

Good Morning

Design of Educational Products for ISRO

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Institute and **Education**

ISRO

Government of India set up Space Commission and Department of Space (DOS) in June 1972.

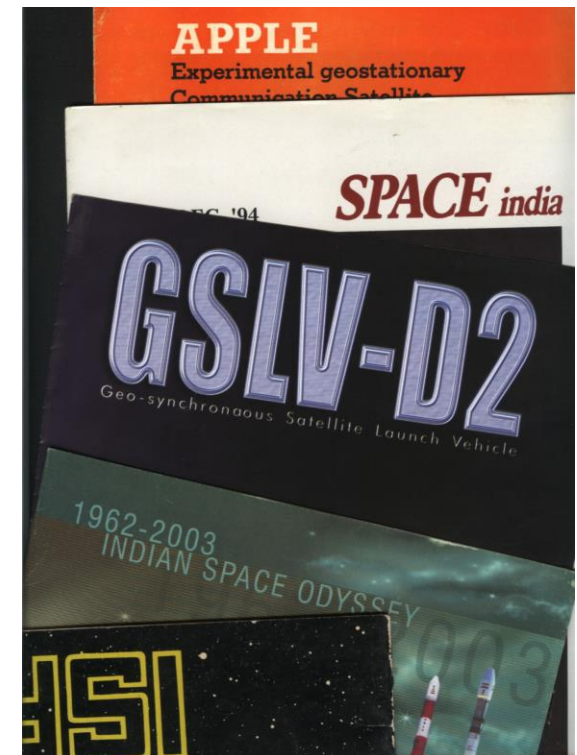
Indian Space Research Organization (ISRO) under DOS executes Space programme through its establishments located in different places in India.

Main objective of space programme includes development of satellites, launch vehicles, Sounding Rockets and associated ground systems.

The prime objective of ISRO has been to develop space technology and its application to various **national tasks**.

ISRO — Reaching out

- ISRO has the responsibility of bringing the **organizational developments to other professionals and general public of the country.**
- ISRO is attempting **to reach out through publications, in-house public exhibitions as well as setting up temporary exhibitions at Technical Institutes, Technical fairs and International Fairs.**



ISRO – communication efforts



The screenshot shows the homepage of the Indian Space Research Organisation (ISRO). At the top, there is a header with the ISRO logo on the left, the Indian national emblem in the center, and the text "Department of Space" on the right. Below this is a large banner with the text "Indian Space Research Organisation" and a background image of a satellite in orbit. A navigation menu below the banner includes links for "About ISRO", "ISRO Centres", "Programmes", "Decade Plan", and "Milestones". There is also a link for "Hindi Version".

Below the navigation menu, there are several sections:

- Space Science**, **Research Sponsored**, **Space Services**, **International**, and **ANTRIX** (all in black buttons).
- Activities of Attached Offices**, **Central Sector Schemes**, **Papers laid in Parliament**, and **Citizen's Charter** (all in white text on a dark background).
- Our Chairman** (in white text on a dark background).
- Annual Report** and **Annual Budget** (in blue text).
- Press Release**, **Announcements**, **Training Facilities**, **Tender Notice**, and **Job Opportunities** (all in yellow text).
- News Letter Spacelndia** (in blue text).
- Site Map**, **Contact for Information**, and **Suggestion about WebSite** (all in blue text).

On the right side, there is a quote: "The prime objective of ISRO has been to develop space technology and its application to various national tasks. Since 1969, when it was set up, ISRO has established space systems like the INSAT for telecommunication, television broadcasting and meteorological services, and the Indian Remote Sensing Satellites (IRS) for resources monitoring and management. ISRO has also developed the satellite launch vehicles PSLV and GSLV to place these satellites in the required orbits."

At the bottom, there is a date: "Friday, January 30, 2004".

Below the quote, there is a link: [Antrix Signs Agreement with Space Imaging, USA for Marketing RESC](#)

At the bottom left, there is a date: "Updated on Jan 26, 2004 7:30 PM".

Below the date, there is a section titled "Conferences:" with two bullet points:

- XIII National Space Science Symposium 2004, Kottavam during February 17-20, 2004.
- VII GSDI-7 Conference 2004, Bangalore during February 2-6, 2004.

Largely promotional

Education not seen as a keen interest

Attempts made by **ESA, NASA**

Center for educational resources

Education- one of the prime interests

The screenshot shows the ESA Education website. At the top, the ESA logo and 'Education' text are displayed, along with the European Space Agency name. A navigation bar includes links for 'ESA Home', 'Education', 'High School', 'Higher Education', and 'Teachers'. A left sidebar menu lists categories like 'About ESA Education', 'Sites', 'Projects', and 'Services'. The main content area features a 'PROJECTS' section with links to 'IAF Congress 2004', ''Zeg het ISS'', and 'Student parabolic flight campaign'. A 'SPOTLIGHT' section highlights 'Where is Mars Express now?' and a 'Spotlight' Archive. Below this is a red banner for 'Europe on Mars' with the text 'Follow the progress of Mars Express'. A 'Space in our lives competition' section, dated 5 January 2004, describes a competition where participants answer questions about space's impact on the future. A 'NEWS IN BRIEF' box lists updates such as the extension of the IAF 2004 application deadline to 1 March and the availability of German and Dutch versions of an ISS education kit. A 'More News' section lists various events like Hungary's first space education workshop and an art competition on life in space. At the bottom, there is a search bar and an advanced search option.

Attempts made by **ESA, NASA**

Center for educational resources

Education- one of the prime interests

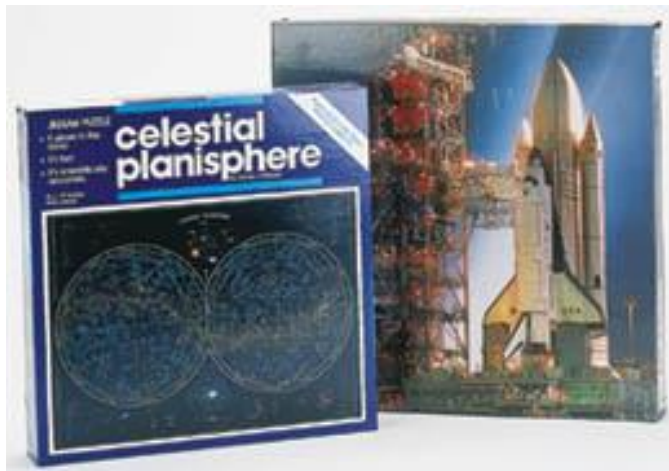
The screenshot displays the Kennedy Space Center website with the following structure:

- Header:** KENNEDY SPACE CENTER LAUNCHING THE NASA VISION with the NASA logo.
- Navigation Bar:** KSC Home, Site Search, Multimedia, FAQ/Contact Us, NASA Centers.
- Left Sidebar:**
 - TEACHER RESOURCES (with an image of a book and a red apple)
 - Education Home
 - Hot Topics
 - Higher Education
 - Pre-College
 - Minority & Disability
 - Teacher Resources
 - Student Resources
 - Virtual KSC Tour
 - FAQ's
 - Links
 - Web Site Map
- Main Content Area:**
 - EDUCATION HOME**
 - Vision
 - Mission Statement
 - Organization
 - HOT TOPICS**
 - NASAexplores
 - HIGHER EDUCATION**
 - ACCESS (Achieving Competence in Computing, Engineering, and Space Science)
 - Experimental Program to Stimulate Competitive Research (EPSCoR)
 - Faculty Awards for Research (FAR)
 - Florida Space Grant Program
 - Graduate Student Research Program (GSRP)
 - NASA ASEE Summer Faculty Fellowship Program
 - NASA/UCF/Department of State Overseas Schools/Brevard Schools Foundation Aerospace Institute for K-12 Educators
 - National Action Council for Minorities in Engineering, Inc (NACME)
 - National Research Council, Resident Research Associateship Program
 - Spaceflight and Life Sciences Training Program (SLSTP)
 - MINORITY & DISABILITY**
 - ACCESS (Achieving Competence in Computing, Engineering, and Space Science)
 - FAMU SBI Project Discover Program II
 - Florida A & M University Increasing Minority Access to Graduate Engineering (I.M.A.G.E.)
 - Florida High School High Tech Project
 - Minority University Mathematics, Science, and Technology Awards for Teacher and Curriculum Enhancement Program (MASTAP)
 - Morehouse College Strategic Preparedness Advancing Careers in Engineering/Sciences Program (S.P.A.C.E.)
 - National Action Council for Minorities in Engineering, Inc (NACME)
 - New Mexico's Mathematics, Engineering and Science Achievement Program (MESAP)
 - Summer High School Apprentice Research Program (SHARP)
 - Spelman College Women In Science and Engineering Scholars (W.I.S.E.)
 - University of New Mexico NASA Training Project (NTP)
 - TEACHER RESOURCES**
 - Aerospace Education Services Program (AESP)
 - Educators Resource Center (ERC)

Space as a rich resource for
Communication Aids



Space as a rich resource for Communication Aids



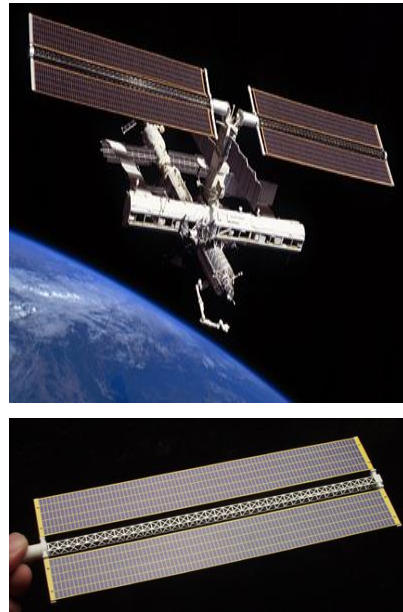
Educational Aids

Space as a rich resource for Communication Aids



Toys

Space as a rich resource for
Communication Aids



Educational Kits

Space as a rich resource for
Communication Aids



Exhibitions

Space as a rich resource for
Communication Aids



Information Kiosk

Space as a rich resource for
Communication Aids



Simulators

Space as a rich resource for
Communication Aids

Educational Aids need the **assistance of teachers** and a proper introduction into the syllabi

Toys encourage **individual owning** and playfulness

Educational kits are characterized by **building** as primary activity

Kiosks are conceived as information and **service providers**

Exhibitions tend to become **space design**

Simulators are exiting products but most often designed for **gaming purposes**

Solution Space

Identify topics of interests and search for an opportunity to develop educational products

How can industrial design play its role by creating communication aids in the vast field of Space exploration ?

Solution Space

Sl. No	INFORMATION TYPE- TOPIC	CONSTITUENTS	SOURCE	USER	DESIGNERS ROLE	FORM OF PRESENTATION	DESIGN
1	SPACE TECHNOLOGY "The scientific method and material used to achieve a commercial or industrial objective."	Technical Data/info Analysis of data Technical development plans Research findings Raw material specifications	Institute Scientists, Research Facilities, Raw material dealers	Scientists Raw material dealers	Information Structuring Publications	Printing Movie Live information	Report Style sheets Kiosk
2	SPACE EXPLORATION "Ranging over for purposes of discovery"	Studies of Space Sciences Studies of celestial bodies Lunar missions	Astronomers Scientists	Students Children Astronomers Scientists Artists Writers	Visualization	Movie clips Space news Print Simulation Games	Book Magazine CD Game Movie Stall Planetarium Exhibition
3	SPACE TRAVEL	Travel Space probes Humans in space Space tourism	Futurists Doctors Scientists Biotechnologist Writers Poets, Astronomer Sociologists	Space travel Enthusiast, Students Children Artists Business Enthusiasts	Visualization Experience Clarity info	Painting Rendering Movie 3D-games Reports Story Play Teaching	Book Simulator Exhibition Game Kiosk Movie Kiosk Toy Educational Kit

Solution Space

4	SPACE TECHNOLOGY APPLICATION	Technology for the use of mankind Benefits and advantages Weather monitoring Earth soil monitoring Communication	Scientists Farmers Sociologist Military Geologist Business Enthusiast	Common People Farmers Fishermen Military Public planners Students Businessman	Visualization Interpretation Device Concepts	Print Statistics Technical paper Game Educational kit Graphs Photographs Models	Poster Sticker Magazine Report Game Kiosk Simulator Exhibition Stall
5	SATELLITES/ ROCKETS "Space Vehicles"	Working, making, Building, controlling, Conceptualizing	Engineers Scientists Physicists	Government Students Scientists #Relative Educational institutes	Visualization Interpretation Simulation	Illustrations Models Educational Aids Movie 3d modeling Photography	Educational Aids Game/kit Model Gift/toy CD Movie Animation Exhibition Kiosk
6	HISTORY OF INDIAN SPACE PROGRAM	Narrating, documenting	Historians Critics Teachers Scientists	Educational institutes	Interpretation Visualization Illustration	Time chart Print Movie Interactive Media	Exhibition Text book Film CD

Solution Space

Space exploration is a **vast field**

- The topics cover some of the most important **phenomena of modern science** and the latest advancement in technology and research
- It is possible to pick almost any topic to further develop into a communication aid, but some topics like **Satellites and Launch Vehicles** are popularly known to people and would interest them.
- Some of the Topics like Satellites, Launch Vehicles give an opportunity for an **industrial designer** to intervene.
- Design explorations can be in the form of teaching aids, information kiosks, toys, exhibitions etc.

Making scientific concepts easy to understand, extending an experience, structuring of information, envisioning new ways of teaching, motivating them to explore further, promoting, giving identity could be some areas where a designer is likely to involve.

Solution Space

Initial Explorations

Educational Aids

To design **educational aids** to schoolchildren to explain **a Scientific concept with the assistance of a teacher.**

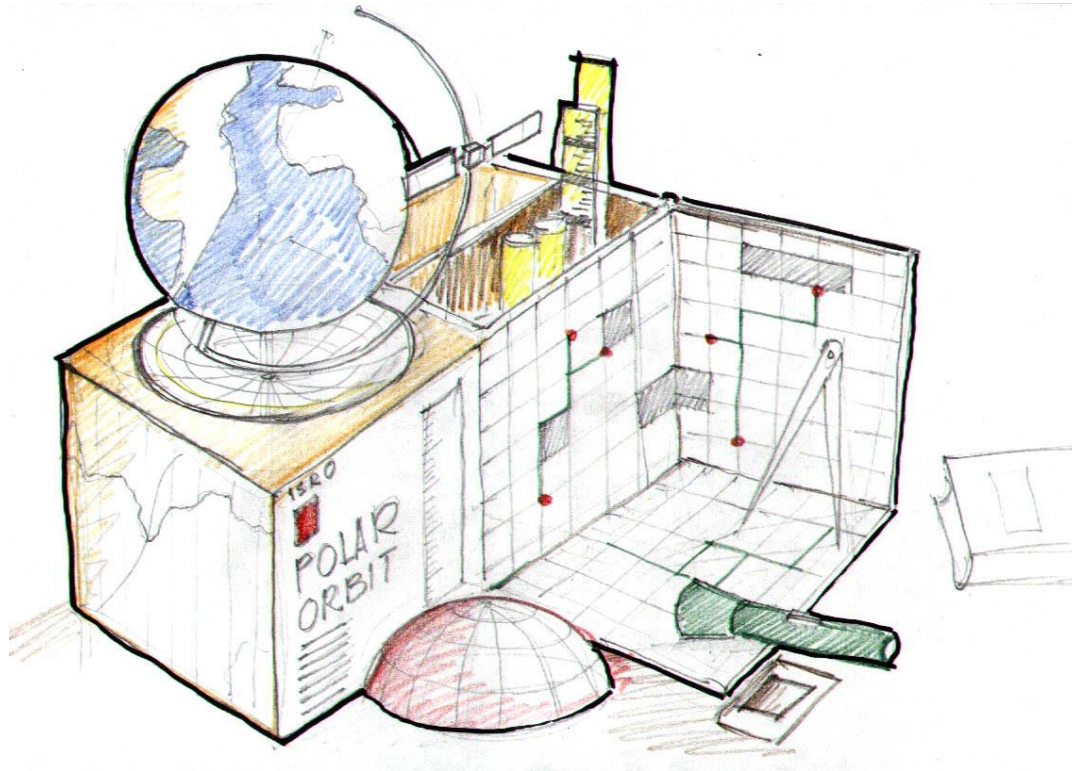
How do satellites work?

How do you build a rocket?

What is a radar?

What is polar orbit?

Educational Aids



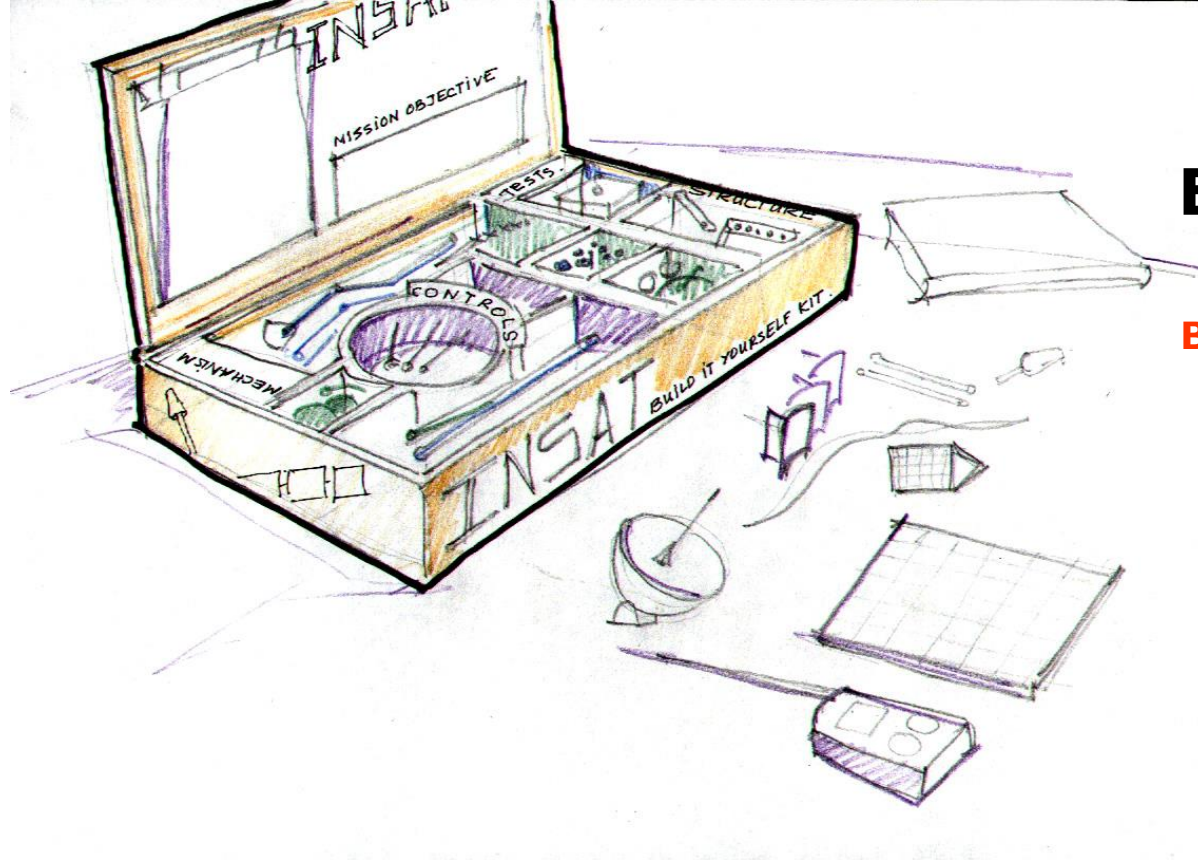
- Powerful **visualization** tool.
- Learning becomes an experience.
- Encourages **group learning**
- Simplification of a complex concept.
- **Story building** ability.

- It can explain only **one concept**.
- Needs an assistance.
- It may tend to become playful and
- Learning can be limited to concepts.
- Its not an **hands on** experience.

Educational Kits

To design creative educational kits for children so that learning becomes a **hand –on**, enjoyable and **self taught experience**.

