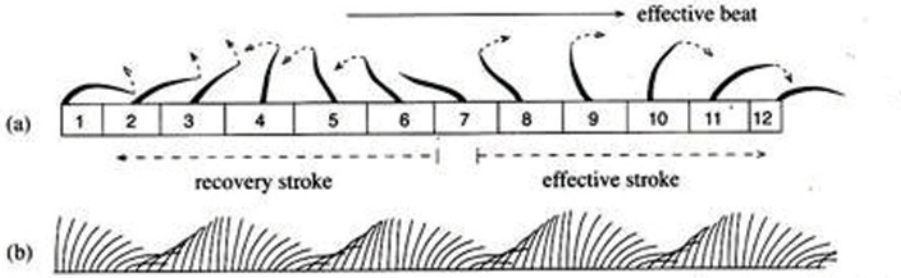


Final Concept and formal variations

The final concept came out of the cumulative understanding and combination of the Walrus and the human heart concept. Picking up the walls from the floor in the Walrus concept proved to be a bit tricky. Instead, a single ball now circulated through the toy driven by the wheel.

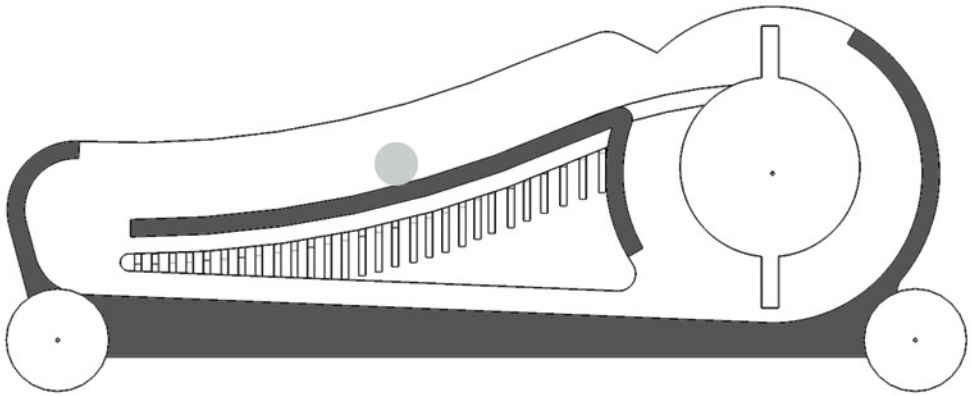
The initial formal variations tried to emulate the 4-chambered blood flow in the human heart. But after making different formal variations, it was realized that the toy was getting more complicated in trying to mimic exactly what exists. Reading about the heart, I came across a term called metachronal rhythm. A metachronal rhythm or metachronal wave refers to wavy movements produced by the sequential action (as opposed to synchronized) of structures such as cilia, segments of worms or legs. These movements produce the appearance of a travelling wave. It is like the movement of cilia or as in millipedes. So the millipedes and its legs came as a new inspiration.

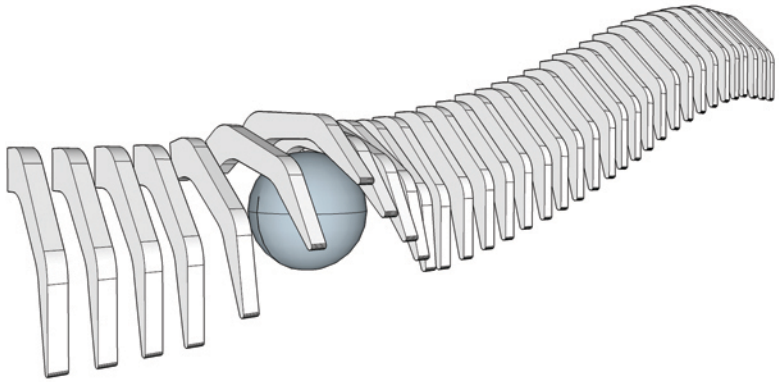




2.9 : Diagram to illustrate metachronal rhythm. (a) Cilia 1 and 12 are at the end of the effective stroke; 2–7 indicate successive stages during the recovery stroke; 8-11 indicate stages during the effective stroke. All the cilia 1–12 are beating in sequence. (b) Diagram illustrating the optical appearance given by a profile view of cilia beating in metachronal rhythm.