- **Build your own satellite.**
- **Make a launch station.**



Educational Kits

Build your own satellite.

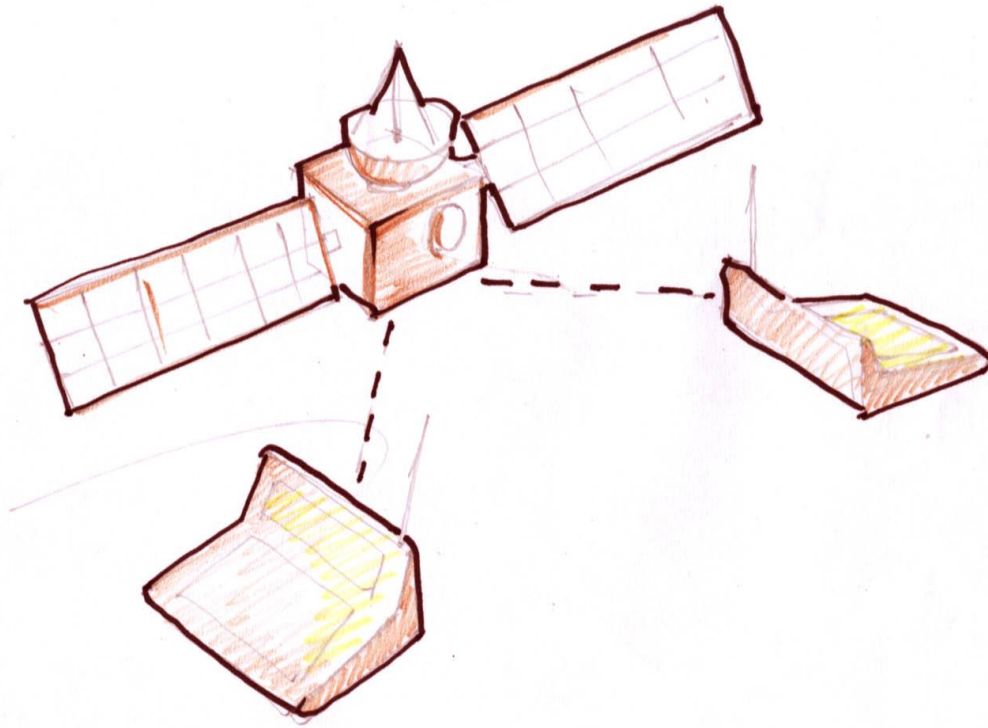
- Kindles the natural ability of child to **search and discover**.
- To learn through **hands on** experience.
- To clarify and apply theoretical knowledge gained at school.
- To develop **manual skills** with **purposeful observation**.

- It can explain only **one concept**.
- Needs an assistance.
- It may tend to become playful and Learning can be limited to a concept.
- It depends on the
- **Individuals interest** and likings over the subject.

Educational Toys

To design an educational toy explaining concept of satellite communication

Educational Toys



- Individual oriented
- Fun dominated
- Learning happens by engaging playing with the object, meddling and relating to the shape and working of the toy.
- Hands on experience

- It may tend to become only playful
- There need not be any learning of scientific concepts.

Theme exhibitions

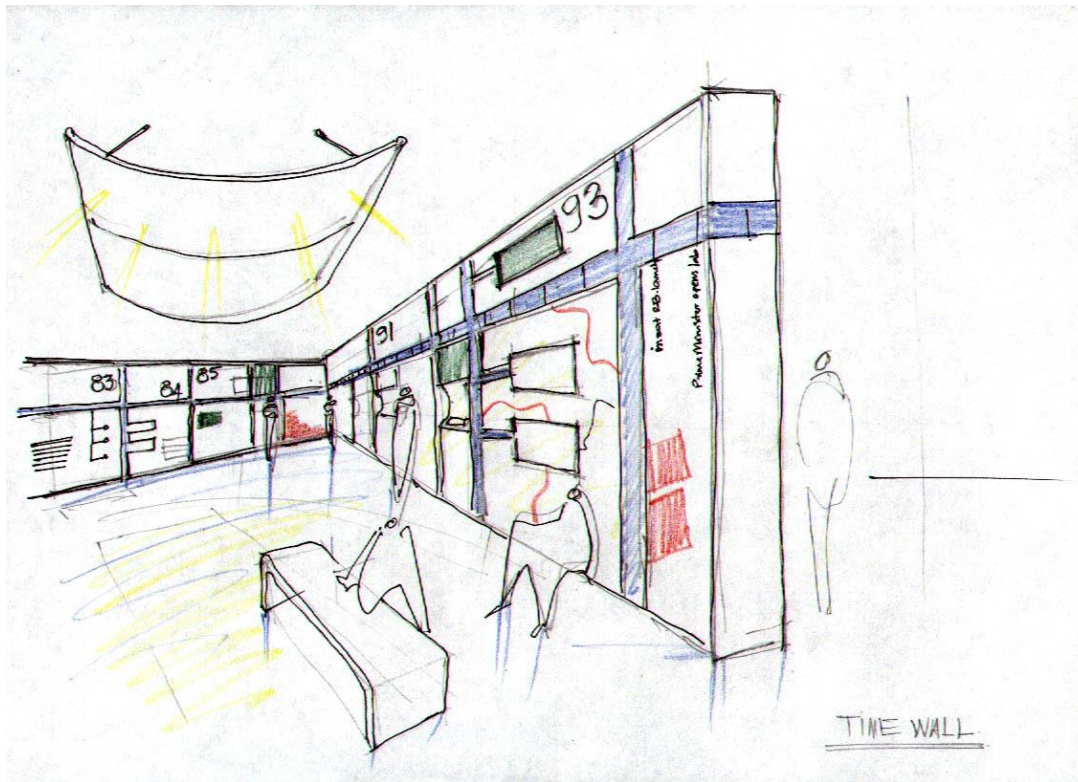
To design a thematic temporary exhibition for ISRO.

Weather forecasting

IRS – P2 explaining its objectives, building, launch, working, application, life

GSLV – making, testing, assembling, launching

35 years of Indian Space Experience



Theme exhibitions

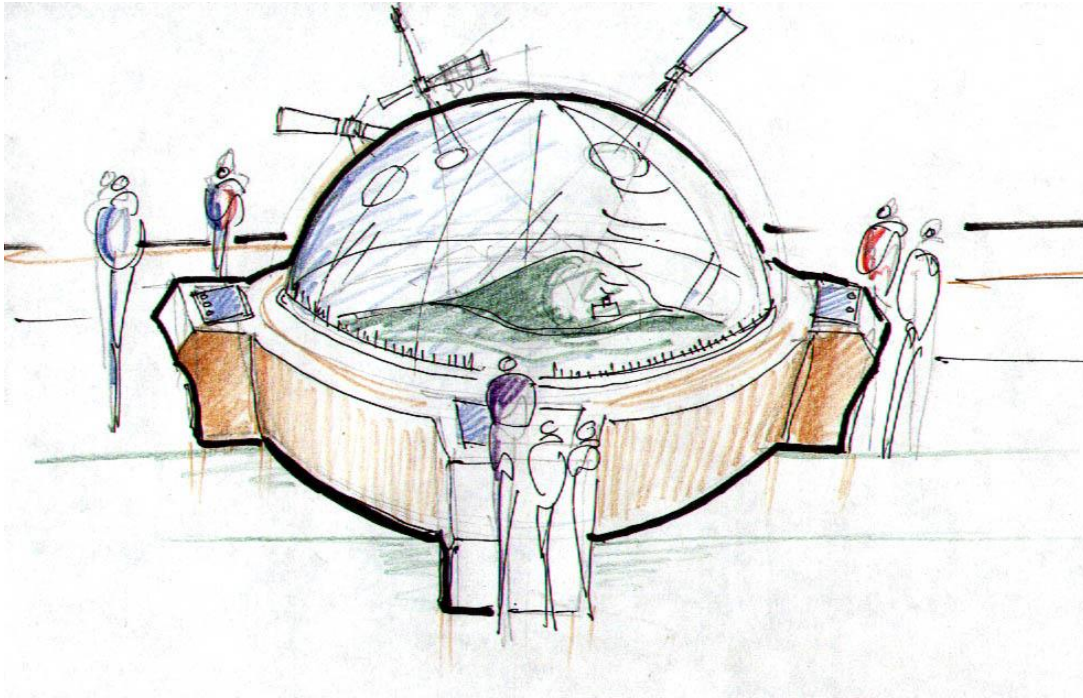
- Addresses to a **larger public** Clarifies and explains a single theme.
 - Ability to communicate **larger degree** of information.
 - Rich graphics and information structuring makes it an experiential learning.
-
- Contains primarily **static information.**
 - Information limited to display or theme.
 - Its more of a see and experience concept as to do and learn.

Permanent interactive display

- To design an **interactive display explaining a scientific phenomena or concept as a part of museum or exhibition.**
- It is theme based.** It demonstrates a working of a device by allowing you to control a certain part of it either mechanically or electronically.

Demonstrating INSAT's system concept
Demonstrating a launch sequence

Permanent interactive display



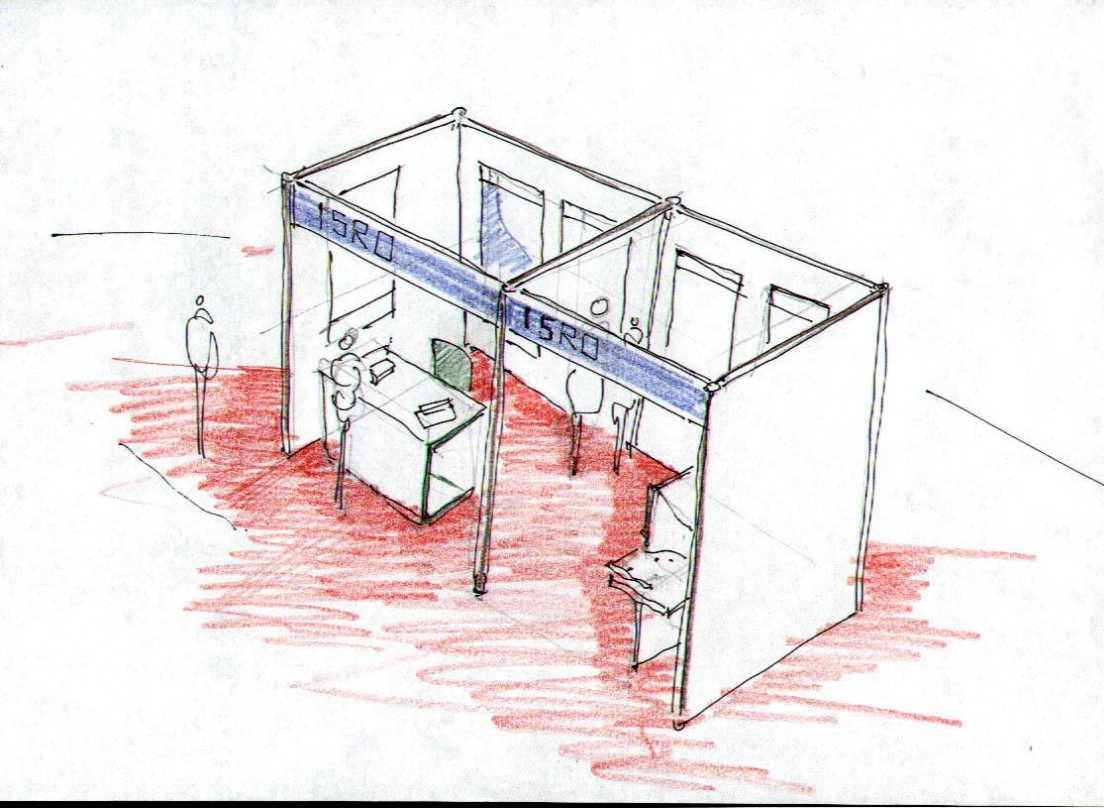
- Gives an **hands on experience** to control and experience.
- Clarifies and explains a single theme.
- Powerful **visualization** material.
- Becomes an object to play with.
- Need not communicate fully the working of a concept.
- Explains a single concept.
- Permanent in nature.

Stall Design

- **To design a stall for ISRO which is a complete solution to temporary display program.**

Stall design for technical colleges.
Stall design for international symposiums.
Stall design for schools.

Stall Design



- Gives a **range of required information in a one place** to varied users.

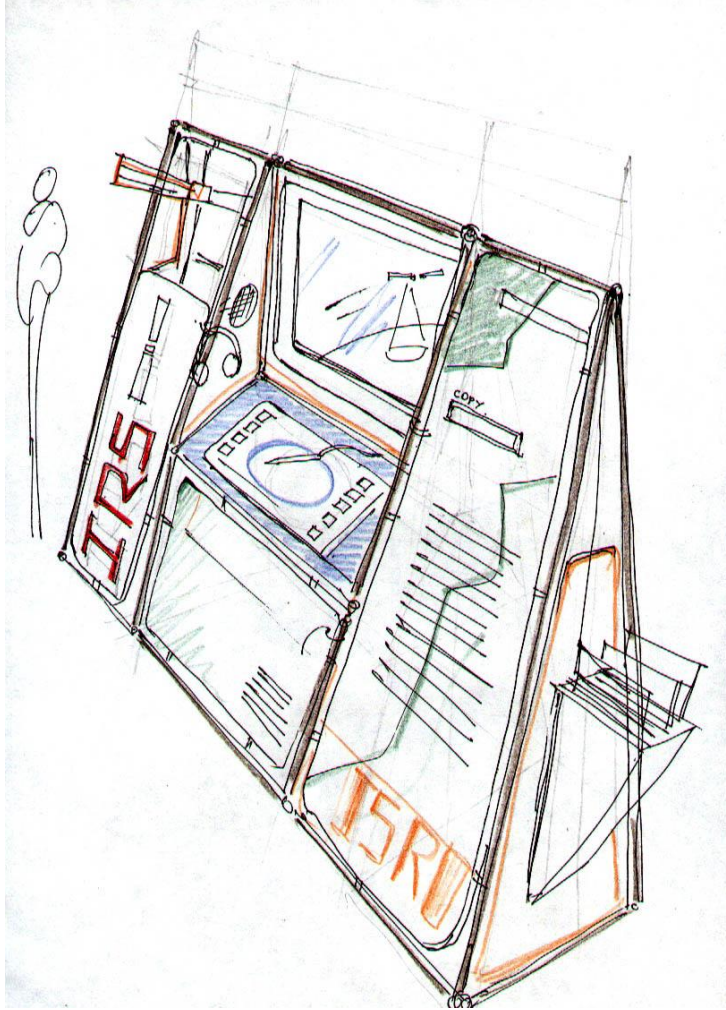
- **Projects an Image of the company**, since it part of other stalls at a festival or conference.

- Provides General information.
 - Non experiential.
 - Non interactive.
- Focused to business interests.

Kiosks

- To design an **Interactive information Kiosks for ISRO** to provide dynamic, experiential information to the users.

- Carry able information kiosks for stalls and exhibitions.
- Interactive information kiosks for exhibitions (educational).



Kiosks

- **Provides interactivity.**
- **Dynamic information.**
- Self serviced technical application.
- Improved access to information using the internet.
- Virtual visualizations.
- **Right of ownership.**

- One person at a time.
- Technology dependant.

Solution Space

Space exploration could be an exciting topic to explore the possibility of educational products.

A research institute can be encouraging by acting as a backbone of resource and expert advisors taking initiatives of spreading the concepts of Space exploration to the understanding of common people.

Though Space exploration is a vast field of knowledge some topics like satellites and launching vehicles are popularly known among the people.

A variety of Industrial design possibilities could be explored explaining certain phenomena of Space Exploration in a creative, pleasurable way so that it encourages the curious minds of students and people to pursue their passion.

Understanding the context

Challenges of being a Communicator – a user study

Task - self

To explain a scientific phenomena to a set of prospective users

To observe the medium of communication and the way of use

To realize the need of variety of mediums used to communicate the phenomena

Task – user

To understand the users knowledge and their ability to understand the scientific phenomena

To see the users reaction to different methods of information assimilation



User Group – 12 years and above

Challenges of being a Communicator – a user study

Day 1

An introduction to space exploration

Objective

To know the knowledge base of the students

To involve a class into a discussion on space exploration

Activity

To explain and narrate the story of space exploration

Use of a poster to explain how rocket looks



Students re-looking closely at the poster

Challenges of being a Communicator – a user study



A need for a black board to sketch the picture of earth while explaining polar satellites



A popular remembrance of terms like thrust, gravity, geo synchronous, solar system etc.



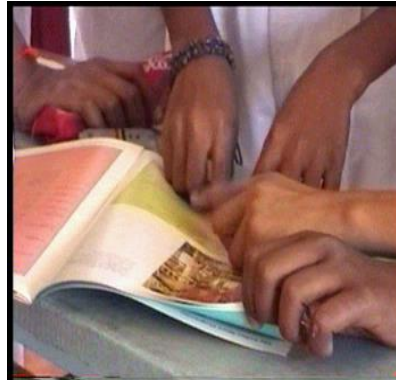
Using a rubber ball to explain orbits

Challenges of being a Communicator – a user study

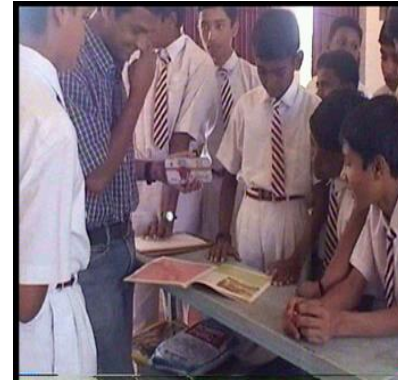
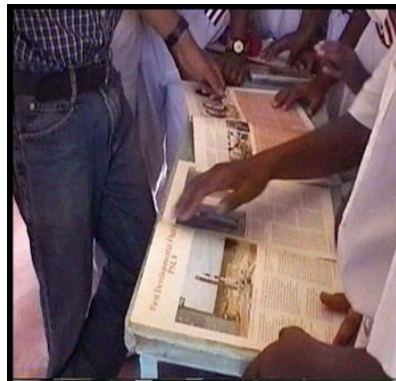
Day 2
**Explaining
launch and orbit
raising events**



A group trying to relate to a diagram



Referring a picture of a launch pad



A need for assistance



Challenges of being a Communicator – a user study

Insights

A concept explanation requires an **appropriate usage** of information type 1

Very **less use of text** and maximum use of 3 dimensional **models** and **clear graphics** helps in a clearer understanding of concept

The information was aided by **constant conversation** with the students keeping them engaging and involved

Terms and **physical relations** caught the interest of students

Awareness of objects like satellites and rockets seemed to be aided by a television influence rather than a book or a picture hence desiring for movement

Categorization of subject simplifies explanation

1- information types:

Text
Diagram
Picture
Video
Poster
Illustration
Model
Voice
Animation

Interactions in a Public environment



Observations in a Museum environment



Observations in a Museum environment

VITM – Bangalore



The concept not realized!

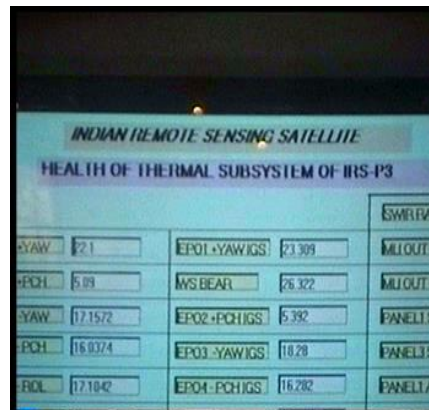
Mock up of ISTRAC



Quiz a popular engager



A difficult interface to relate to



Interaction by protected mouse and switch

Observations in a Museum environment

Insights

The computer screen is a **attraction** and the size becomes important to be noticed in a information filled environment

The **concept** is left unnoticed due to little attention given to its **realization**

Navigation and interactivity depends on the **creative interaction** provided on the system

Non synchronous use of audio-visual presentation tends to **diminish the experience** over the users

The unit allowed for group work

People tend to **look out for help** if they seem to not understand the concept

To control or to interact gives an opportunity for the user to **engage** with it and hence **learn**.