Metachronal rhythm in th locomotion of millipede and cilia

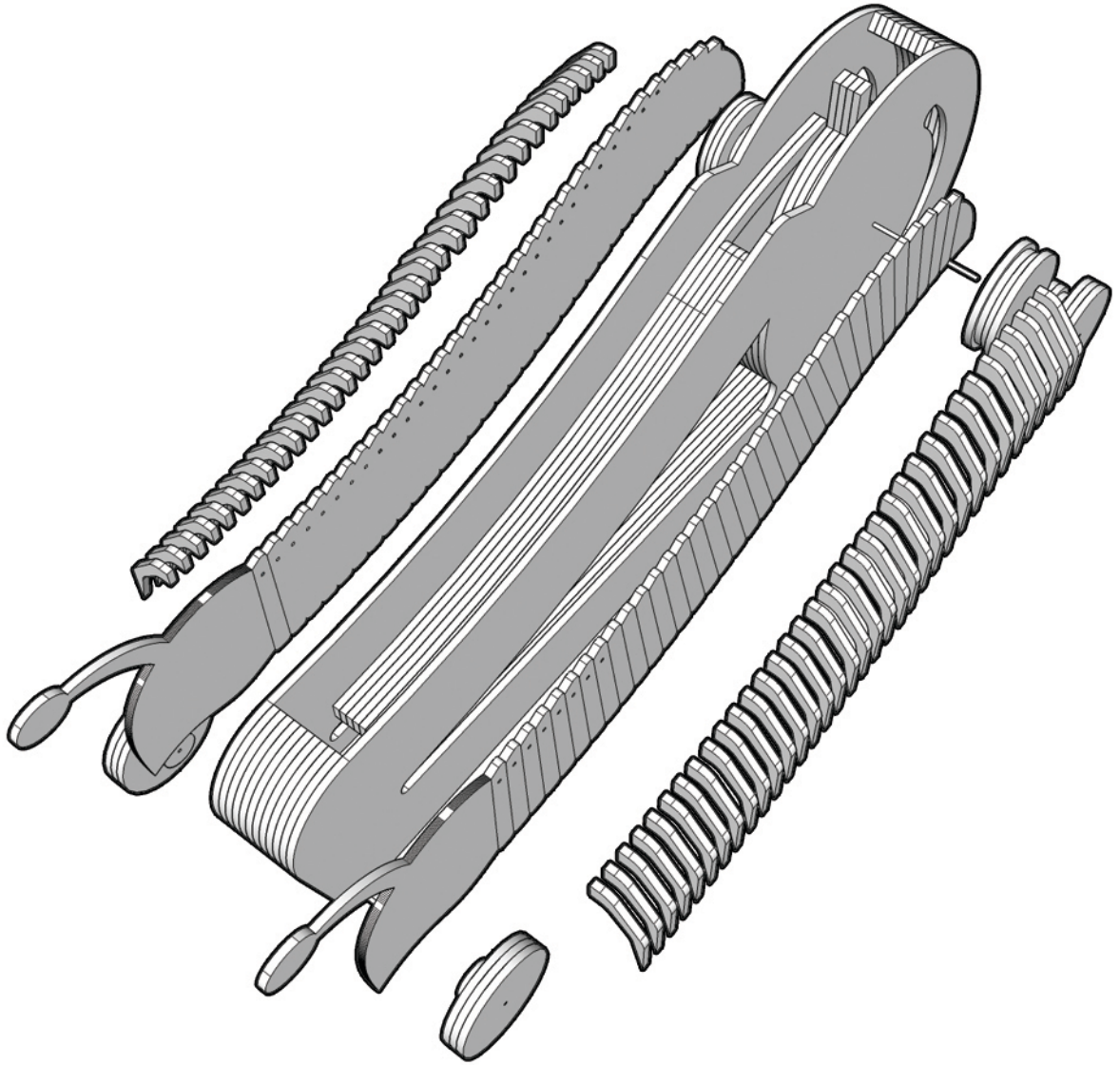




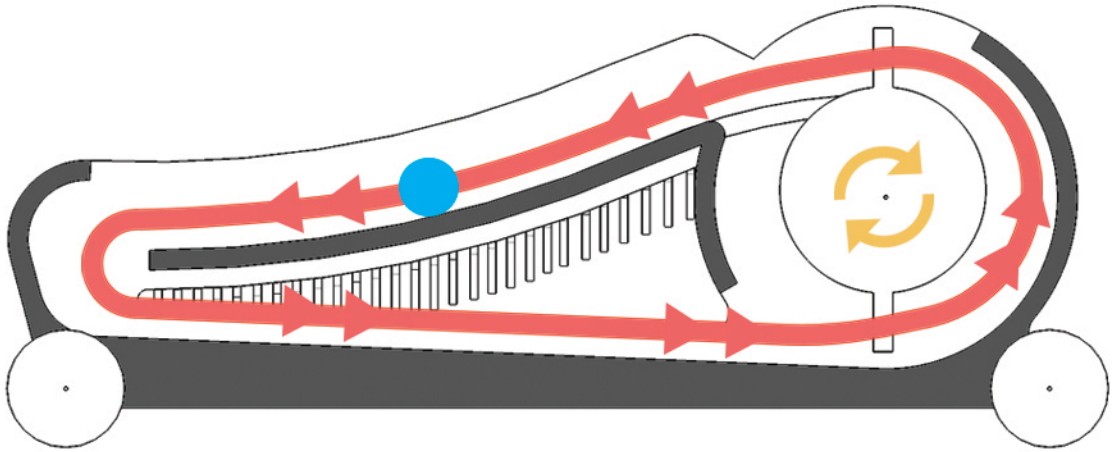
Trying to emulate the movement of millipede's legs through a rolling ball