Reactions

Brainstorming

Inputs from scientists

The class room experience

The museum experience

Product Brief - 1

- The project involved design of Educational Products with the support of ISRO. Initial essential objectives of the project were
 - To design a self motivating, three dimensional, experienced based learning unit in public environments
 - To inspire an enquiry into the subject of space exploration
 - To instigate an interaction with the product to realize the scientific concept
 - To provide opportunity to control the variables achieving specific goals.
 - To involve direct relationship with the content
- To envision orchestrated handling of the concept becoming an experience

Product Brief - 1

Target Users:

1 - The primary target audience is students of the age group 12+ years or class of VII STD and above

2- Anyone visiting the museum

The product will be in the **form** of

- an experience unit
- will allow user to control specific variables
- express the concept boldly

The product was envisioned to be installed in public places like Museums, planetariums, Science centers.

Theme

“Artificial Satellites”

Concept 1

Satellite finder

Background

Satellites when launched in space mix with the stars shine in the dark sky alone with the millions of other stars. They are sometime visible to our naked eye in the night sky. Students tools in school as well as at home has been the faithful globe used to visualize the positions in space. He bases his observation with the reference to the globe. The satellite finder reverses the situation.

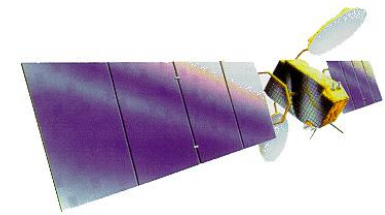
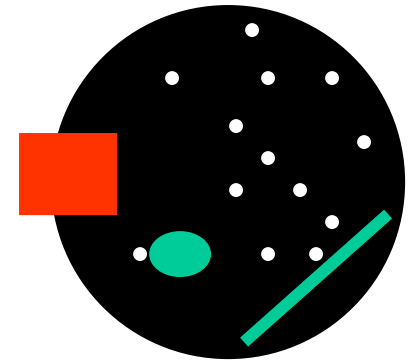
Task

Tasks are designed knowing the user group but its primary function is to locate a satellite in the dark calm night sky and know about it.

Concept 1

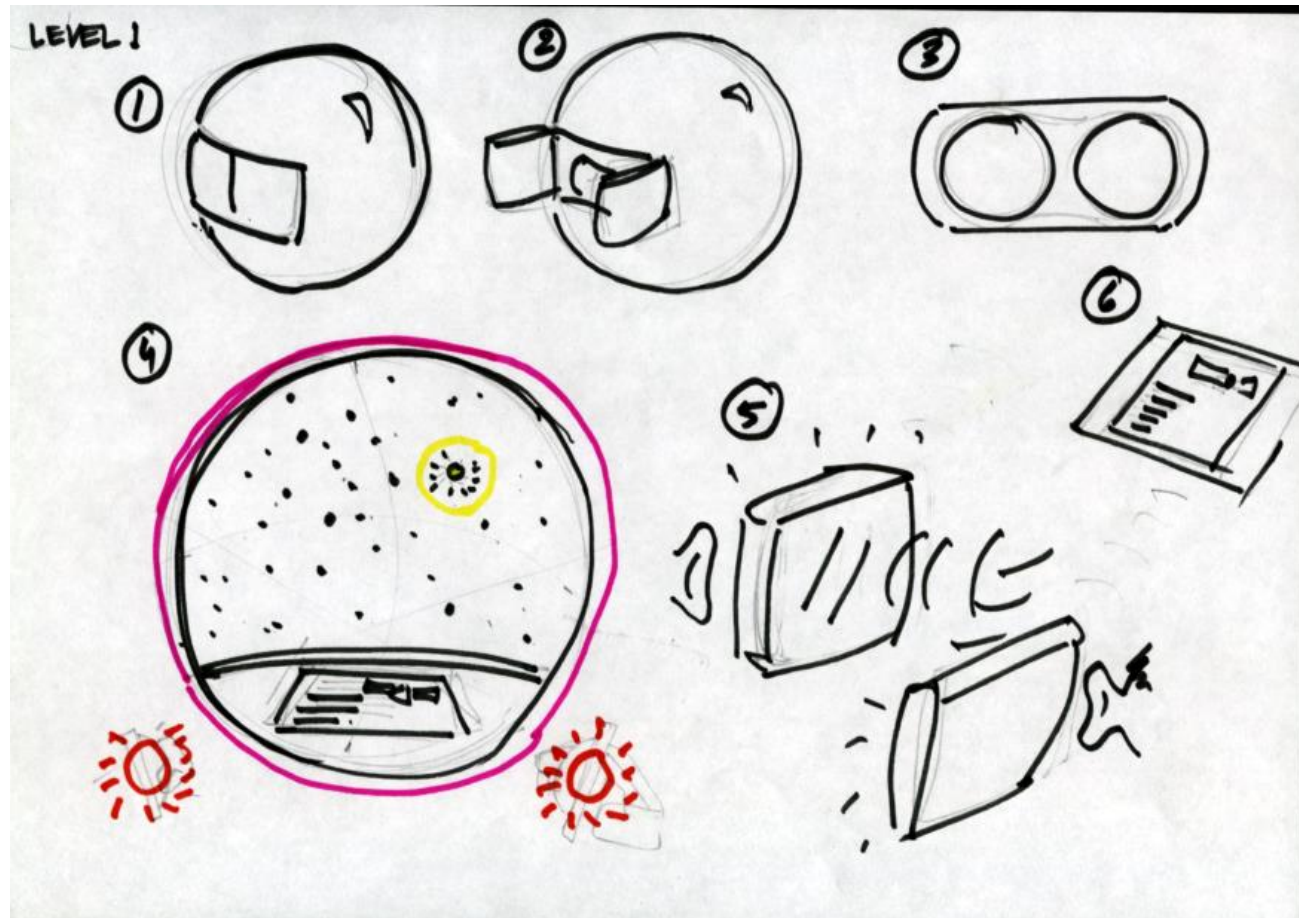


Satellite finder



Concept 1

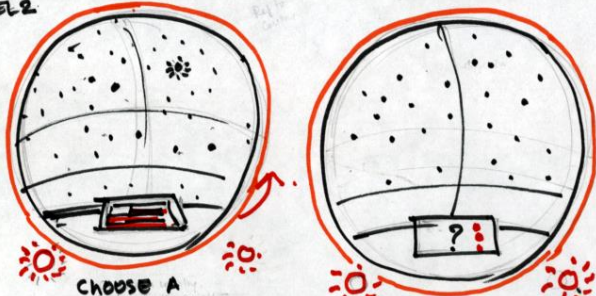
Satellite finder



Concept 1

Satellite finder

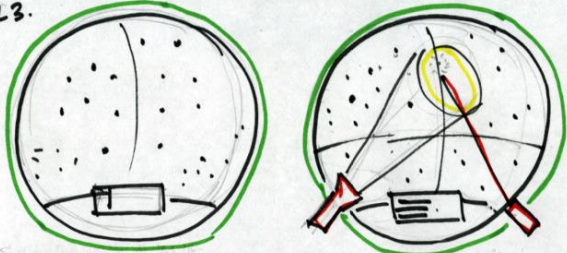
LEVEL 2



CHOOSE A COUNTRY BY TURNING THE SKY!

CLUE - THIS SATELLITE WAS LAUNCHED AT — TIME @ — PLACE SO IT HAS TO BE — LOCATION.

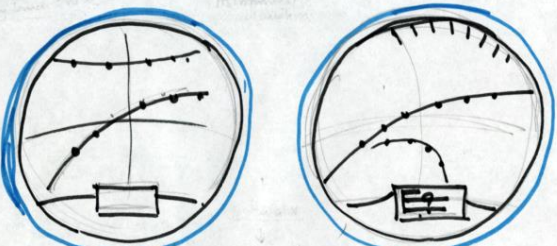
LEVEL 3.



LOCATE THE HUBBLE TELESCOPE.

CLUE IT IS SITUATED AT 23°N OF GREAT BEAR CONSTELLATION. USE THE ZONE TORCH & SATELLITE POINTER FOR SEARCHING.

LEVEL - 4 -



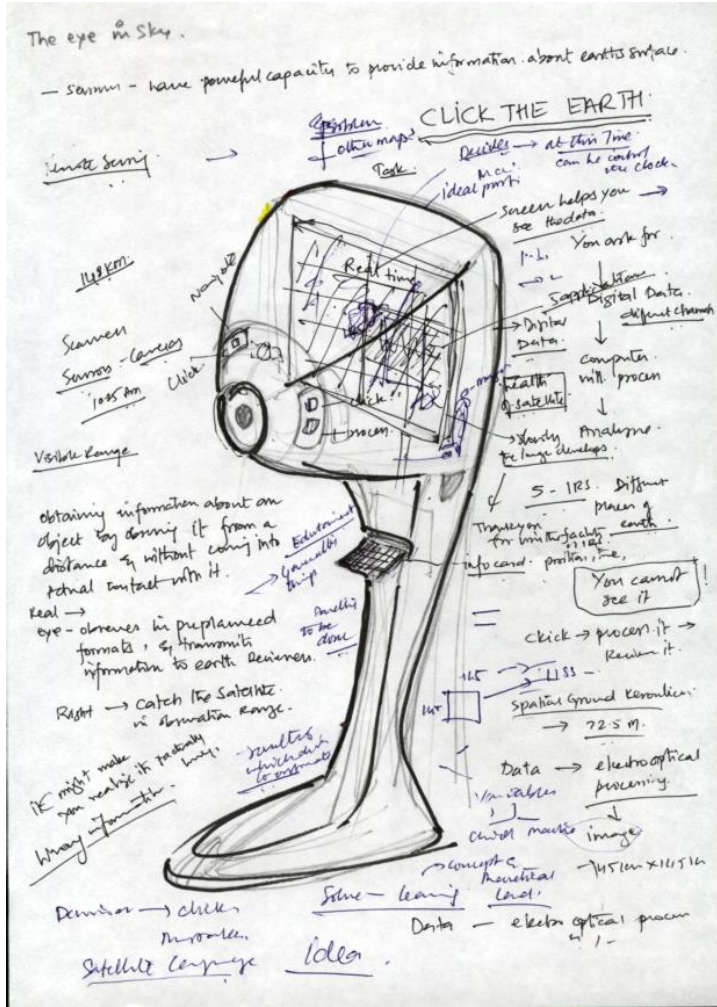
DESIGN THE TRAJECTORY OR TRACE IT BY ALTERING 1A'S 1B'S GROUND TRACE BY 5°N. !

ASTRONOMICAL CALCULATIONS USE CALCULATOR & SCRIBBLE PAD !

Concept 2

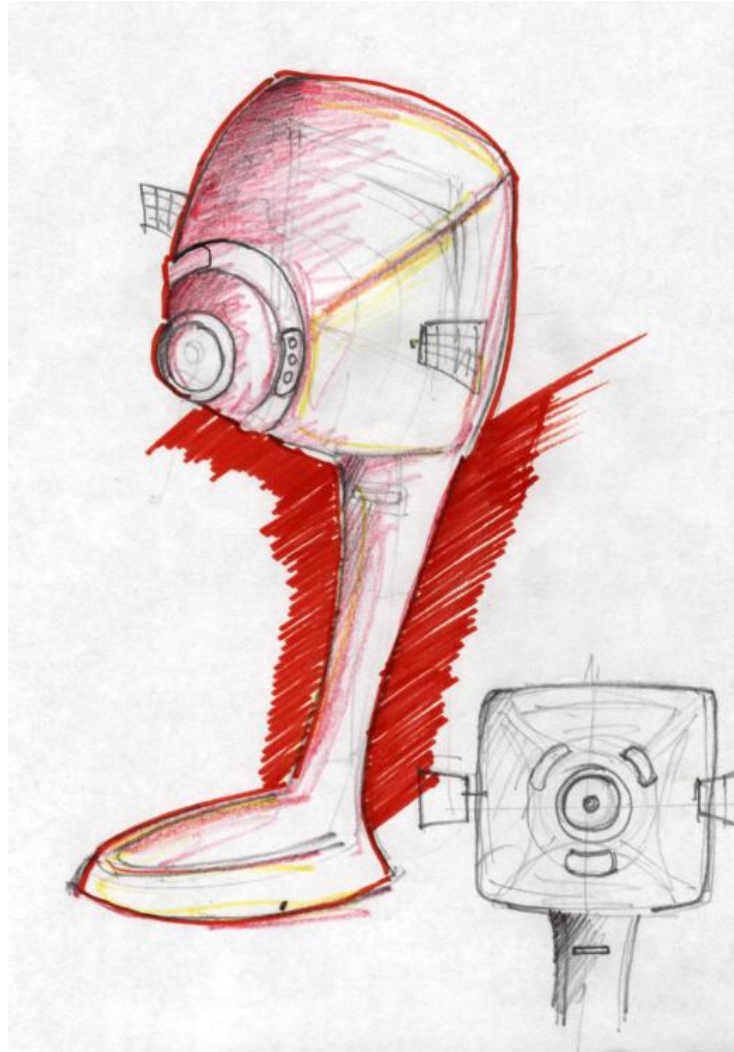
This is my house!

Click the earth



Concept 2

Click the earth



To look through the eyes of camera of a satellite towards earth and experience the concepts of remote sensing

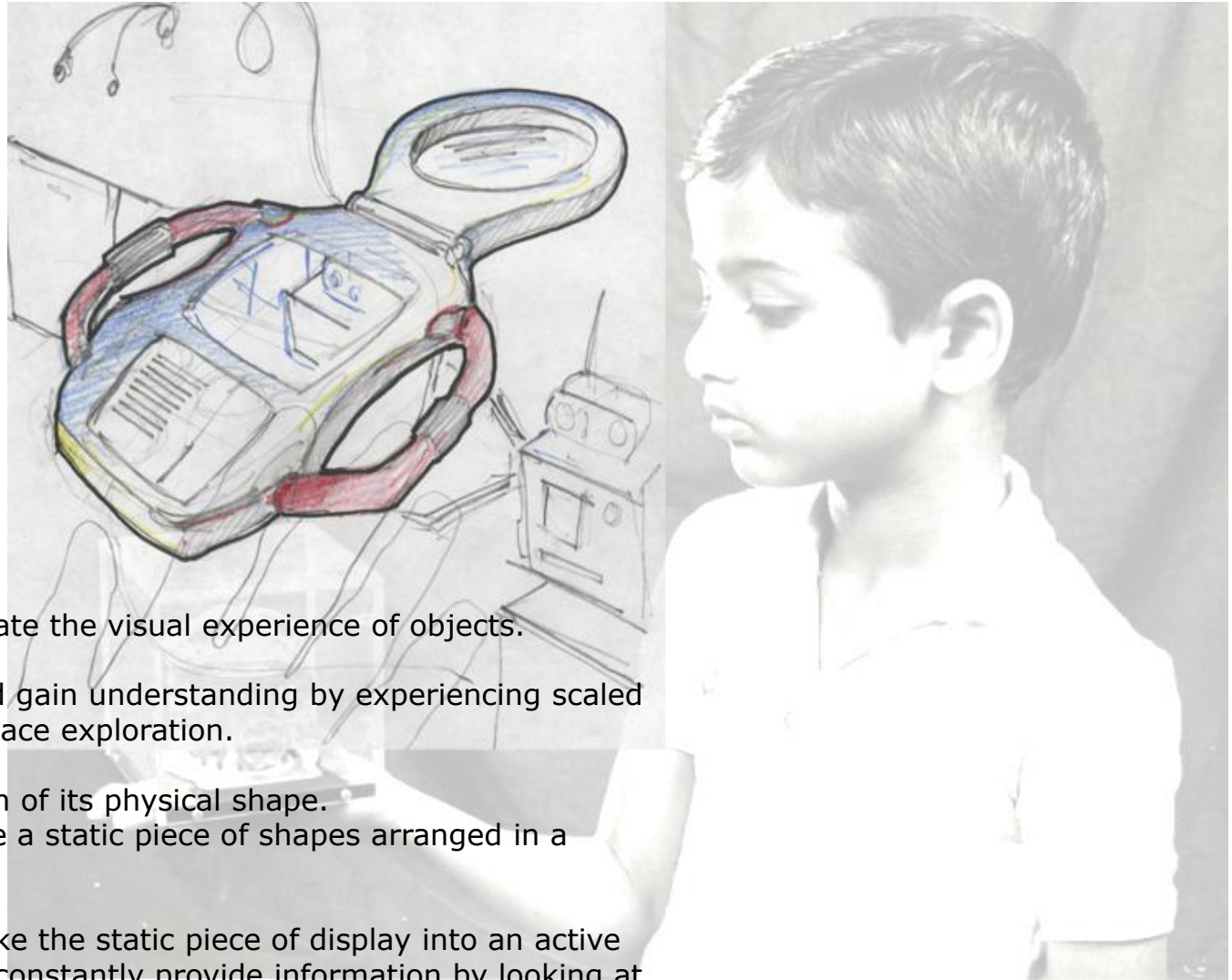
Role playing by using the imagery for various applications

Assisting people from different professions to use remote sensing applications

To watch the earth melting, flooding, burning, raining.

Concept 3

Info lens



Physical models dominate the visual experience of objects.

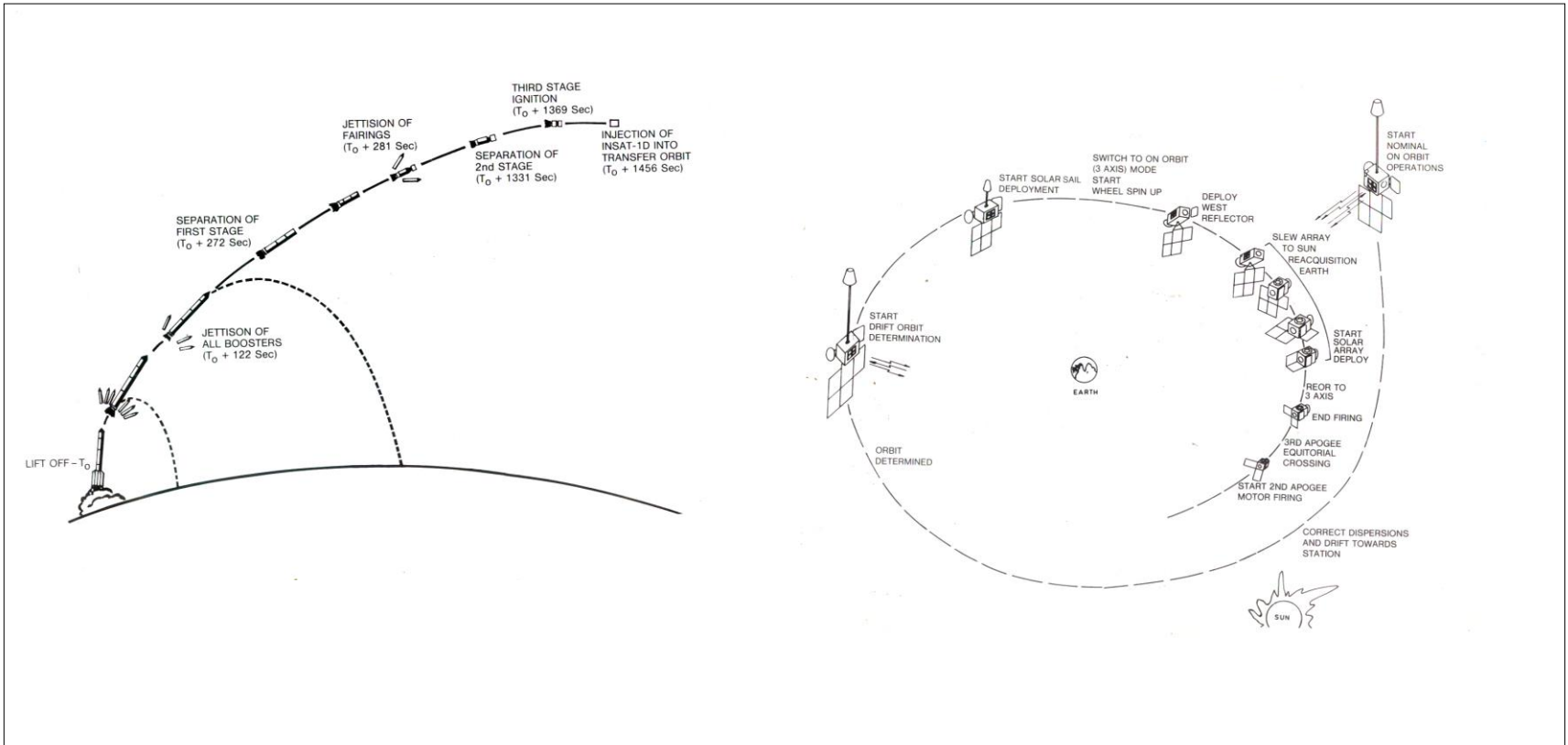
People try to relate and gain understanding by experiencing scaled models of objects of space exploration.

Models give information of its physical shape.
Otherwise they become a static piece of shapes arranged in a museum environment.

“Info Lens” tries to make the static piece of display into an active by a device which can constantly provide information by looking at the display.

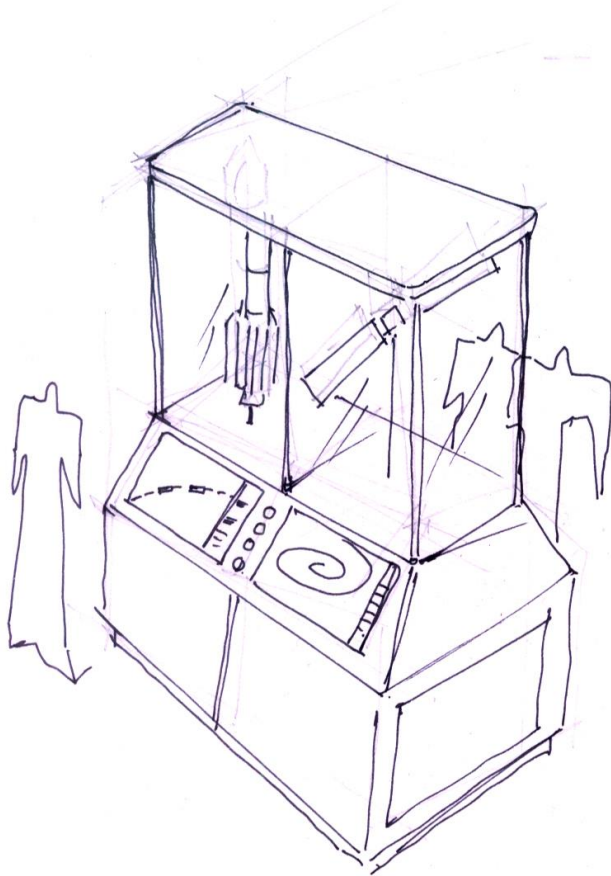
Concept 4

Launch pad

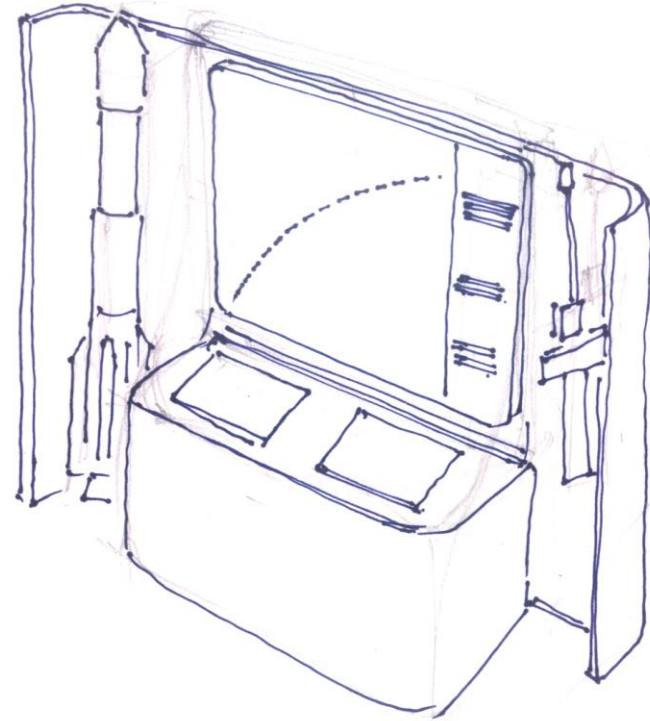


Launch and orbit raising events

Concept 4



Launch pad



Any one of the above concepts would have been developed further. I choose to develop the idea of **finding satellites** in the dark sky for following reasons

- Satellite finding included exploring searching and thus mystery in the product
- Satellites were a popular subject of interests to students
- The product could be made for Museum environments could be used by user above 12 years.
- I could relate it to my personal experience and hence it would be comforting to narrate to others
- The tasks in the product would grow with complexity thus creating different levels for different users.
- It would encourage further probe into the subject by involving the audience into an experience
- It would give a sense of accomplishment
- Other concepts could be added to existing setup

Concept

Satellite finder

Background

Satellites when launched in space mix with the stars shine in the dark sky along with the millions of other stars. They are sometimes visible to our naked eye in the night sky. Students' tools in school as well as at home have been the faithful globe used to visualize the positions in space. He bases his observation with the reference to the globe. The satellite finder reverses the situation.

Task

Tasks are designed knowing the user group but its primary function is to locate a satellite in the dark calm night sky and know about it.

Concept

Satellite finder

Searching for Satellites

Primarily Two Kinds of Artificial Satellites

Polar Satellites

Altitude of about 800 km

Visible to naked eye

Moving at a speed of 7.8 km/sec

Found passing over the sky usually from north to south

Earth Observing satellites

An Average of 4 passes at any given time

Geo Stationary Satellites

Altitude of about 36000 km

Invisible to naked eye

Appear stationary due to unique orbital status, speed 3.6km/sec

Found near the celestial equator

Communication satellites

Concept

Satellite finder

Searching for Satellites

Polar Satellites

Visibility due to swift movement

Cannot recognize the Satellite

Path Prediction method – Satellite Pass

Know, recognize, predict the satellite

Data Required

Location

Time

Concept

Satellite finder



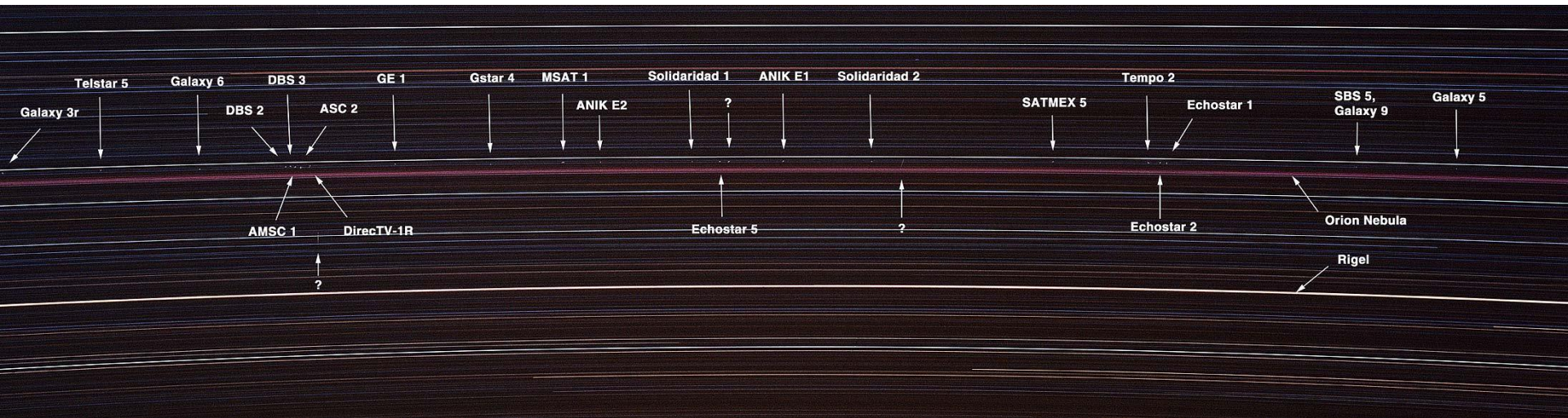
Searching for Satellites

Polar Satellites

Visibility due to swift movement
Cannot recognize the Satellite

Concept

Satellite finder



Searching for Satellites

Geo-stationary Satellites

Data Required

Location

Time

Celestial Equator

Searching for Satellites

Type of satellite	Method used to find in real scenario	Way of finding	Interpretation into product
Polar satellites	Using visibility strategy	Looking out for moving bright object in sky	Use the created environment to look out for moving bright spot simulated
Note Polar satellites are visible to naked eye They are moving	Using prediction charts Prediction charts are packaged information on satellite passes overhead.	Enter your location and time Generate the prediction chart Find satellites azimuth and altitude above the local horizon using prediction program Search for satellite using the given data	Enter your location and time Interpret the chart into a strategic variable making it challenging Use the product to scan to appropriate azimuth and altitude Search for satellite using visibility strategy
Geostationary satellites	Two line elements Sets method 13	Two line elements are obtained Series of position are generated Plotted on a star map to form a finder chart The guide stars will help identify satellites	
Geostationary satellites They appear stationary at a point It is possible however armed with telescope or camera to spot the satellites	Prediction method 14	Find satellites azimuth and altitude above the local horizon using prediction program In Case of Using Special Equipment: TELESCOPE: Turning off the motor of a driven telescope will maintain the satellite in the field of view whilst the stars drift in and out courtesy of the Earth's rotation Camera: track the satellite and keep the camera for long exposure to see the stars drift and satellite constant	Enter your location and time Know Use a special Equipment Interpret the chart into a strategic variable making it challenging Search for satellite using the special equipment

Searching for Satellites

Standard methods could be a base to design the interaction possibilities in the product.

A method of search would be the essence of the product

Visibility strategy could be the initial way of navigating as a starter.
Prediction method could be a challenging clue to engage the audience in later levels

The design of interaction would lie in creating interesting sequence of events using these methods.

Clues from Software Packages

Searching for Satellites

Polar Satellites

Existing Methods
Sat Buster 1.7

Path Prediction method – Know, recognize, predict the satellite

Data Required

Location Time

SATBUSTER 1.7

File Edit View World Sky Satellite Ephemeris Tools Options Windows Help

Rectangular map

Main satellite

Lat.	0.06°N	El.	74.53°	Hgt. (km.)	35791.0	App. (km.)	35800.8	Prd. (h:m:s)	23:56:11	Orbit #	1195.7
Lon.	80.21°E	Az.	168.38°	Rng. (km.)	35986.7	Prg. (km.)	35776.1	Vel. (km/s)	3.1	Rng.R (km/s)	0.0

Planet ephemeris

Planet	El.	Az.	R.A.	Dec.	Mag.	Dist.(au)	Dist.(light)
Mercury	42.4°	90.8°	1h04m	8°06'	-2.4	1.1	9m02s
Venus	16.9°	73.2°	2h57m	19°35'	-5.0	0.8	6m22s
Mars	4.3°	69.0°	3h53m	21°23'	0.9	1.8	15m19s
Jupiter	-63.4°	322.8°	10h55m	8°26'	-2.5	4.5	37m12s
Saturn	-28.4°	54.8°	6h26m	22°48'	0.6	8.9	1h14m60s
Uranus	65.0°	159.6°	22h26m	-10°33'	5.9	20.9	2h54m02s
Neptune	58.6°	200.4°	21h07m	-16°31'	8.0	30.7	4h16m39s

Dist.(km)

Sun	54.3°	107.3°	0h07m	0°45'	149,077,009	8m17s
Moon	41.2°	95.2°	1h06m	4°38'	394,419	1.3s

Time

Time settings

Local Time: 10:11:19
Greenwich Time: 04:41:19
Local Sideral Time: 21:51:45
Greenwich Sideral Time: 16:41:25
Julian Day: 2453086.69536

Settings: Real time
Simulation start time (local): Mon 22 Mar 2004 10:03:52
Use PC clock: Stop

Time: Local Date: 22 Mar 2004, Greenwich Date: 22 Mar 2004
82 day / year, 82 day / year

Location

Time zone: 5 hr 30 min East of Greenwich
Daylight time:

Location: India: Bangalore, Germany: Stuttgart, Germany: Wurzberg, Greece: Athens, Herzegovina: Mostar, Hong Kong, Hungary: Budapest, Iceland: Reykjavik, India: Bangalore, India: Bombay

Geographical coordinates: Lat. 12.970°, Lon. 77.580°, Altitude (mt.) 0

Loaded cities: 1641

Beidou 1b India: Bangalore

Start | SATBUSTER 1.7 | 10:11 AM

Clues from Software Packages

Searching for Satellites

Polar Satellites

Existing Methods
Sat Buster 1.7

Path Prediction method – Know, recognize, predict the satellite

Data Required

Location
Time

SATBUSTER 1.7
File Edit View World Sky Satellite Ephemeris Tools Options Windows Help

Rectangular map
General map - 22 Mar 2004 10:15 local time - R.A. 12h 17m 18s Dec. -71° 28'

Main satellite

Lat.	0.06°N	El.	74.53°	Hgt. (km.)	35790.7	App. (km.)	35900.8	Prd. (h:m:s)	23:56:11	Orbit #	1195.7
Lon.	80.21°E	Az.	168.38°	Rng. (km.)	35986.4	Prng. (km.)	35776.0	Vel. (km/s)	3.1	Rng.R (km/s)	0.0

Local map - 22 Mar 2004 10:15 local time

Satellite ephemeris

Observer parameters	Orbital parameters 1/2		Orbital parameters 2/2		Radio parameters	
Satellite name	El.	Az.	R.A.	Dec.	Mag.	State
BEIDOU 1B	74.53°	168.38°	22h08m39s	-02°11'	???	not vis.
BRASILSAT 2	-73.34°	351.88°	10h05m38s	+03°31'	*	not vis.
BRAZILSAT B4	-75.61°	320.80°	10h32m29s	-01°42'	*	not vis.
	00.00°	00.00°	0	0		
	00.00°	00.00°	0	0		
	00.00°	00.00°	0	0		
	00.00°	00.00°	0	0		
	00.00°	00.00°	0	0		
	00.00°	00.00°	0	0		
	00.00°	00.00°	0	0		

Main satellite

R.A.	22h08m39s	El.	74.53°	Hgt. (km.)	35790.7	Orbit #	1195.7	State	not vis.	Lenght (h:m:s)	24:04:10
Dec.	-02°11'	Az.	168.38°	Rng. (km.)	35986.4	Rng.R (km/s)	0.0	Magnitude	???	Step (m:s)	07:58

22 March 2004 10:15:53 Beidou 1b India: Bangalore

Start SATBUSTER 1.7 Pass predictions Satellite ephemeris 10:15 AM

Clues from Software Packages

Searching for Satellites

Polar Satellites

Existing Methods
Satellite Hunting

Path Prediction
method – Know,
recognize, predict
the satellite

Data Required

Location
Time

Search

Start Date
3 22 2004
MM/DD/YYYY

Duration
1 Days

Target
 Evening
 Morning
 Specify Window

Twilight
 Astronomical
 Nautical
 Civil

Brightness
 Mag 3.5
 Mag 4.5
 Other

Horizon
 Plus 20°
 Plus 10°
 All

Observer

Location
Location #1

Time Zone
GMT (GMT +0:00) 'Zulu'
 Standard
 DST [+]

Latitude
0
 North
 South

Longitude
0
 East
 West

Elevation
0
 M.
 Ft.

Window
7:17 PM To 8:10 PM

Status bright50.tle 3/22/04 4:47:42 AM 3/22/04 10:22:50 AM

Clues from Software Packages

Searching for Satellites

Polar Satellites

Existing Methods Satellite Hunting

**Path Prediction
method –Know,
recognize, predict
the satellite**

Data Required

**Location
Time**

Prediction Date	Local Time ±mm:ss	U.T.C.	Satellite Name	Sat.#	EL	Azimuth	Mag	Hgt	Rng	RAscension	Declination	SatLat	SatLon
2004 Mar 22 [Mon]	7:33:49 PM [±00:00]	19:33:49	Cosmos 2297 r	23405	20°	349° [N]	4.5	842	1842	05h 43m 35s	67° 04' 55.61"	13.590	-2.768
2004 Mar 22 [Mon]	7:37:50 PM [±00:00]	19:37:50	Cosmos 2297 r	23405	82°	079° [E]	2.8	843	850	08h 12m 28s	1° 30' 08.62"	.177	.941
2004 Mar 22 [Mon]	7:41:50 PM [±00:00]	19:41:50	Cosmos 2297 r	23405	20°	161° [S]	4.5	843	1852	10h 32m 26s	-63° 13' 51.30"	-13.180	4.627
2004 Mar 22 [Mon]	7:41:46 PM [±00:00]	19:41:46	Seasat	10967	51°	145° [SE]	3.0	752	941	09h 25m 14s	-32° 35' 49.32"	-3.942	2.758
2004 Mar 22 [Mon]	7:41:47 PM [±00:00]	19:41:47	Seasat	10967	50°	146° [SE]	3.0	752	943	09h 24m 33s	-32° 10' 51.20"	-4.000	2.735
2004 Mar 22 [Mon]	7:44:21 PM [±00:00]	19:44:21	Seasat	10967	20°	184° [S]	4.3	752	1682	07h 07m 00s	-70° 16' 11.30"	-12.787	-832

Clues from Software Packages

Software packages could provide easy and reliable source to create a dynamic environment for finding satellites

They inform you with accurate results

They could aid you with relevant information and help you to make the subject easy to understand

Software packages support real time information giving an opportunity to connect the user with near real experience of real time.

Software packages support graphics of sky and locations to give a near real experience of night sky

Observations – Finding Satellites

Looking into various methods of finding satellites gave me insights into the working of the concept

Satellites could be found if you know your location and time on earth

The parameters of location of satellites is explained by certain geometric terms like the altitude and azimuth

Predicting satellites involves the ability to understand prediction charts

The modern computing has allowed developing various software packages powerful enough to provide the information about the location and pass of satellites accurately

The spirit of satellite finding encourages experiencing scientific concepts like elevation, azimuth, orbit, path prediction, ephemeris, inclination, phase effects etc.

Satellite finding is a popular hobby which gets connected with different communities interested in searching of satellites all over the globe.

Product Brief Level 2

Product Brief Level 2

Product should give an experience of searching for satellites and getting education through this direct experience to the audience.

This is done by conceiving an "experience unit" containing the simulation of dark sky for near real experience and control unit enabling the users to interact with it

It would be a device to search for Artificial Satellites and know more about them

It would motivate the user to involve him in searching for satellites by providing different levels of complexities

Attract different users with respective knowledge levels.