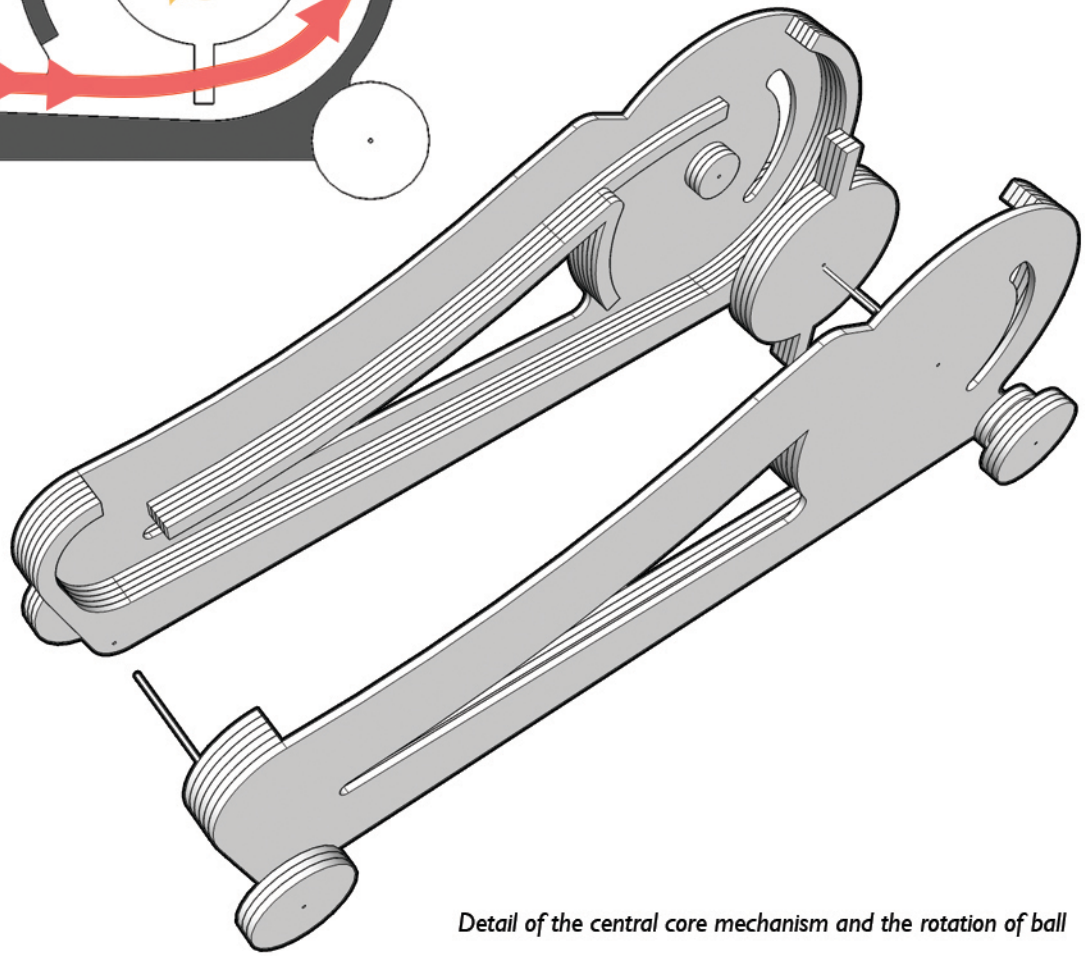
Final Design

The final design detail and scale came of of many considerations. One of them was the size of the ball. The size of the ball was kept 3.3.5 cm diameter so that the child would not be able to swallow it. Keeping the size of the ball fixed, at any moment during rolling down, the ball should displace atleat 3 pair of limbs to create a visual effect of wave. Therefore, the distance between 2 pair of limbs should not be greater than the radius of the ball i.e. 1.5 cm.