Product Brief Level 2

Aid the user with theory as required by making it familiar and easy to understand and educationally active

Installed in public places as satellite finding could be a collective experience

Use software capabilities in computing relevant accurate information

Allow the audience to collect and store their performance over the product

To give a real time experience of satellite finding

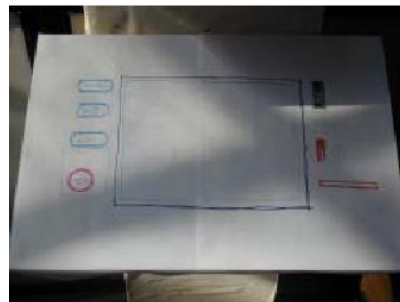
To encourage the audience to perform the same in real locations and situations

Ideation

Interaction

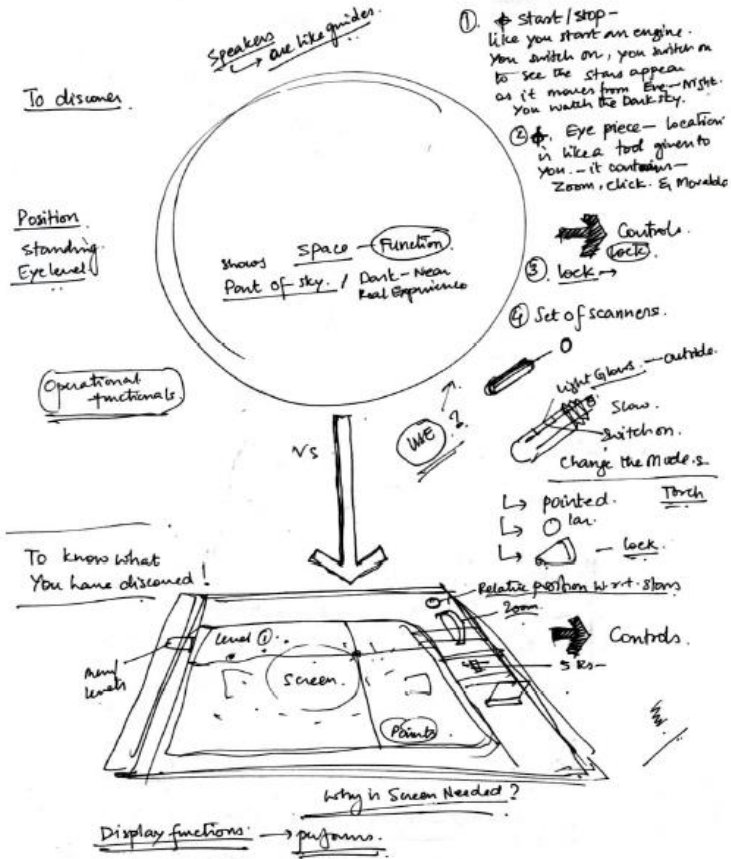
Form

Initial Exploration

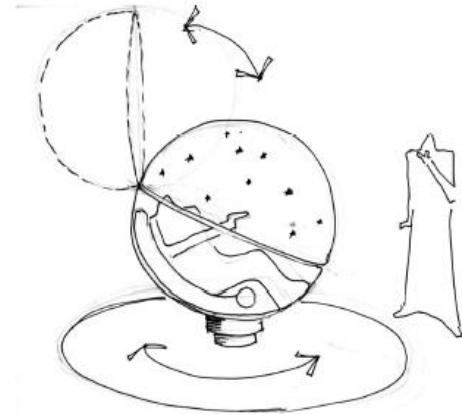
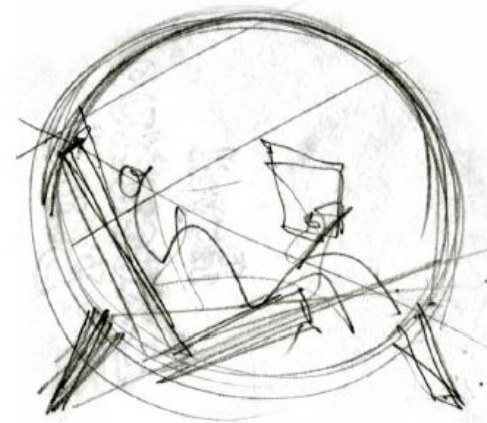


A mock Up Model to visualize it contents.

Initial Exploration



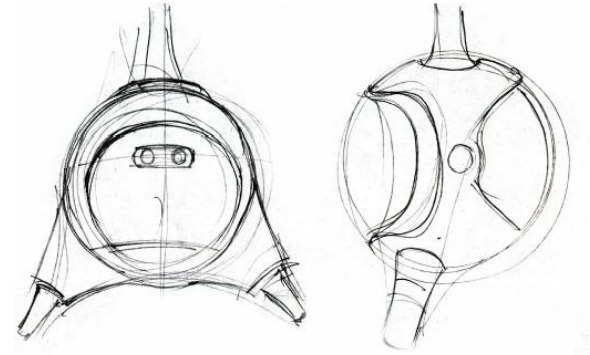
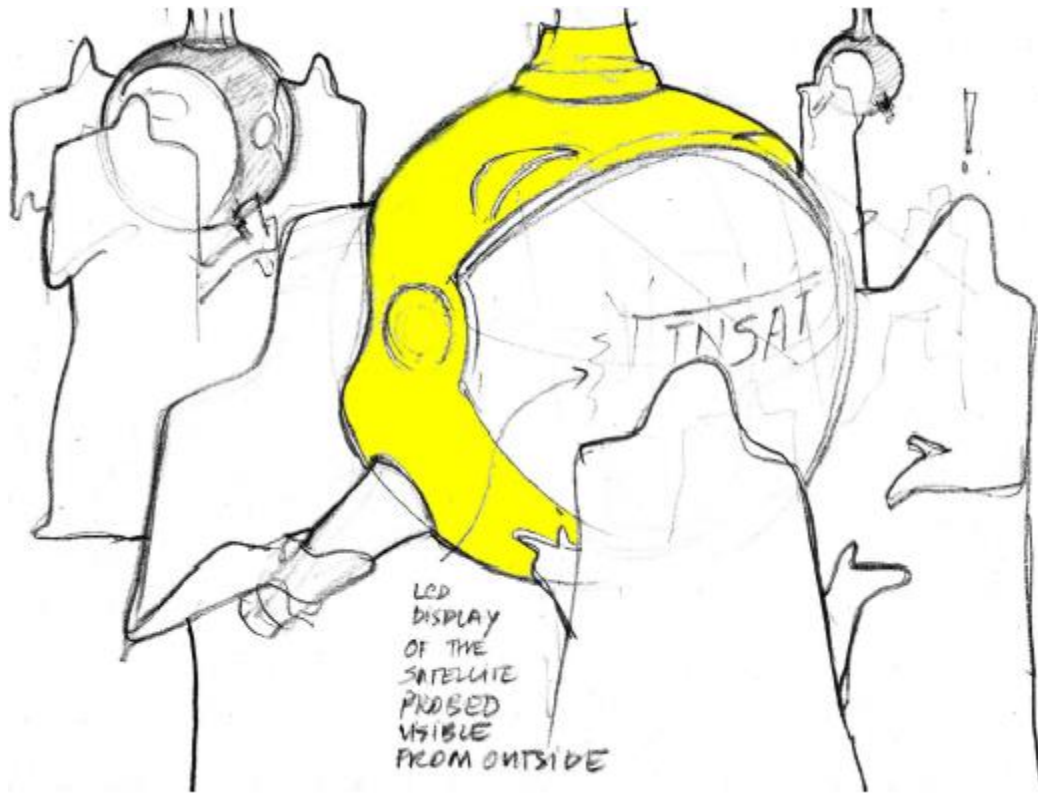
Visualizing the screen and the control



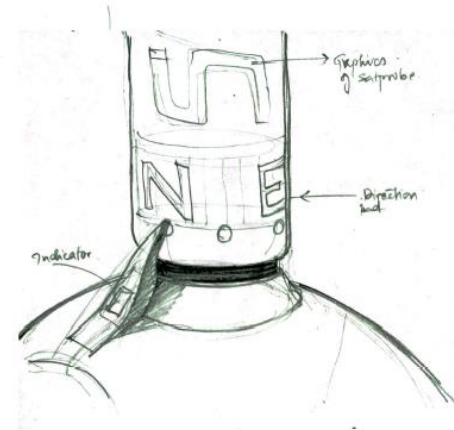
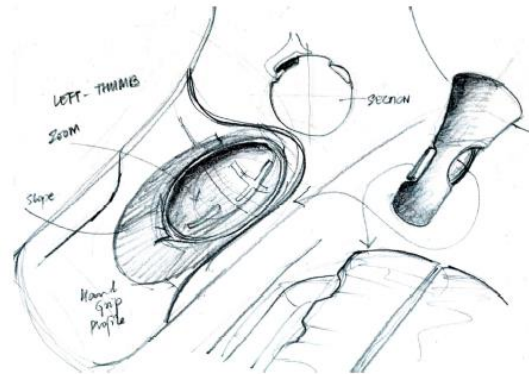
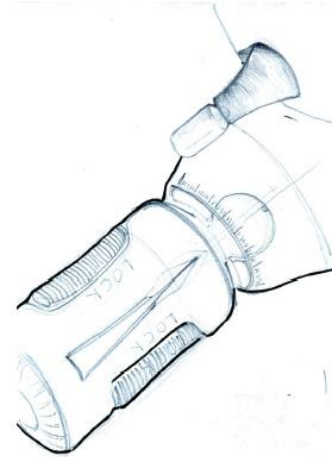
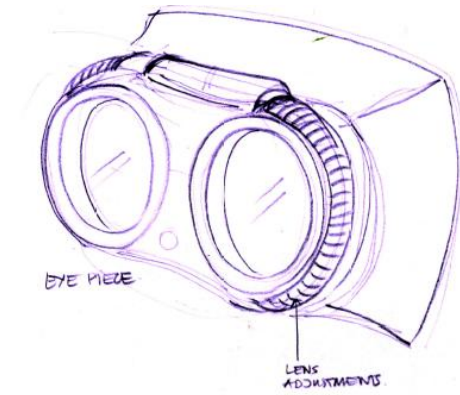
SITTING MODULE.

Ways of watching

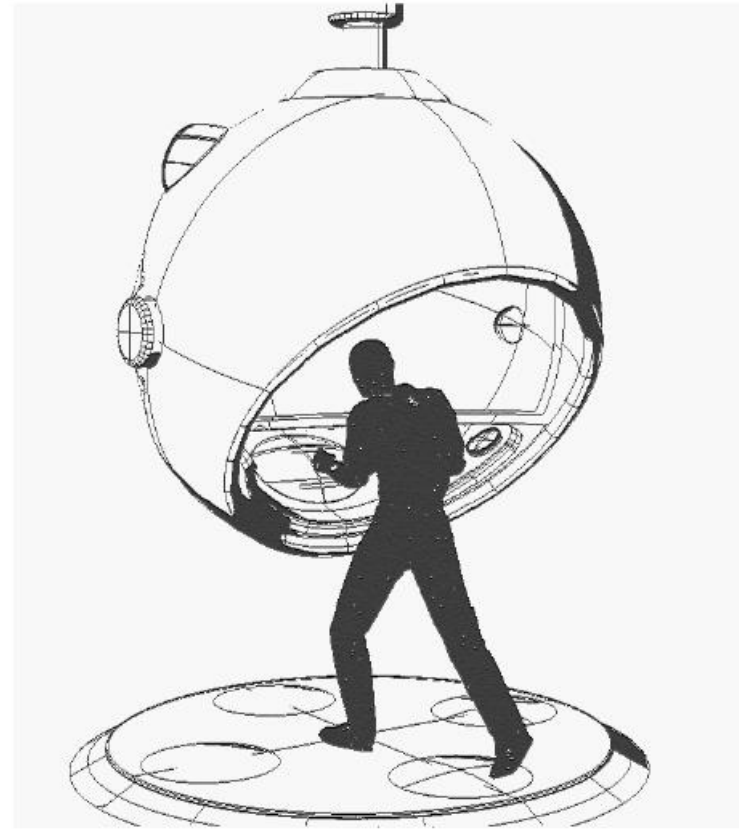
Initial Exploration



Initial Exploration

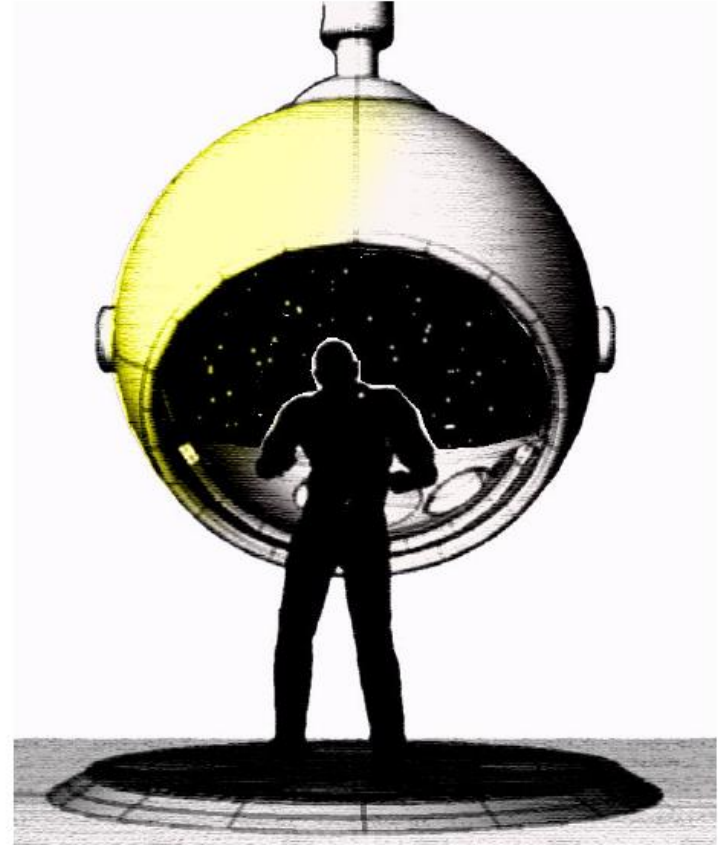


Initial Exploration



Screen as Enclosure

Initial Exploration



Screen as Enclosure

A look into possible Technologies

A look into possible Technologies



Curved Screens

A look into possible Technologies

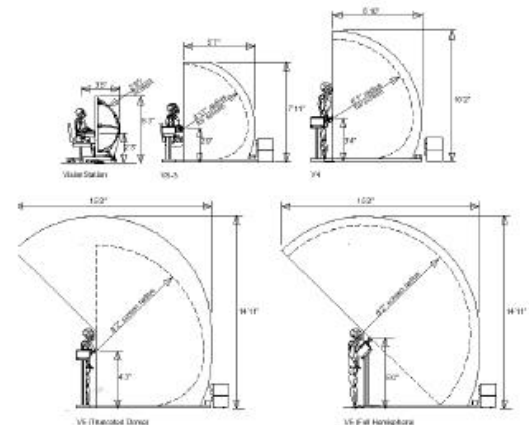
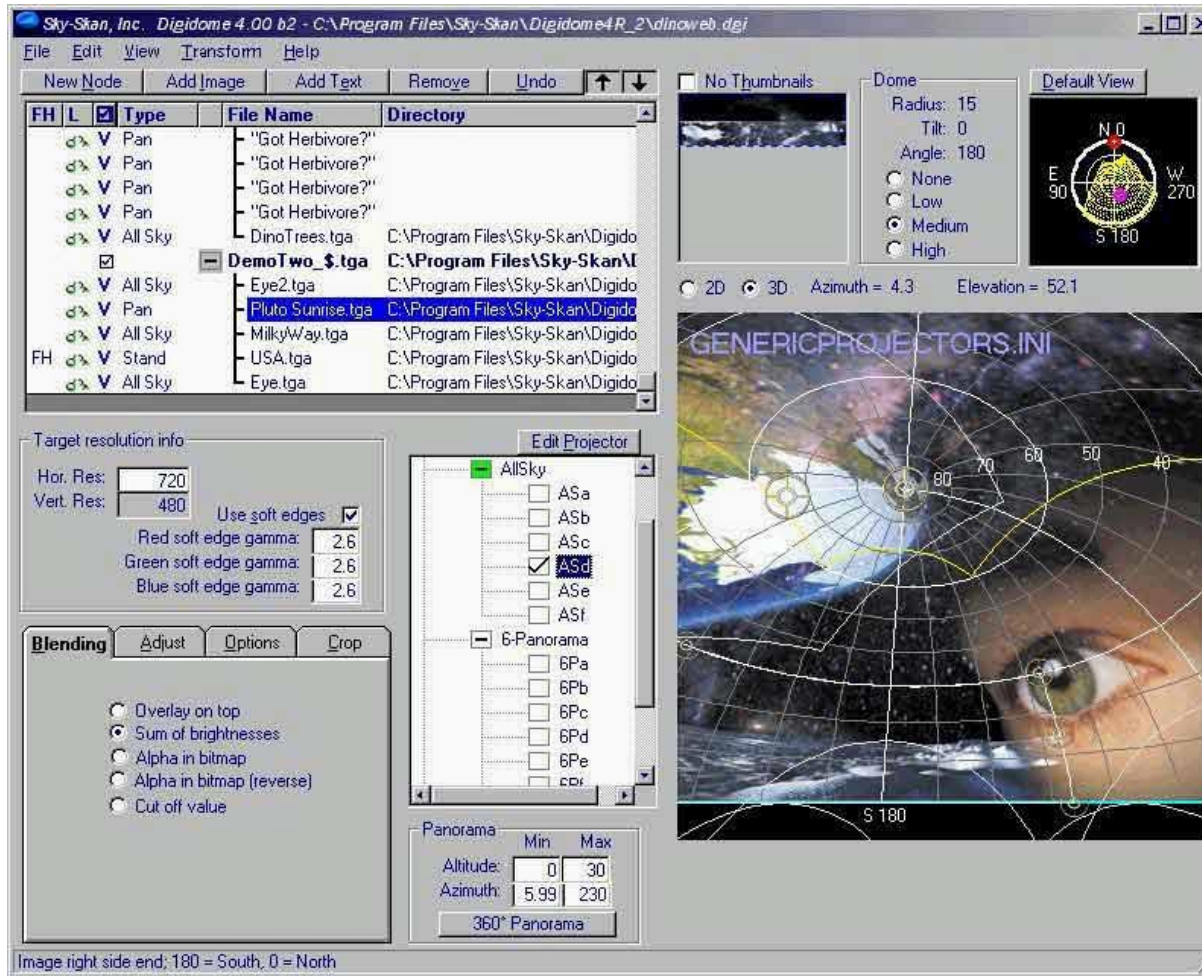


Figure 1. Side Views of the Vision Series Models

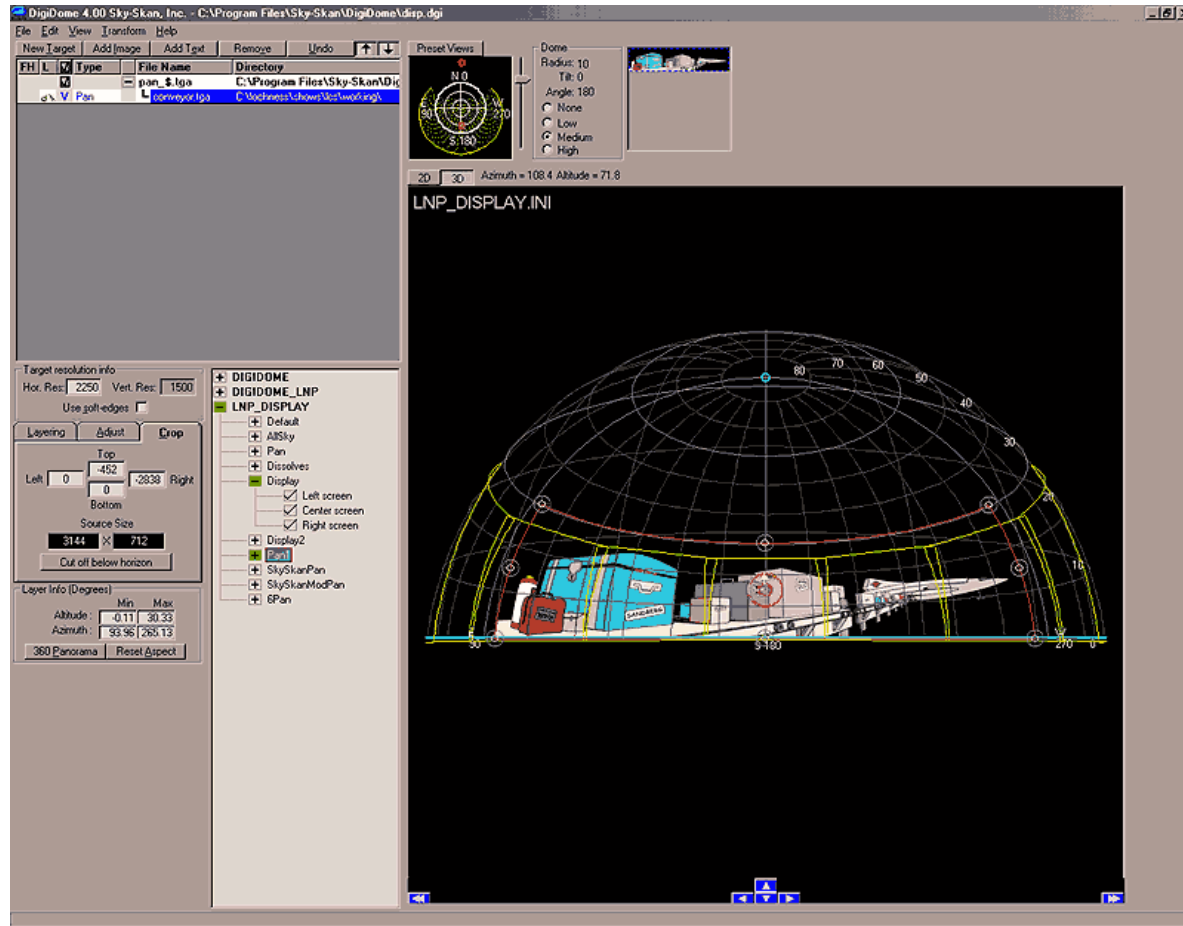
Projection Systems on domes

A look into possible Technologies



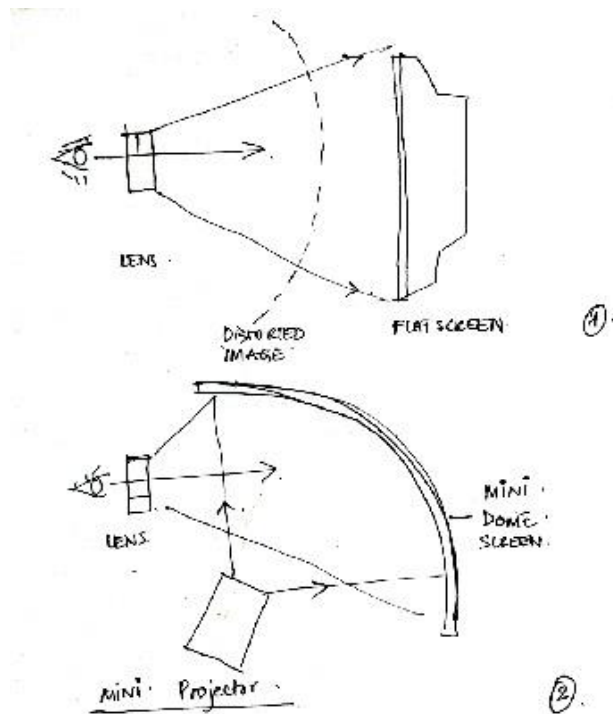
Softwares

A look into possible Technologies



Softwares

A look into possible Technologies



Projection technology on to domes is best suited to create simulation of night sky

Existing Projection technology on to domes can be modified to suit the requirements of the product

Software assists the workings of night sky by providing facilities for graphic rich environments and easy navigation

The Visionstation and Digital Planetarium technologies are to the scale of individual audience, **affordable, controllable** and **can be installed in public places.**

Design of Interaction

Finding satellites needed an involvement of audience to contribute their basic presence like location and time.

Some of the **objectives** for allowing the audience to interact for a product experience were -To involve with the search by directly interacting and being responsible to the actions

To give an opportunity for design of different kinds of **challenges** posed for different users with different level of background of the subject

To make the **learning pleasurable by motivating** the users to handle controls for self exploration of the Concept

To aid to the direct experience by providing specific controls designed to accomplish the task which was imposed

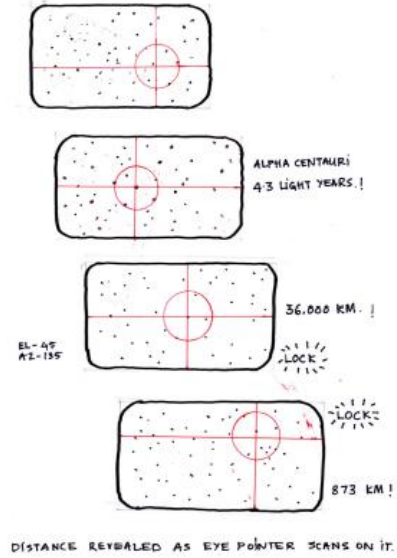
To design imaginative tasks in real time situations

Creating an interactive experience

Experience while Searching

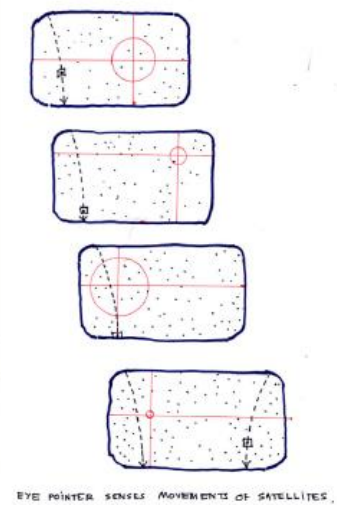
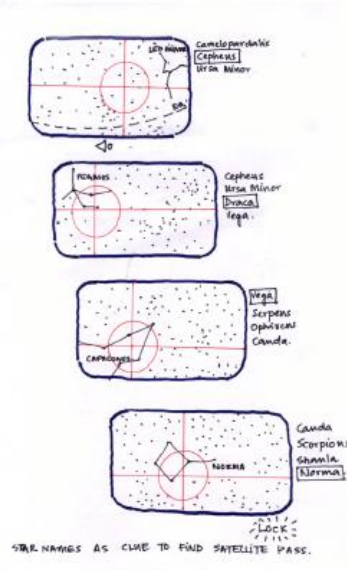
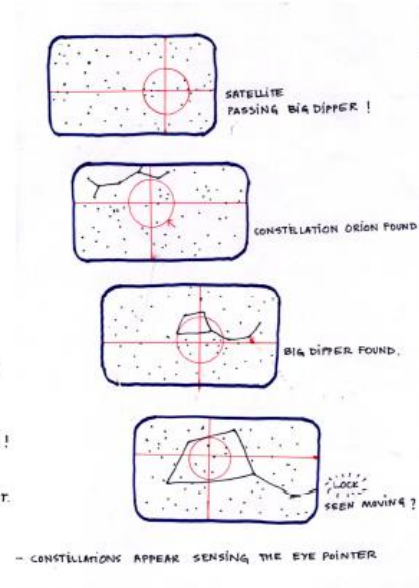
Experience by facing a challenge

Experience while Searching



DISTANCE REVEALED AS EYE POINTER SCANS ON IT.

Search Strategies



Experience by creating Situations

Satellite type	Search strategy	Challenge	Visualization	Previous knowledge required	Expected to learn
PO	Visibility	Testing your visibility skill	Moving star, blinking, reflecting	Looking	Turning the product, locking the satellite
PO GO	Searching before somebody does	To compete with someone	Some agencies are already ready to track down a certain satellite	To read azimuth and altitude and search for point in space	Searching from a location
PO GO	Searching more than 1 satellite in given time	To meet the task in given time	Pass predictions are used and real situations are given	Using prediction hint to catch	There could many satellites over your head at a given location and time

PO	Catching in anticipated location	Selecting the right location	Choosing different locations	The geography of earth or names of important cities	Locating different places and remembering satellite passes over that location
PO GO	Giving an incentive	Search for a "family" of satellites to get a free model of satellite	Different locations are visualized	Earlier level	Learn about satellite families
PO GO	Creating a celestial event	Find a satellite before a comet destroys other satellite	Comet is seen in some part of sky	Which satellites to save	Dangers of outer space
PO	Forecasting in different times	find satellites which will pass in next week	Prediction interpretation	Reading prediction charts	Anticipating passes in real life

PO -Polar orbit

GO - Geostationary Orbit

Other Possibilities

Album

Event

Orthodox method

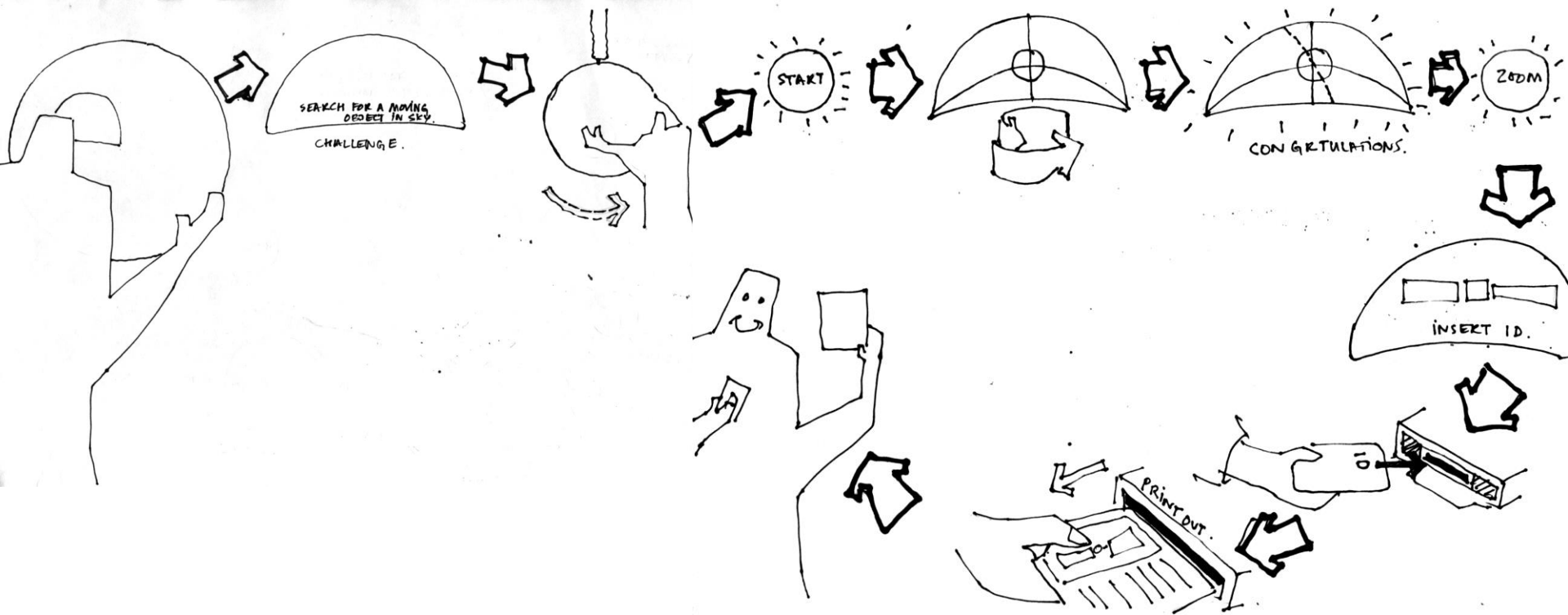
Real Time

Mathematically involving

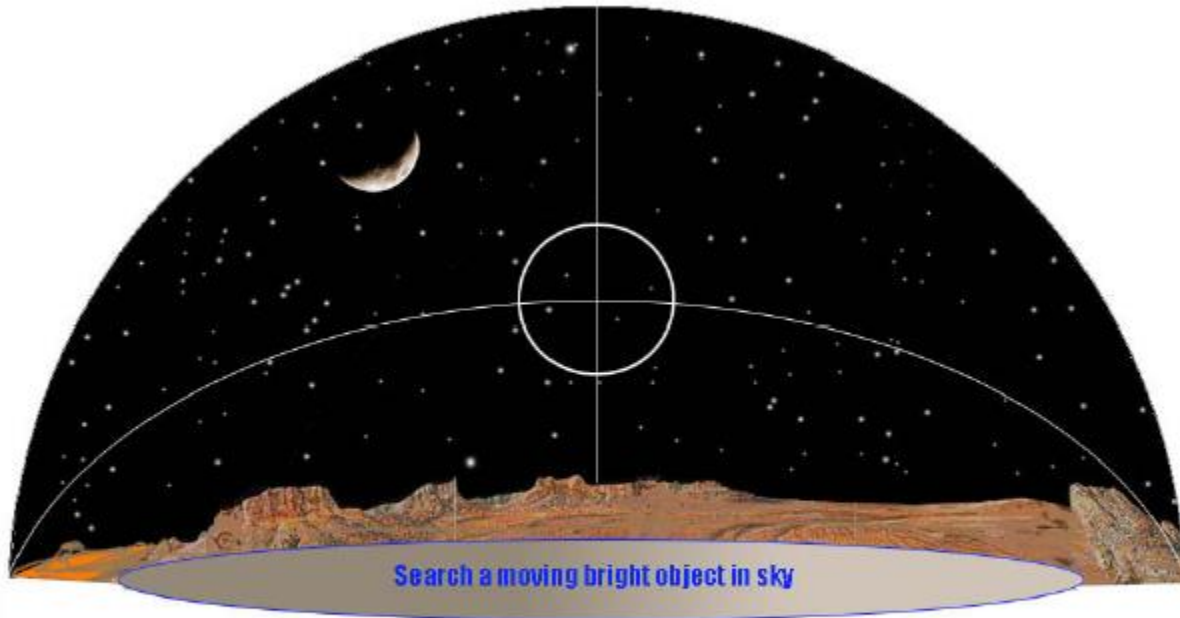
Assigning roles

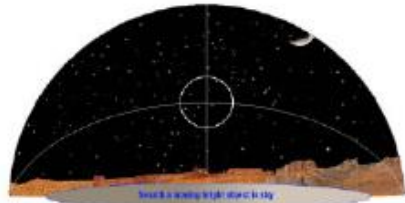
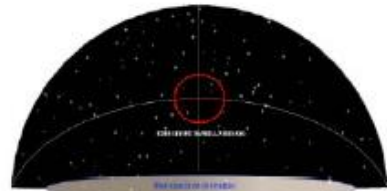
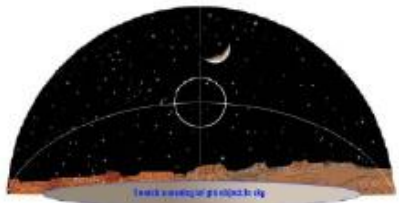
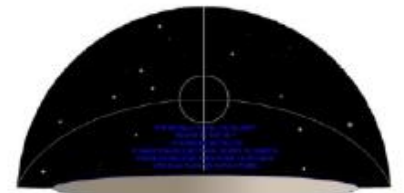
scenario