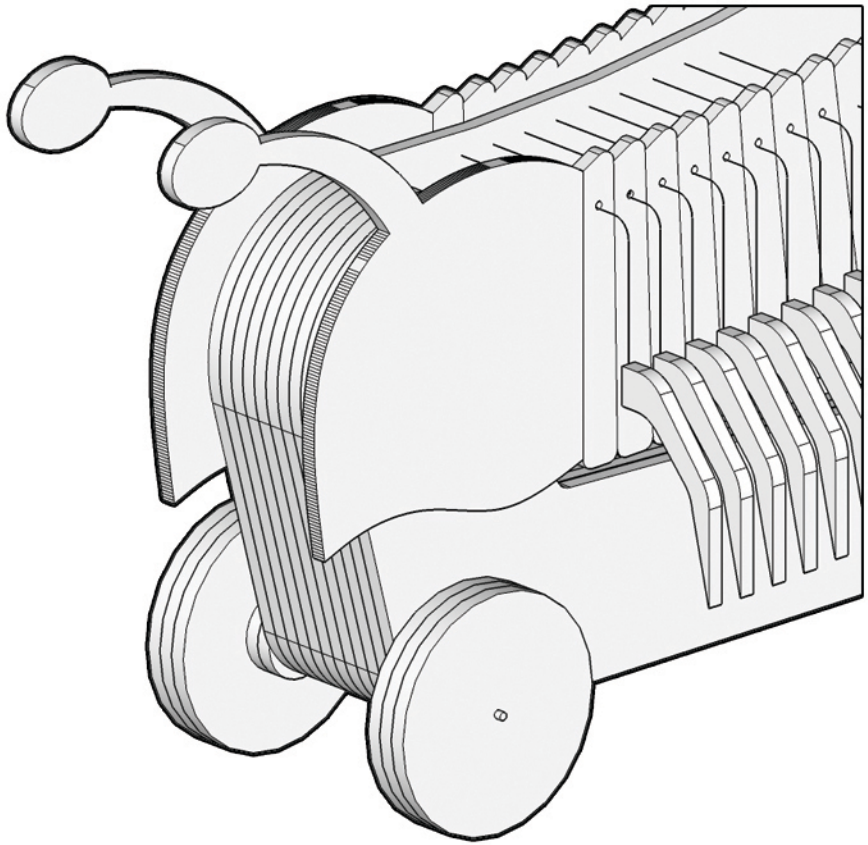


Assembly and layering of product

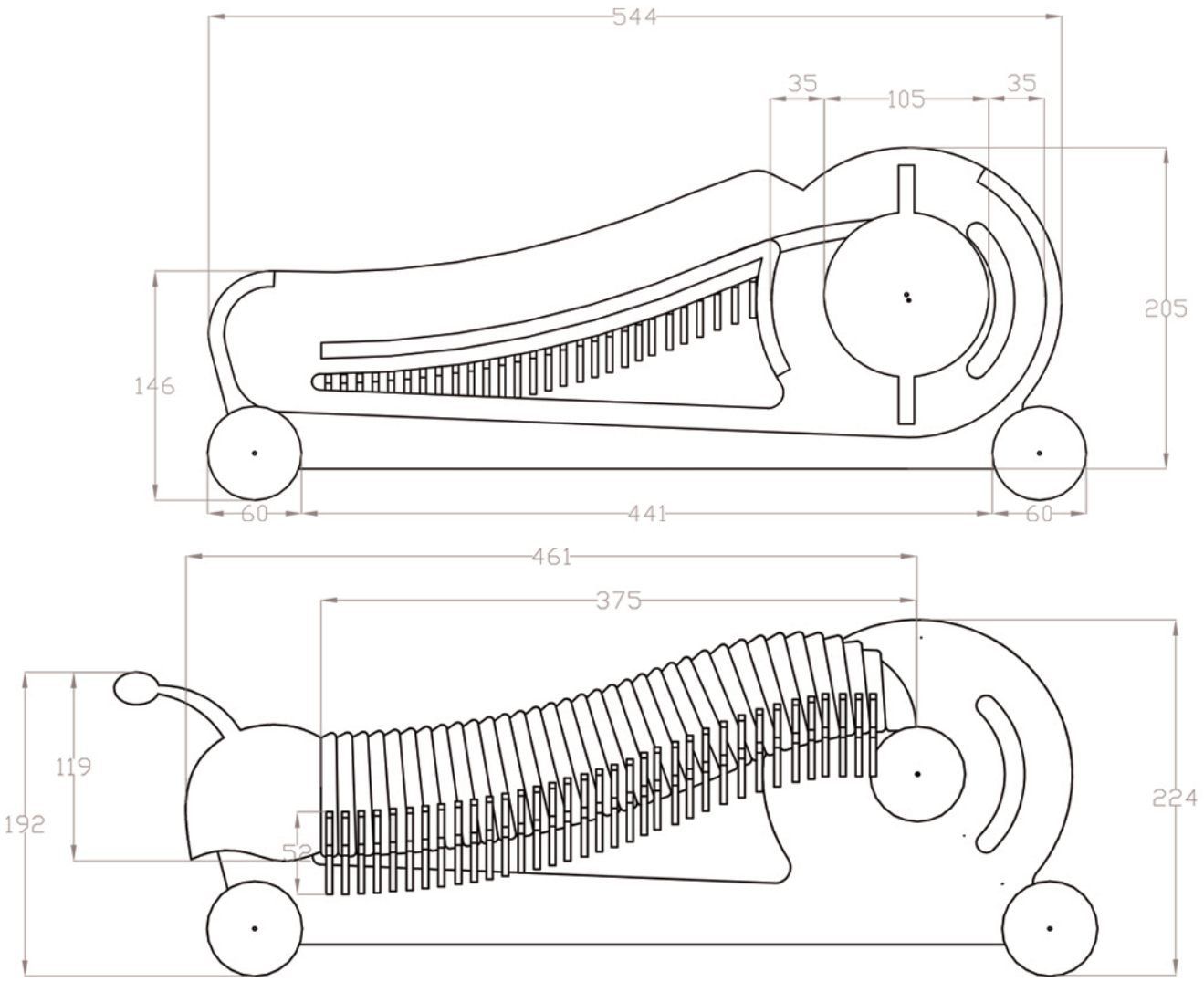




Detail of the central core mechanism and the rotation of ball



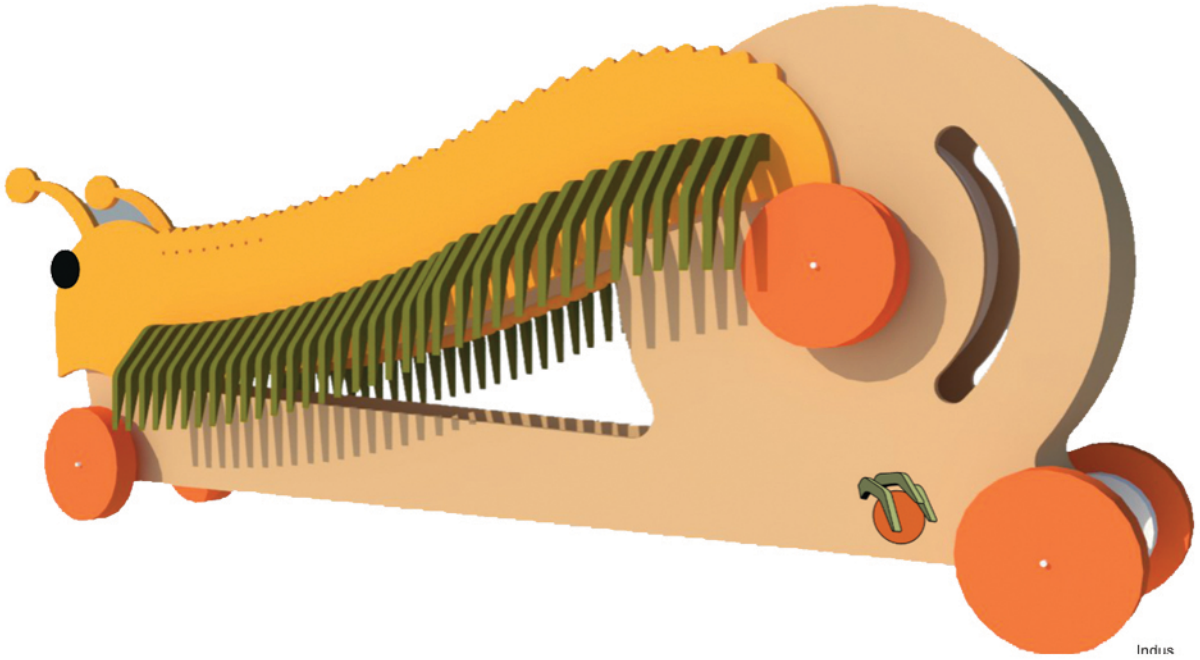
Detail of the ball contact and limb movement mechanism


544
35
105
35
205
146
60
441
60
461
375
119
192
224
52

Branding

The main features which makes the toy are millipede and a rolling ball which translates the motion of its limbs. Therefore, a logo should convey these characteristics of the toy. The Logo, also, should not be very descriptive of the toy, rather should just give a visual hint of what the toy is about. In this case, a rolling moving ball creates a wavy pattern in the series of limbs of the millipede, hence, a ball and th and three legs rising due to the ball rolling below communicates the essence of the toy without being explicit about the animal or the movement from the outside.

rollerpede



Logo and branding

Toy study and toy shop visit

Prof. Bapat also provided us with some interesting toys to study from his collection and also examples from few of the toys designed by students of previous years. He also asked us to visit the toy shops nearby to see what is there in the market.

It was a personal realisation that there is a stark difference between the toys available at the Hamley's store and the toys from Prof. Bapat's collection. The Hamley's store is full of generic toys placed categorically in different shelves such as string pull toys, miniature cars, roleplay toys, dolls, figurines etc. Here, the design of a toy, semantically, is very much suggestive of what activity is to be performed on it, which, in turn, is reinforced by making figurative or iconographic designs. There was nothing new in terms of function and activity. Unlike the Hamley's toys, the toys from Prof. Bapat's collection were very simple, ingenuine and honest in terms of the function it performed and the form and iconography it represented.

toys provided by Prof. Bapat

Group Brainstorming

A class discussion and brainstorming session was done post toy study and market visit. The aim of the discussion was to exchange and share insights among each other and also to analyse issues and points common to everyone.

The points came up during the brainstorming session helped in creating a final consolidated brief for oneself. The insights were further categorized and divided into 'Must have' and 'May have'.