scenario

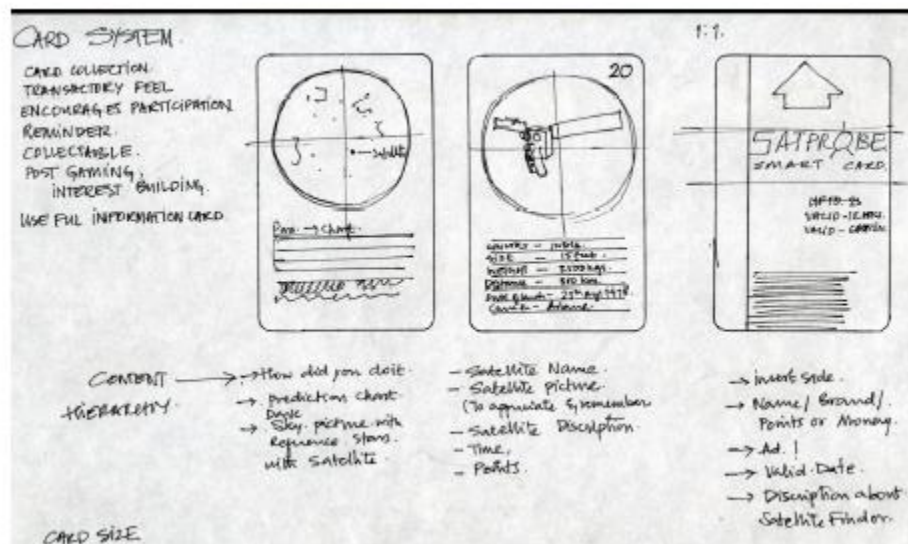


Screen Layout





Creating Sense of Accomplishment



Educational Cards

Videos

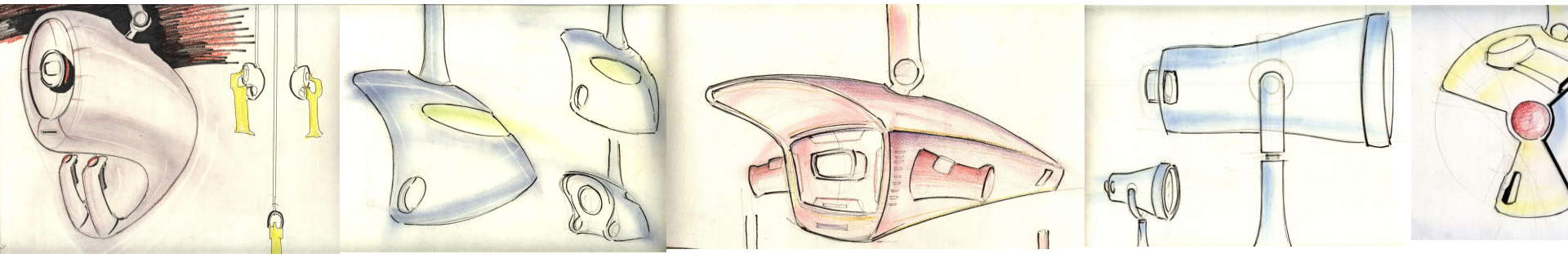
Popular controls - Observations



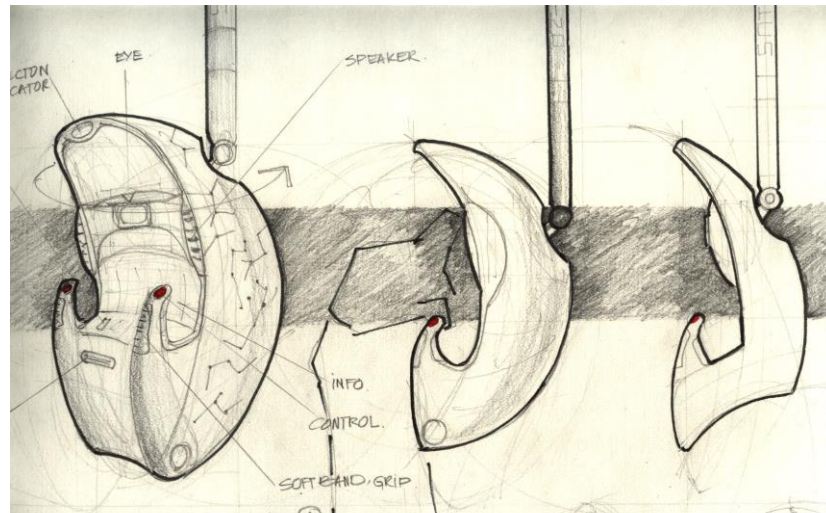
Design using metaphor

metaphor

Satellite finding



Initial Concepts



metaphor

Imagery

Alien Like

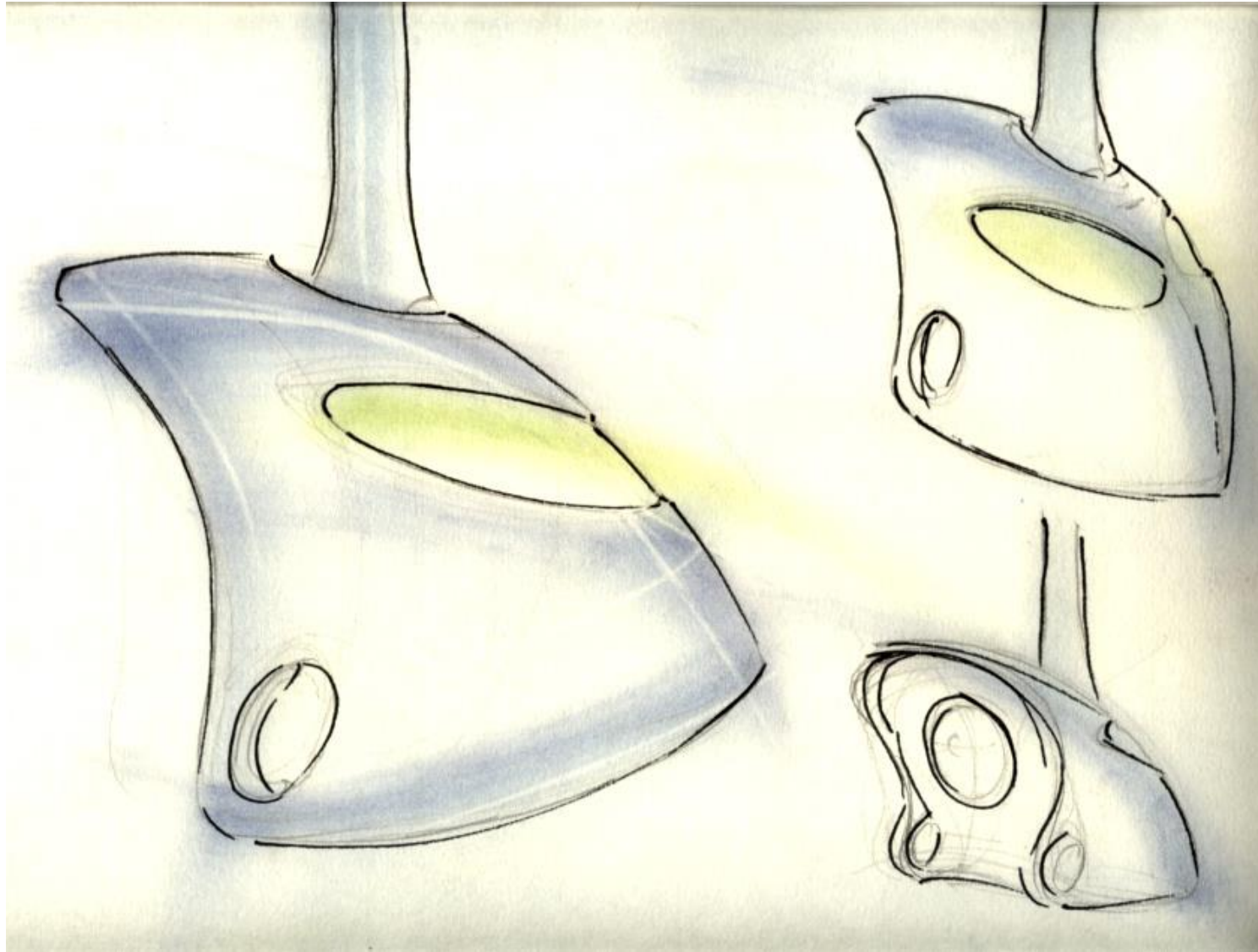
Satellite finding



metaphor

Satellite finding

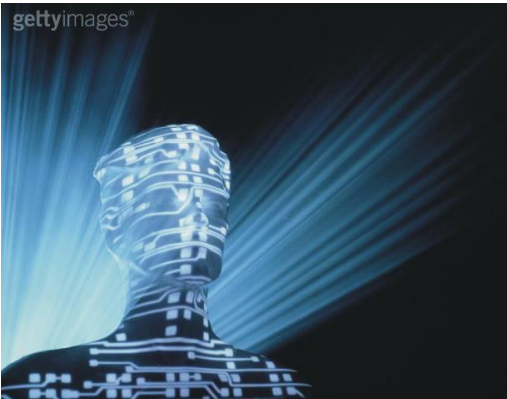
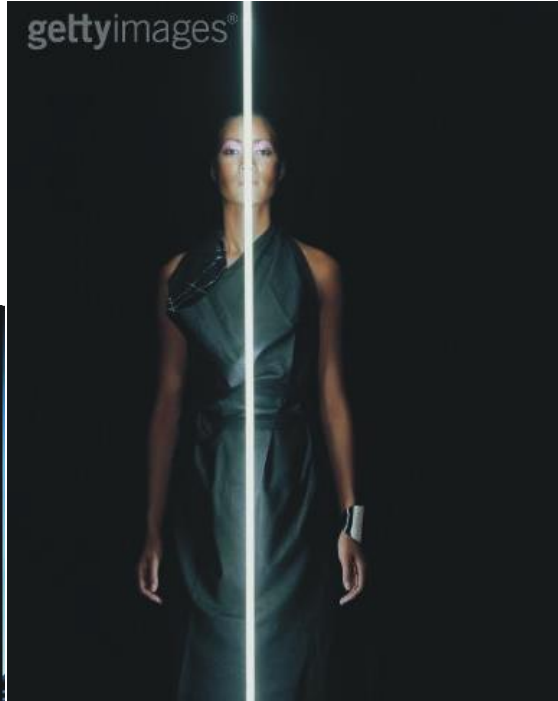
Alien Like



metaphor

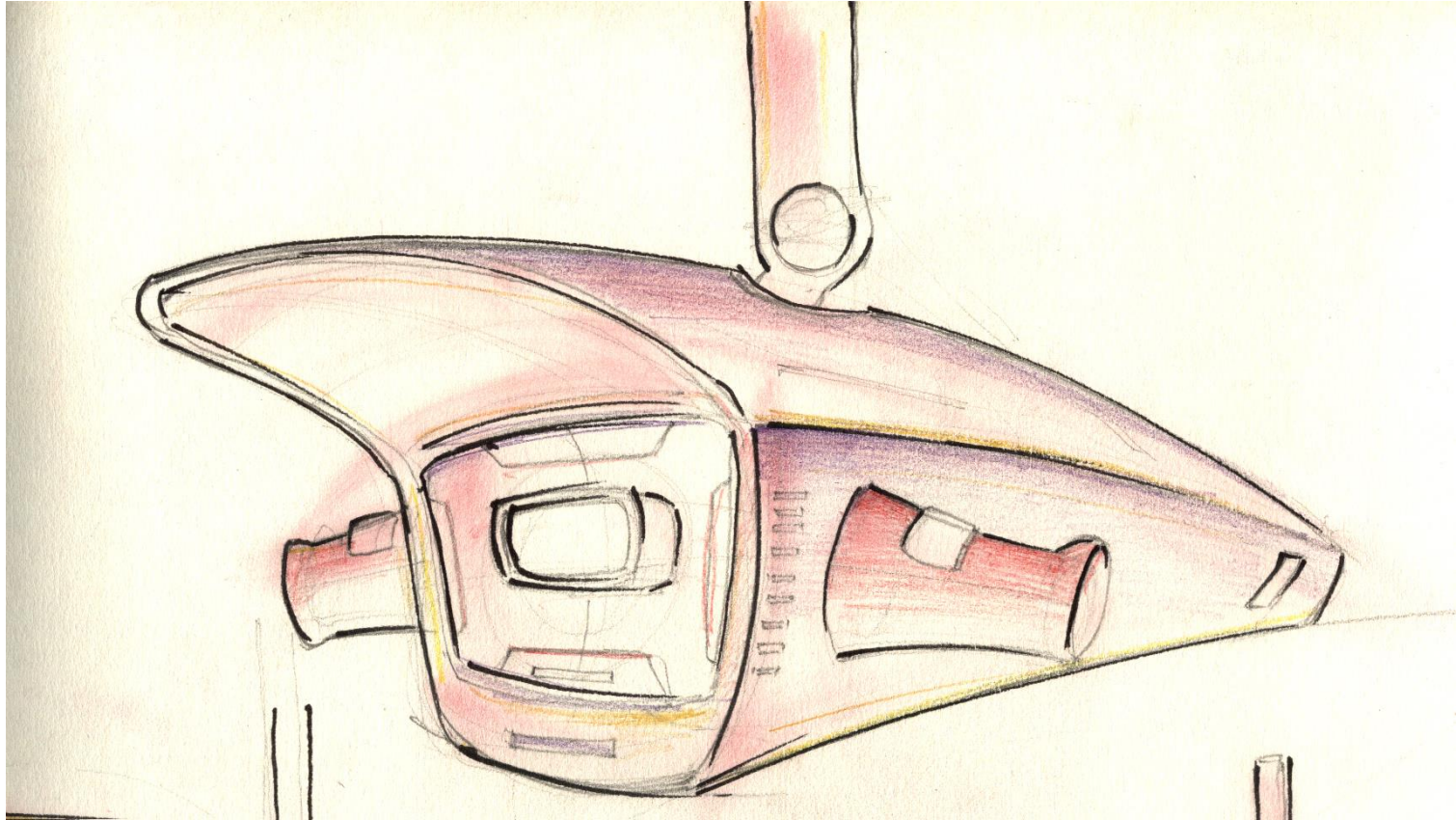
Imagery

Futuristic



metaphor

Futuristic



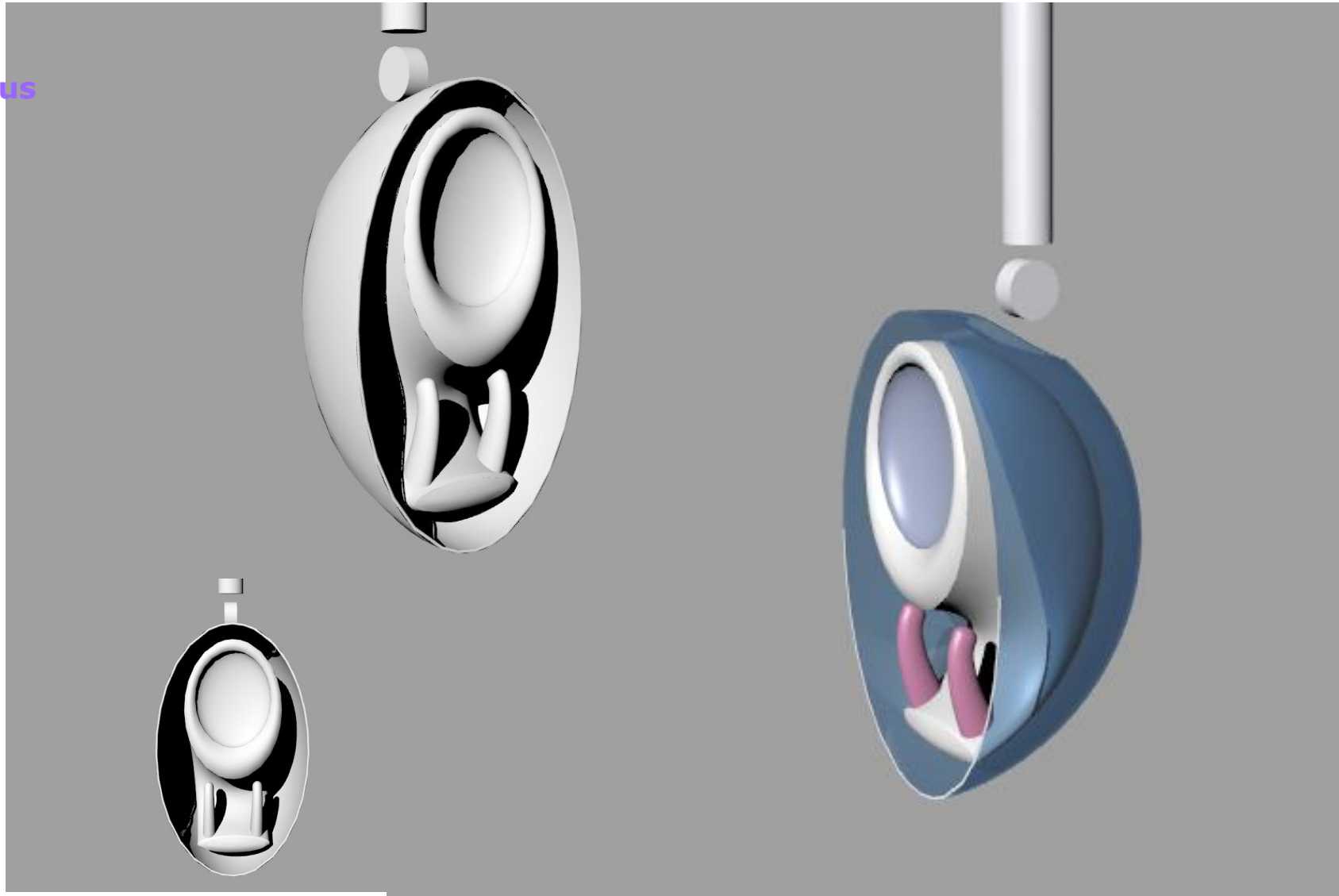
Imagery

Mysterious

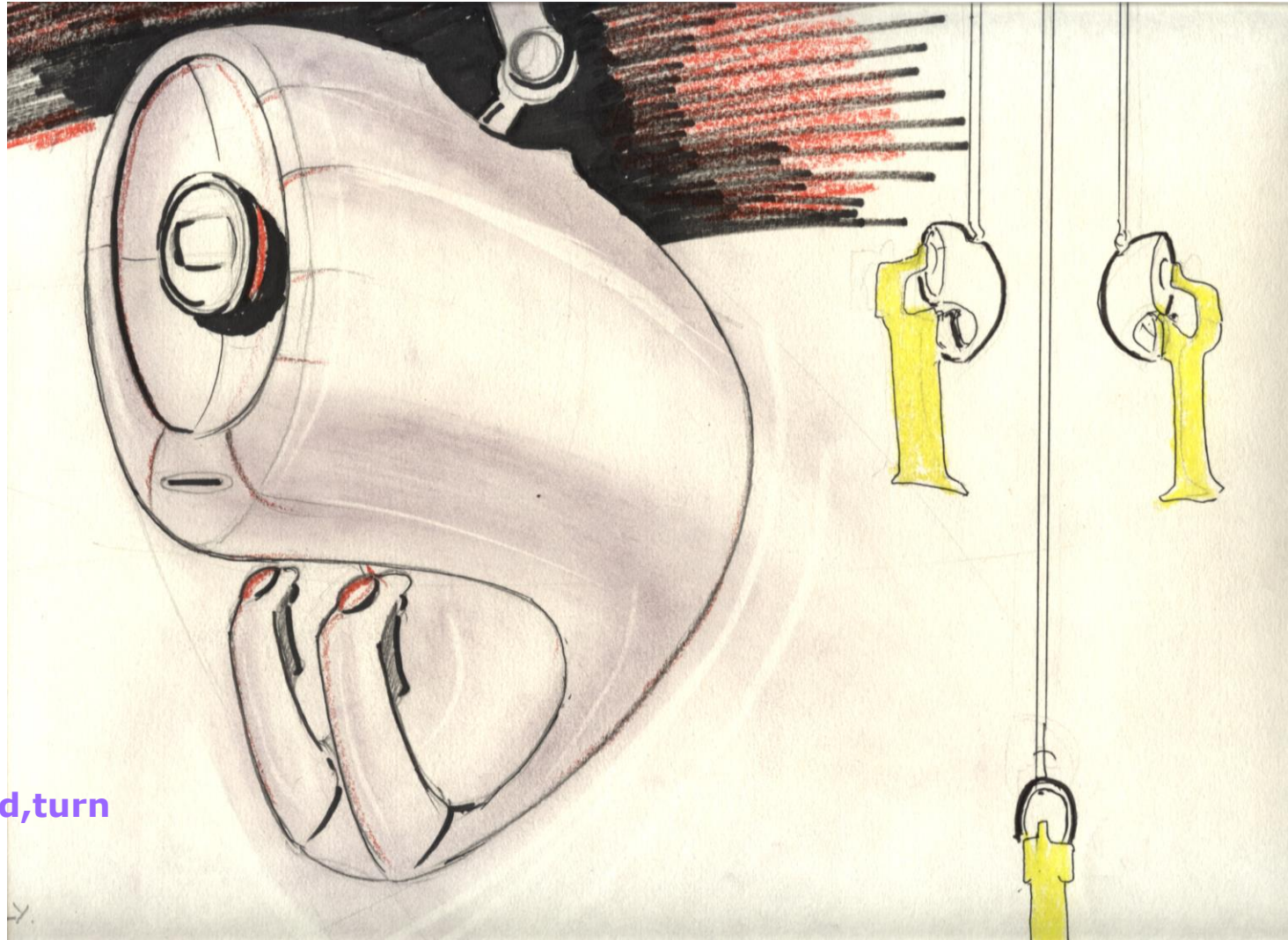


metaphor

Mysterious



metaphor



Peep into,hold,turn

metaphor

Imagery

Outer Space



Metaphor for Final Concept

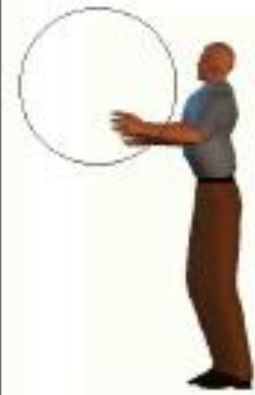
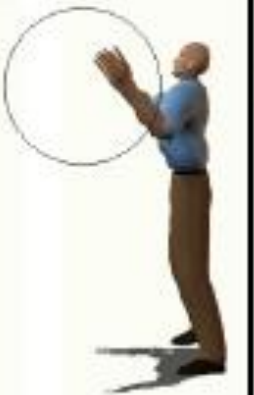
Outer Space- Space Helmet