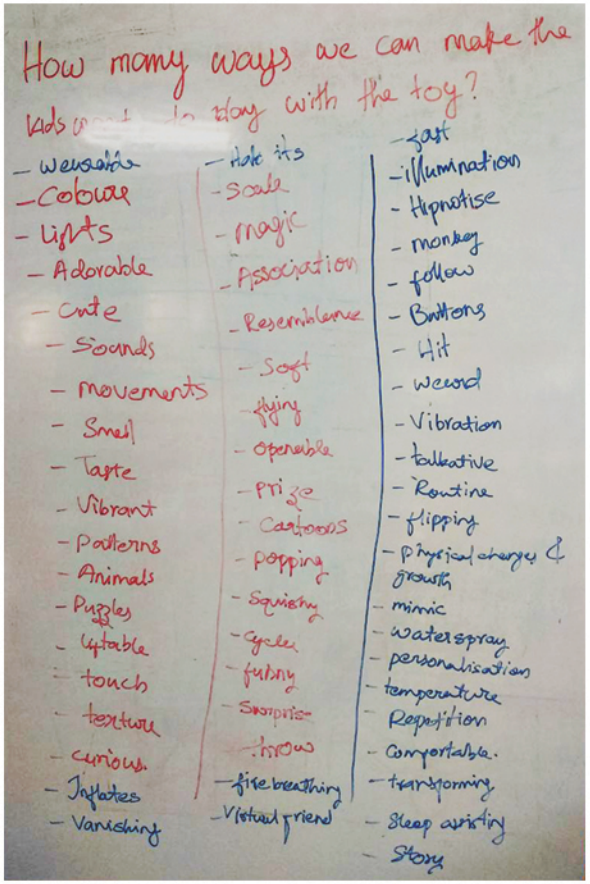
Insights which came after group discussion and brainstorming.

Must have

- The toy should be safe for the kids – form, material and size of parts, etc.
- The toy should be easy to operate and visually approachable.
- The toy should be able to withstand wear and tear

May have

- The toy should be relatable to their surrounding environment
- The toy should be able to keep up with the curiosity of the kid
- The toy should facilitate the physical development of the kid like sensory, fine motor and gross motor skills
- The toy should facilitate the Cognitive development of the kid like logical, creative and linguistic skills.
- The toy should facilitate the social development of the kid like emotional, communication, self- esteem, empathy etc.
- The toy should communicate with the child.
- The toy should be able to create memories
- The toy should be more open ended.
- The toy should provide a personalised experience to the kid



A snapshot of the keywords came up during the group brainstorming session.

Brief

After group brainstorming session, everyone created their own individual brief for the toy. Belonging to the first group, the author had to design a wooden push toy for 9-15 months old children. The insights for the brief came from literature, toy and market study as well as group sessions. Here are shown the major points which forms the brief.

The brief, nonetheless, consists of all the 'Must have' points which arrived in the group brainstorming session. The points shown are the issues and areas observed by the author.

1. There is an evident lack of new formal expressions which define an act of play and vice versa in the market of toys for small children. Also, toys being too defined and too suggestive restricts child's own creativity to come into picture during an act of play. Hence, the design of the toy should be based on the premise of addressing these two issues.

2. From the children of age 9-15 months, concentration on any orderly activity is not usually expected. For them, playing is more of a disorderly activity without any rules or regulations. Due to their inquisitiveness, they demand for a more quick and direct feedback from the toy for the actions they perform on it. It could be visual or audio or tactile or even through taste or smell. The toy should be based on the concept of instantly reacting or communicating back to physical actions performed on it by the child. This action-reaction or communication of the child with the toy forms the building block of an act of play. The toy, thus, could react to the child by transforming its form, or colour, or position in space and/or by making any sound. Although, many toys such as string pull toys etc. works on a similar kind of approach, the expected physical action input required on the toy in these cases is very coordinated and controlled for a 9-15-month-old child, unlike in the case of a balloon or a hit me toy where the action input by the child is much more simple and instinctive in bringing an instant physical reaction. Thus, the toy should be designed for a higher degree of its physical interaction with the child based on the concept of action-reaction/communication.

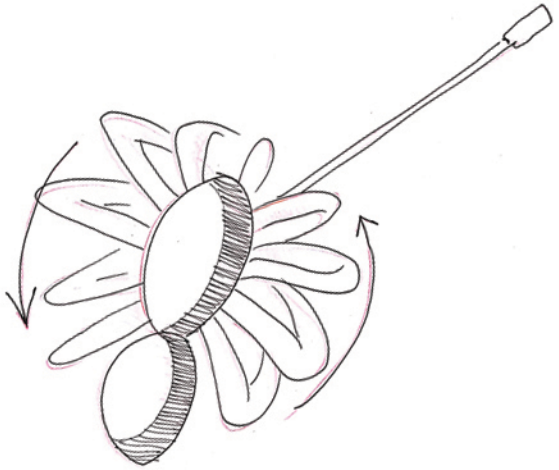
3. Age of 9-15 months is the time when a child learns to walk and move. The toy should encourage the child to walk or move by making him independent and exploratory in his/her space of play.

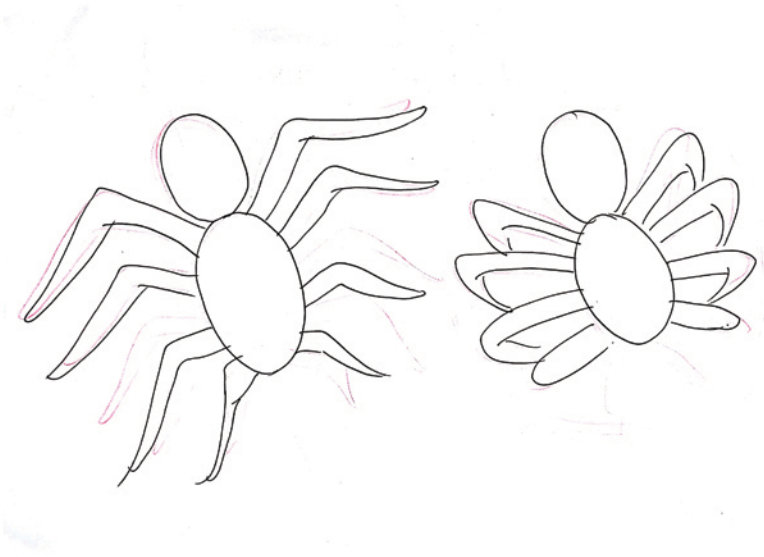
Ideation

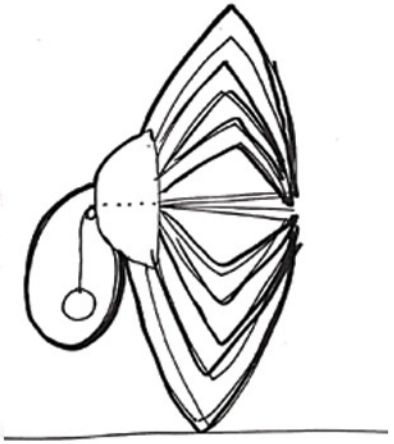
The nest stage was to come up with different ideas and concepts inspired from nature which could take shape of a toy and also takes in consideration the points which came in the brief.

There are toys in the market which try to replicate the movements and activities in nature but there are very few which take the inspiration to add a new dimension to the toy. Many ideas were generated initially in the process of ideation inspired from various things in nature such as spiders, cockroaches, human heart, walrus. Each of these inspirations came with the intent of enhancing and getting involved in the act of pushing and walking. Like, spiders changing the form to change the locomotion, bipedalism in cockroach when walking at high speeds, associating movement and rhythm of walking with the rhythm of heart in a pinball inspired setup, spitting of water by walrus in the form of a ball or marble driven by the pushing and rolling action of the toy.

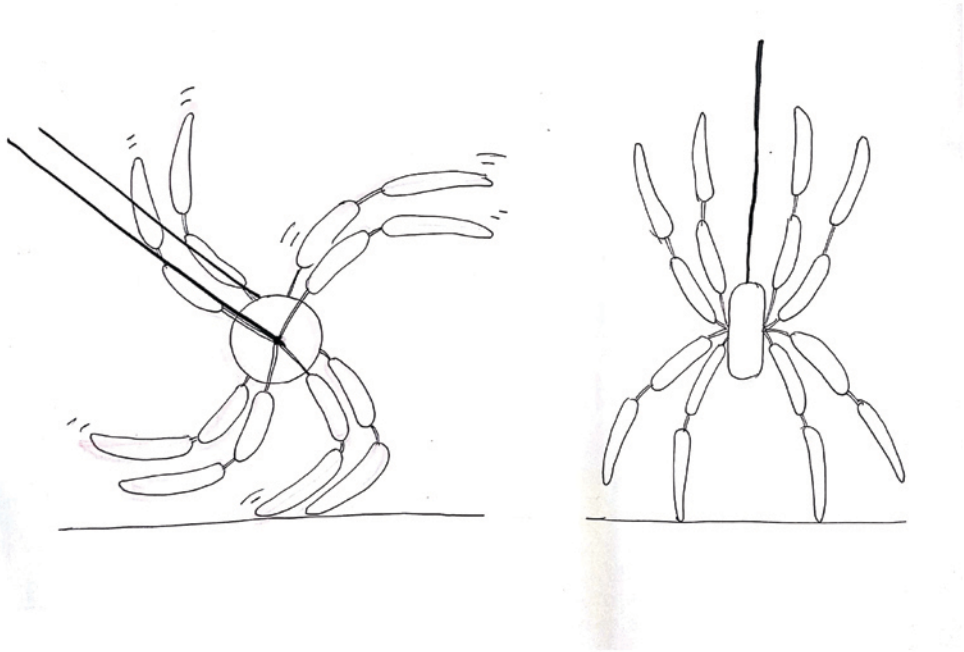
1. Golden wheel spider



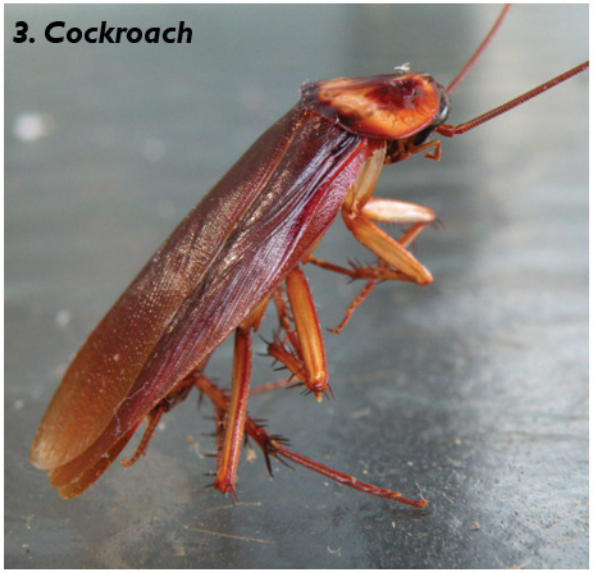


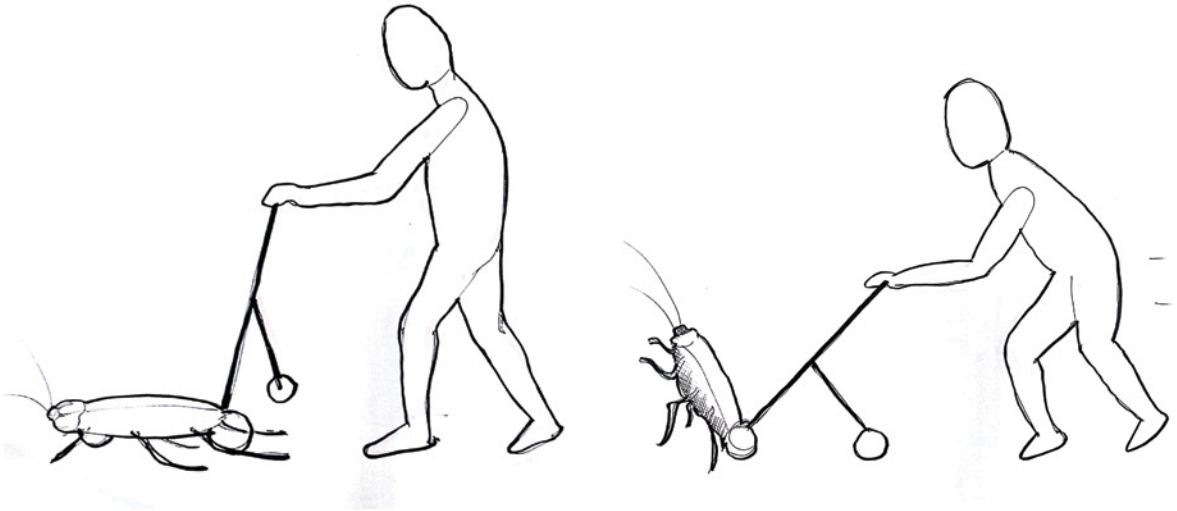


2. Flic-flac spider

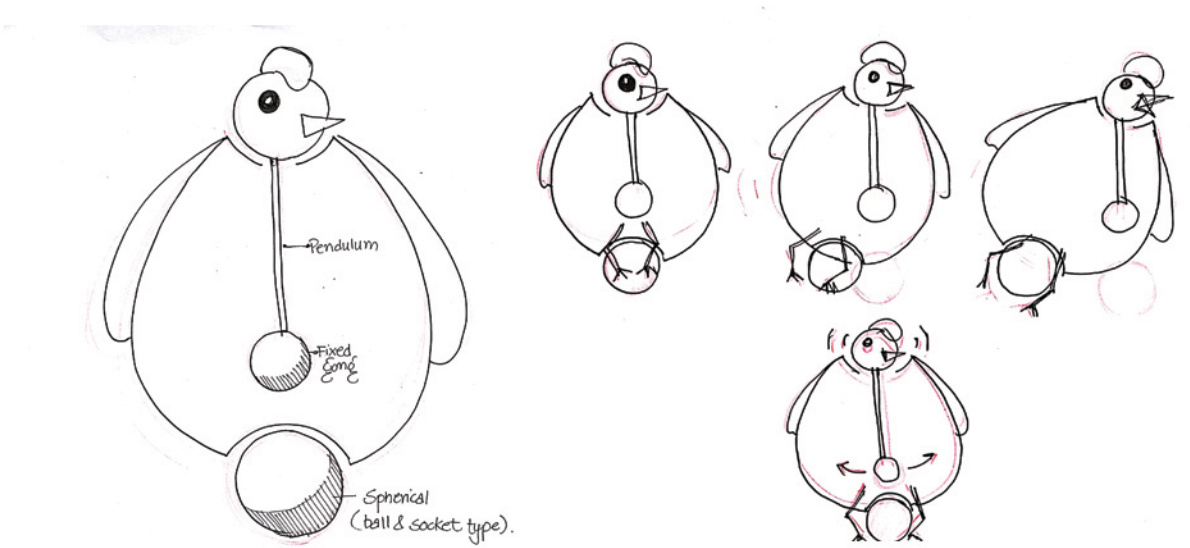


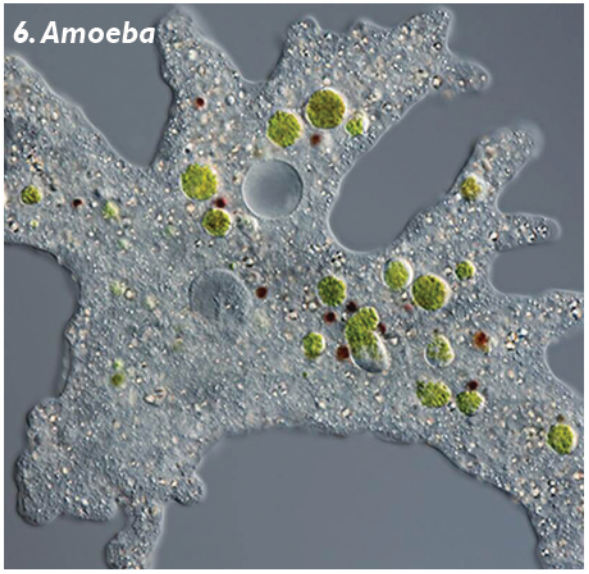
3. Cockroach

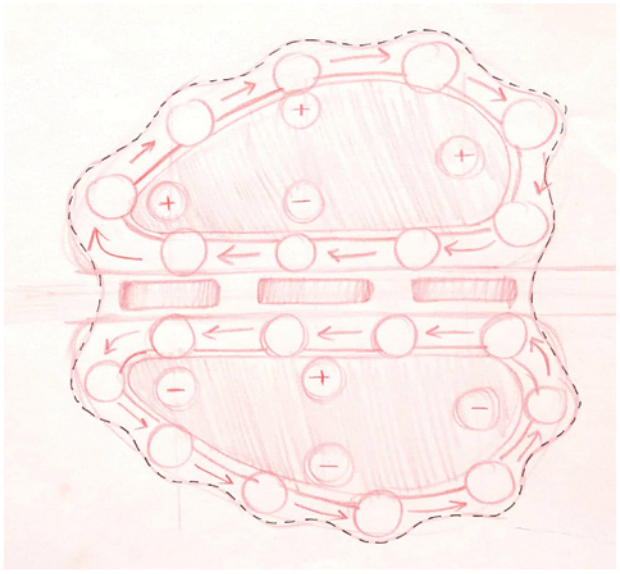


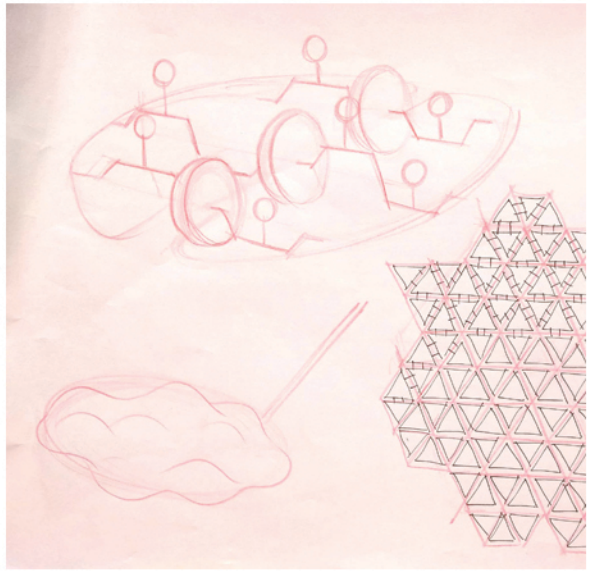



5. Chicken

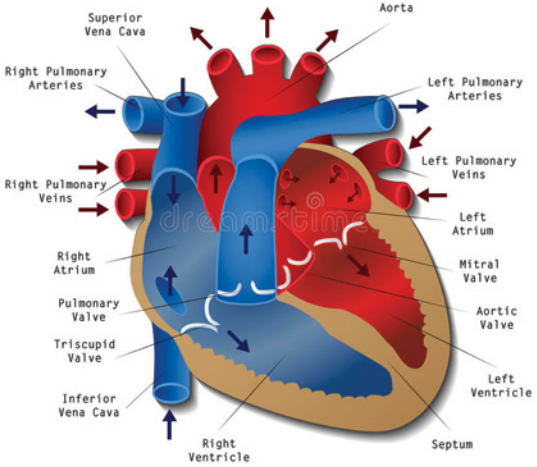

Pendulum
Fixed Joint
Spherical
(ball & socket type).