Deciding the postures

Peep Like

Periscope Like

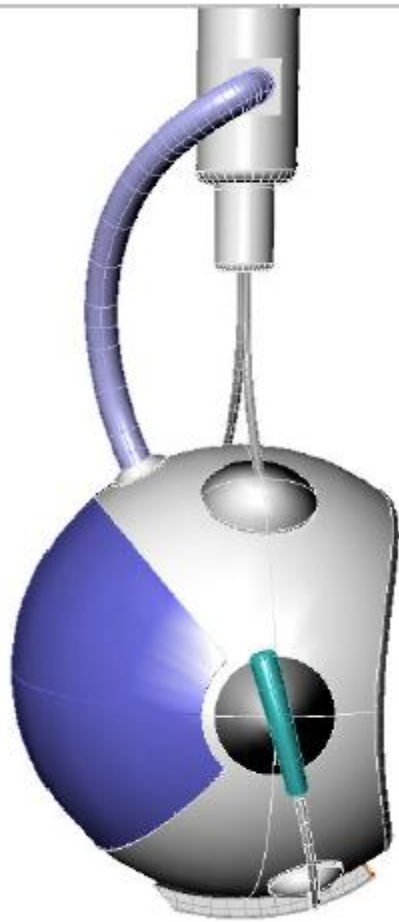


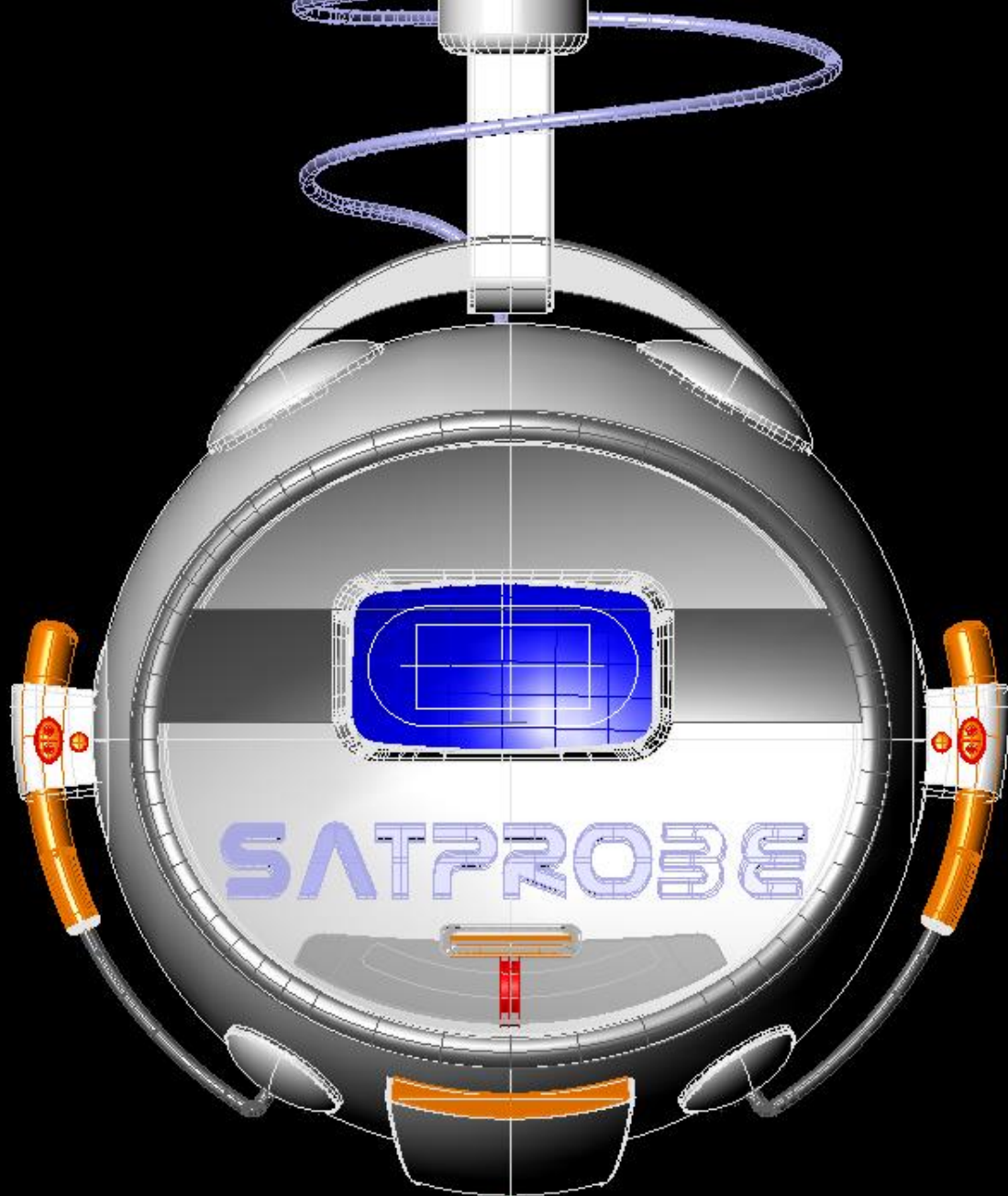
Handle Like

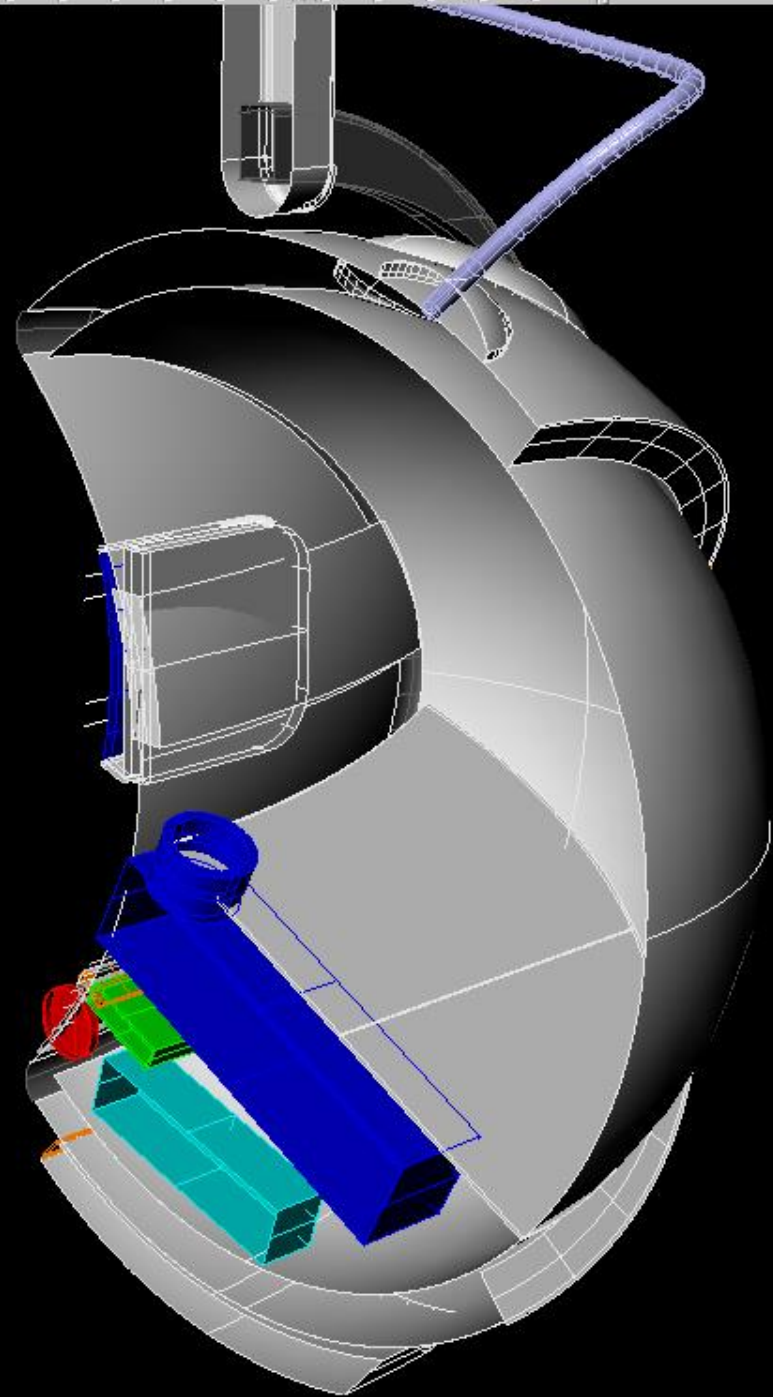
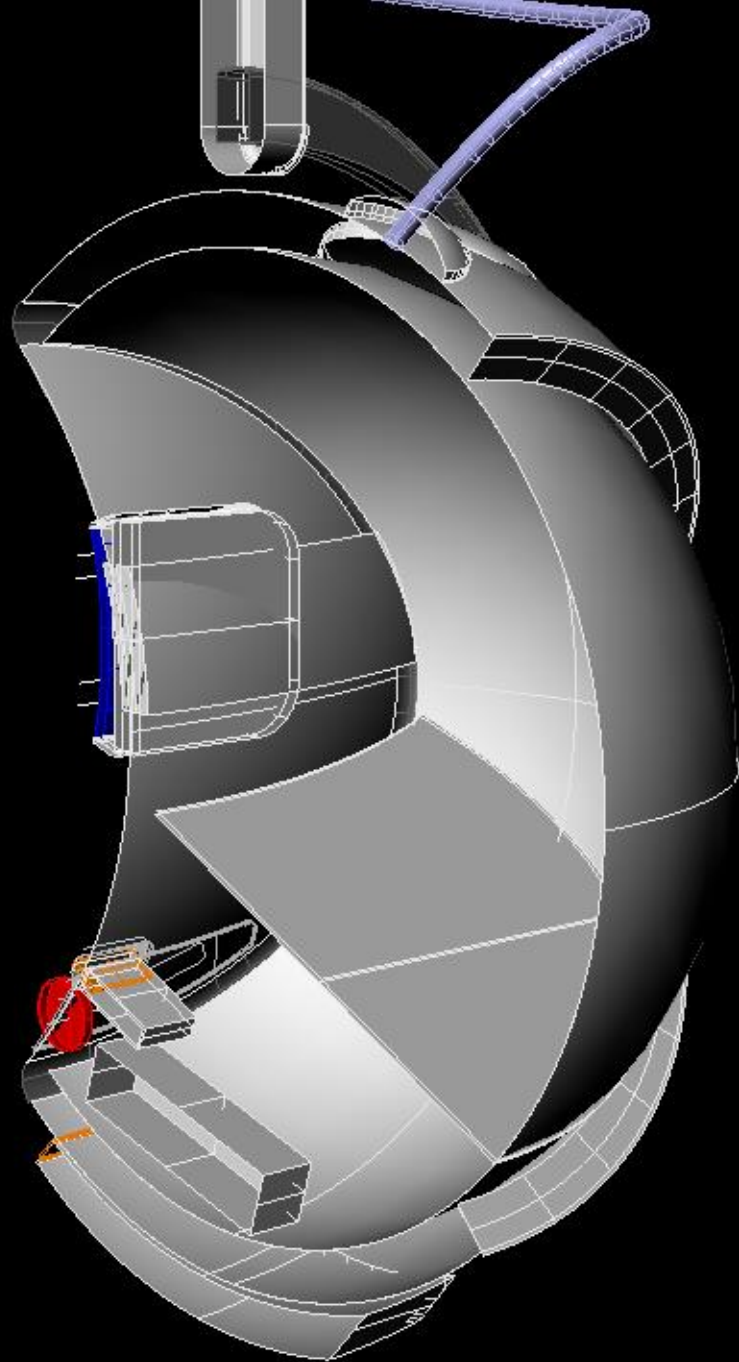
Embrace like

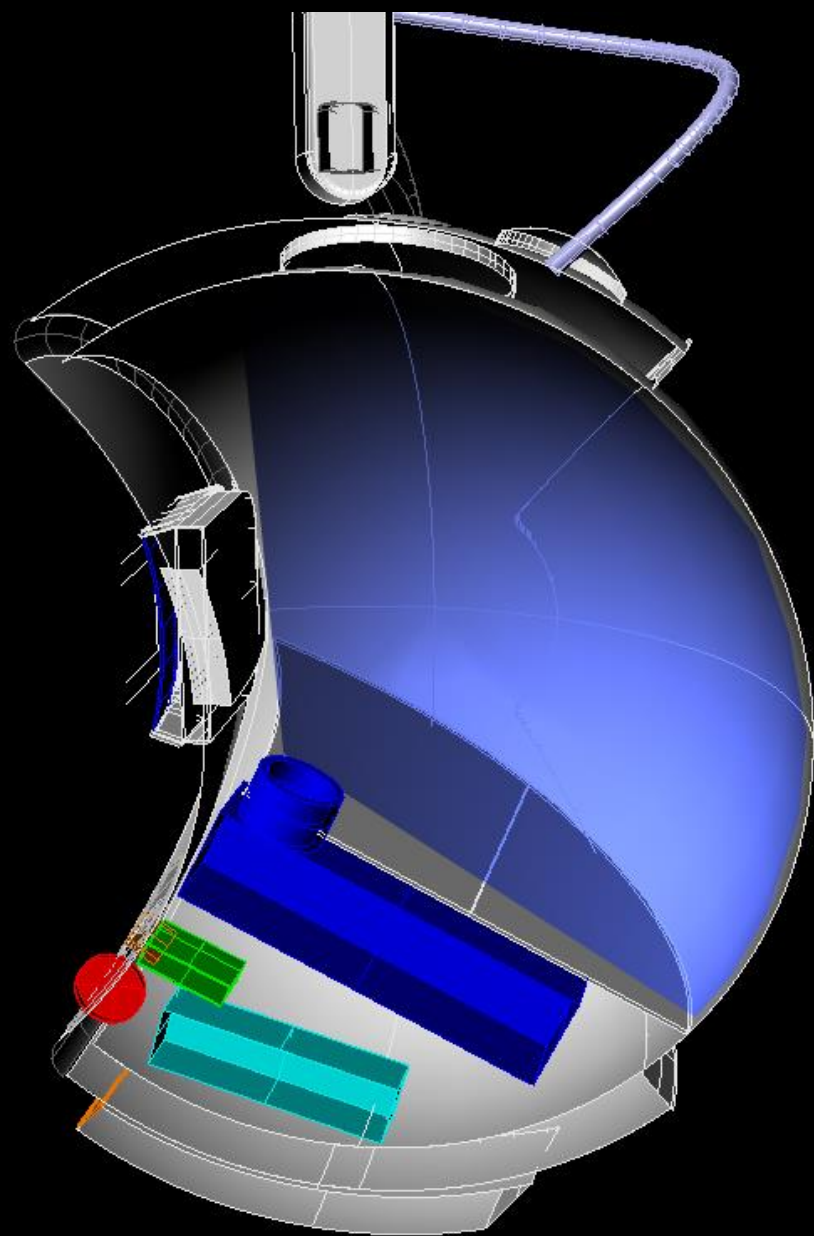
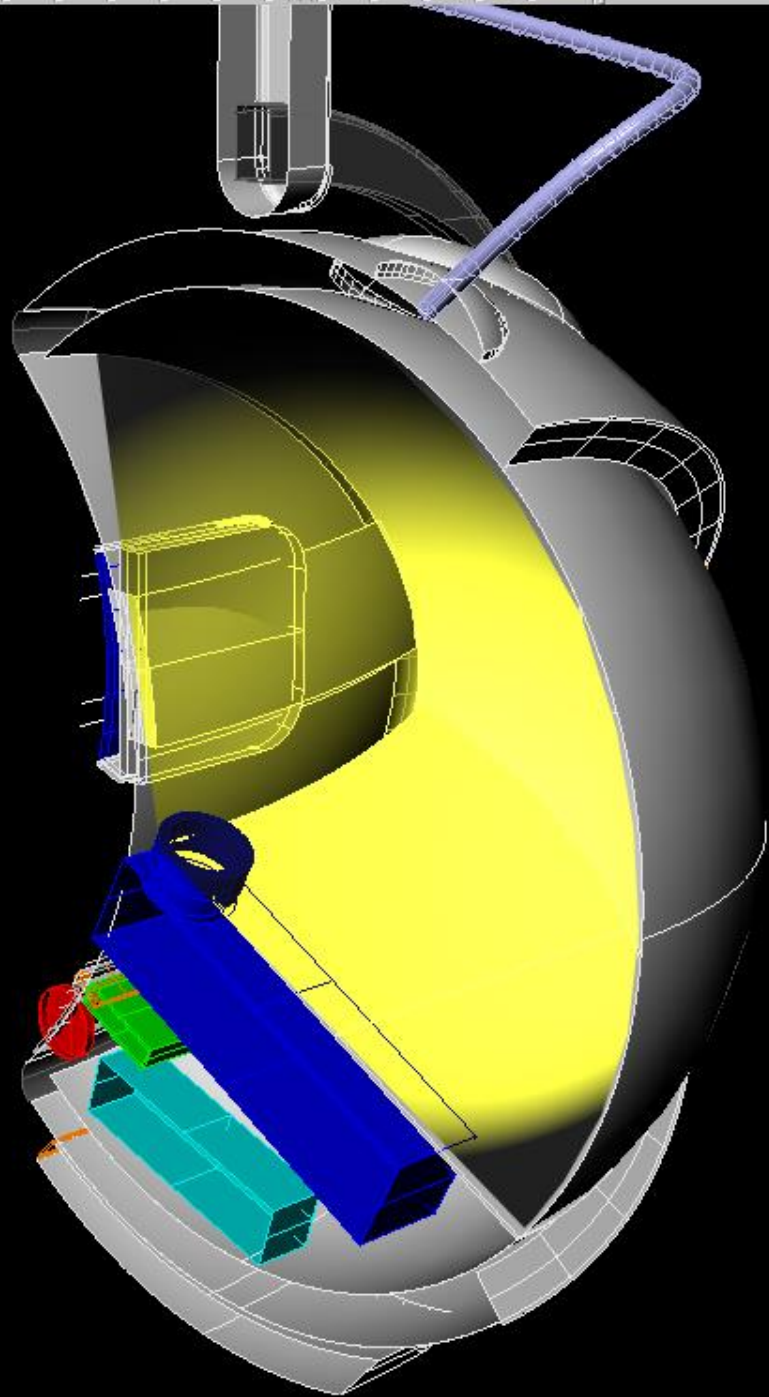
Group Interaction - A Proposal

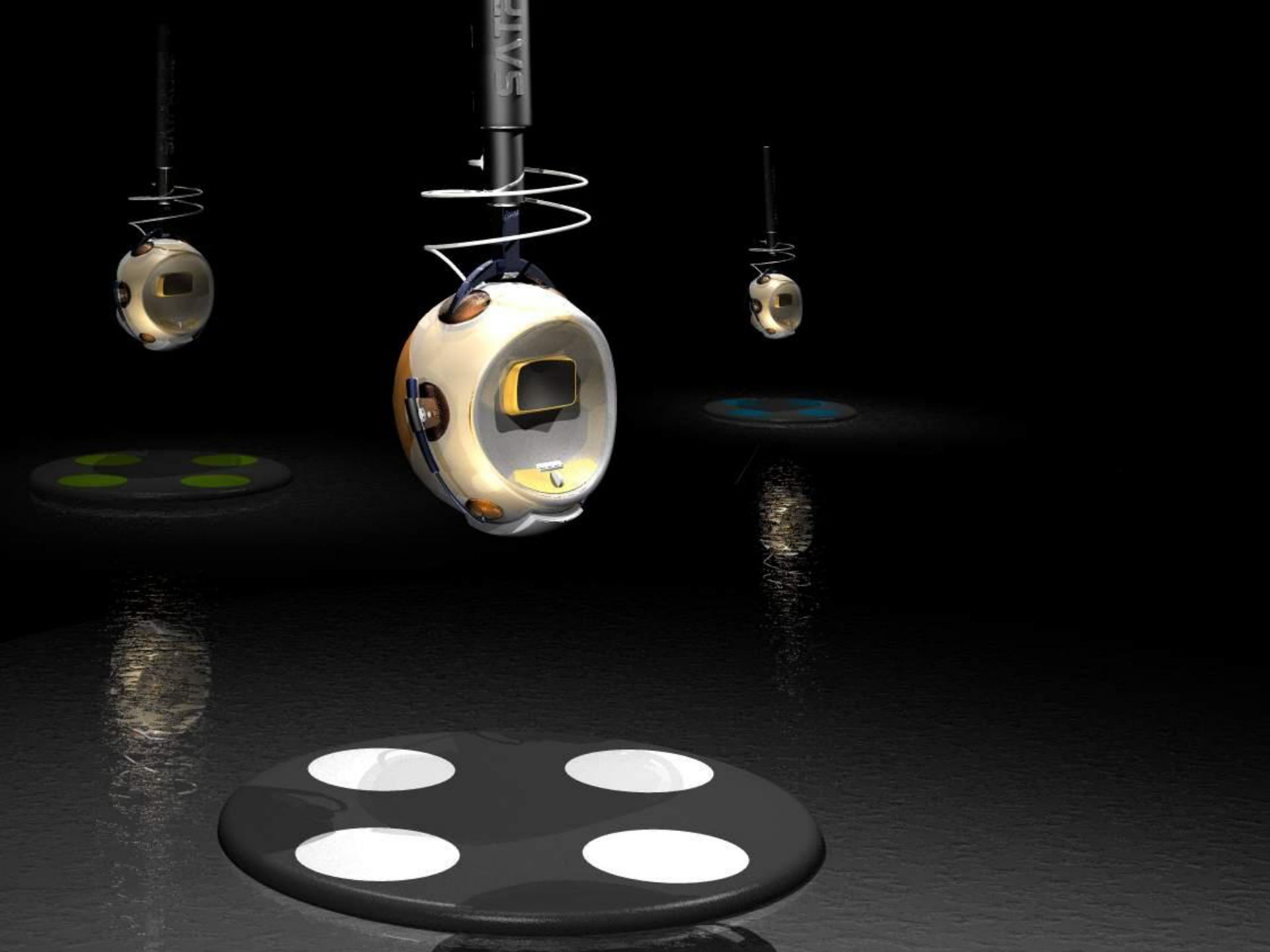
Final concept



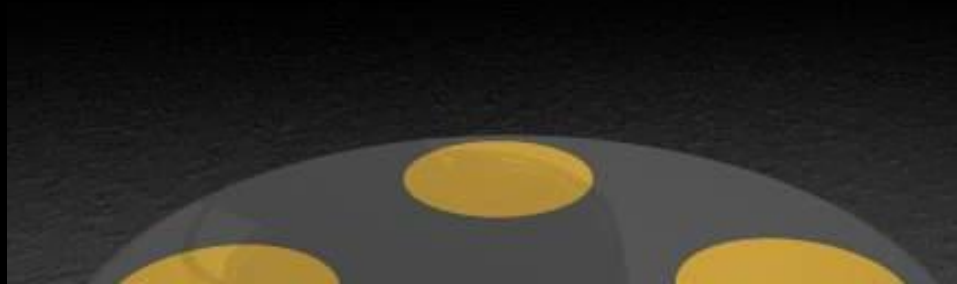












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