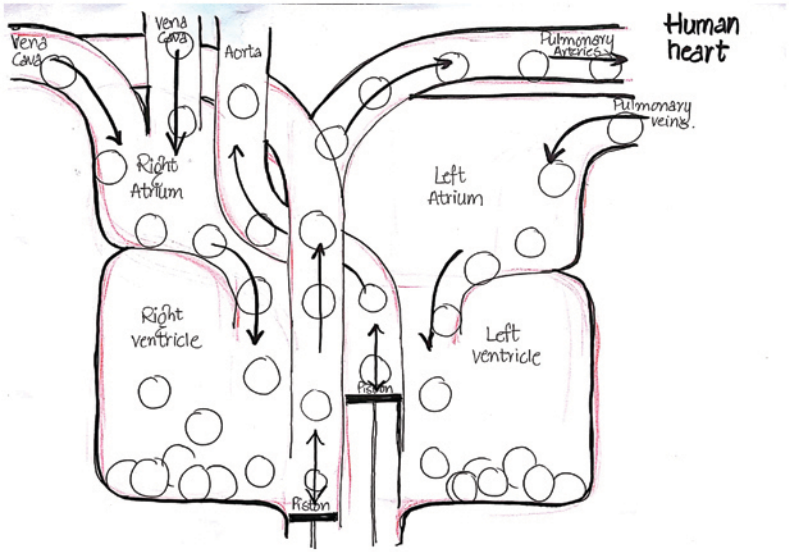

6. Amoeba



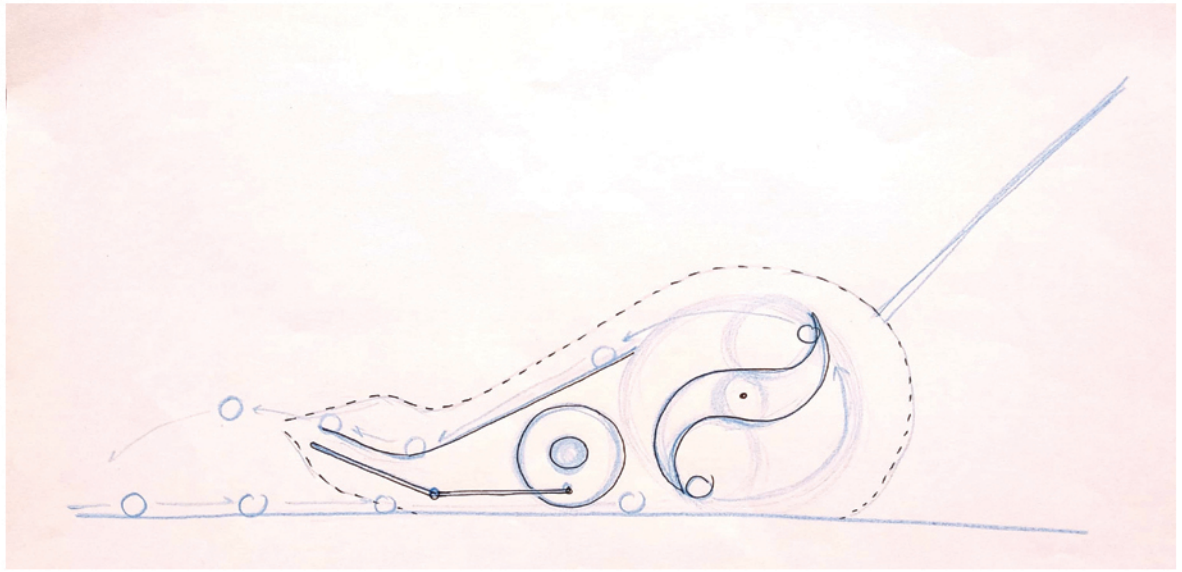


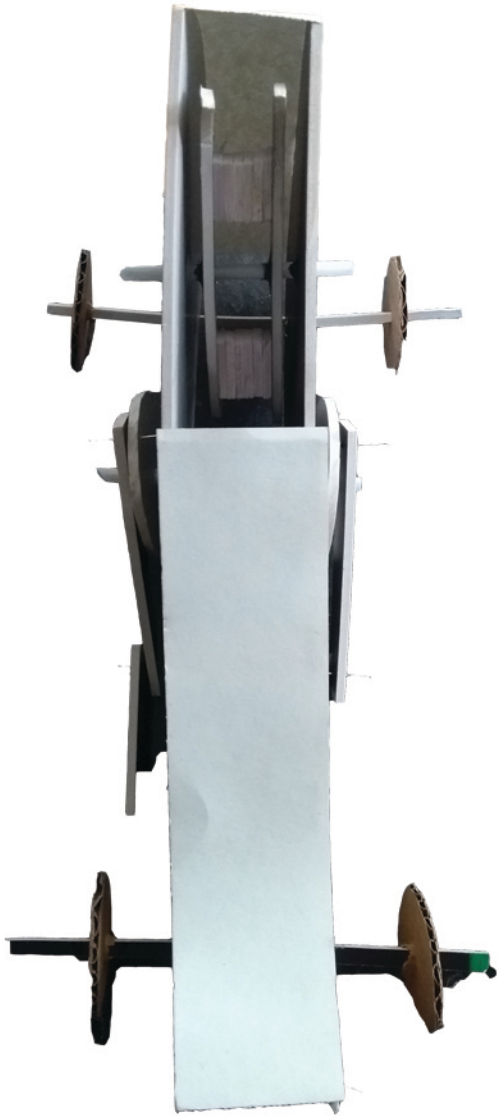
7. Human Heart





8. Walrus





Sketch model for the walrus concept