

Design Course

Product Design 1

An introductory course

by

Prof. Vijay P Bapat and Prof. Purba Joshi

IDC, IIT Bombay

Source:

<https://www.dsource.in/course/product-design-1>



1. Introduction
2. Planning the Module
3. An Exercise to Warm-up
4. Theme of the Module
5. Idea Generation-Brainstorming
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- 16, 17, 18, 19, 20

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<https://www.dsource.in/course/product-design-1/introduction>

Introduction

The emphasis of the course is on designing a physical product. It is the first course in design studies in which students are asked to design a product using their learning in previous courses like Elements of Design, Studies in Form, Media Investigation and Methods of Communication. Selection of the project brief is based on the possibility of innovation in form, material application, process and experience design. Students are introduced to the user centric design process through various supporting exercises. This being the basic course; students are asked to find out user related problems via role play to derive the design brief and then take their final output to user for feedback. Projects end with a comprehensive presentation through working/mock up models, design drawings and a report.

The project is supported by detailed discussion on various stages in the design process emphasizing the complementary nature of systematic and creative thinking. This is achieved by short supporting assignments in the following topics: creativity techniques like brainstorming & synectics to develop creative attitude and open mind, design opportunity, problem perception, idea sketching, exploratory mockup models for concept development, evaluation of concepts, final concept selection, concept development, refinement and detailing. Students develop their innovative and aesthetic sensibilities into making a coherent and appropriate product.

Following contents of this section are more in the in the form of story; than a step-wise guide to product design. It tries to capture the mood in a first year design class filled with tension, excitement and fun. At the same time, it also highlights the important stages of the product design process.



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Planning the Module

The team of Prof. V. Bapat and Prof. Purba Joshi was once again involved in a discussion over a cup of tea. The discussion led to a plan of action for the 'Product Design – I' module; a week before the actual scheduled start of the module.

Students of first year; by then would have equipped themselves with learning from courses like Studies in Form, Elements of Design – I, and Media Investigation. Prof. Bapat and Prof. Puba wanted to design Introduction to Product Design assignments in such a way that students will have enough scope to innovate. Understanding user needs, and user scenarios, writing a design brief, idea generation, converting them into concepts, selecting concepts, model making and process documentation; were the agreed must-have points for the Introduction to Product Design assignments. Introduction to branding by making a logo for the product and suggesting packaging design for the product was left as a part of the semester examination.

The user survey for refining the design brief was intentionally left out of the Introduction to Product Design course plan because of the time constraint. Professors wanted the students to have user feedback at the end of the course for the result of the Introduction to Product Design assignments.

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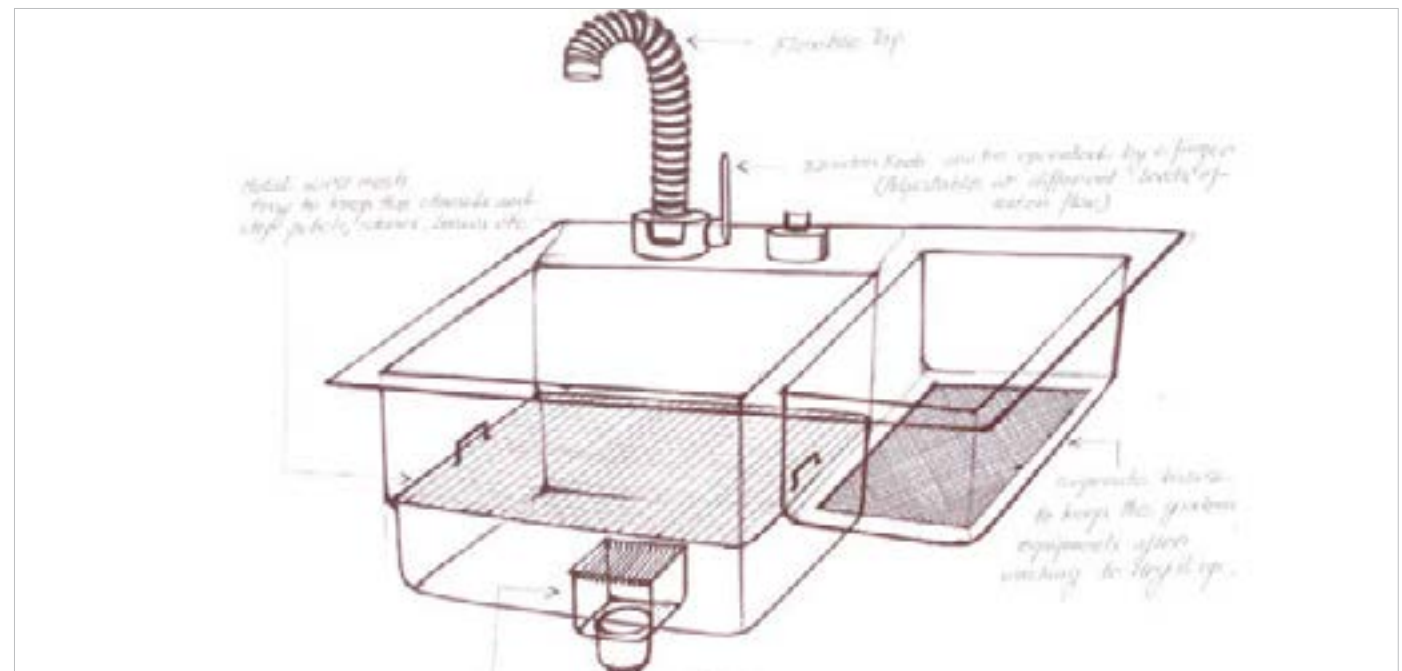
An Exercise to Warm-up

Design is a user-centric process and Prof. Bapat was particularly keen on making the same deep impression in the young designer's minds. Hence, he came up with an interesting assignment to kick start the 'Introduction to Product Design' course.

The assignment asked students to design a wash basin for specific users like – Shree Ganesh, Dashanan Ravan, Long Beard Sadhu, A Blind Man, Tom & Jerry, A Dentist, and A Muslim Woman in Public Space. The assignment not only freshen-up the start of the 'Introduction to Product Design' course but also unknowingly put some important questions in the young designer's minds like:

- How will the proposed contraption be used by an extreme user?
- Who all will use it?
- What are his/her needs?

This was just an ideal beginning for the upcoming Introduction to Product Design assignments.



Wash basin designed for: Gardener

Student: Nabarun Bhowmick

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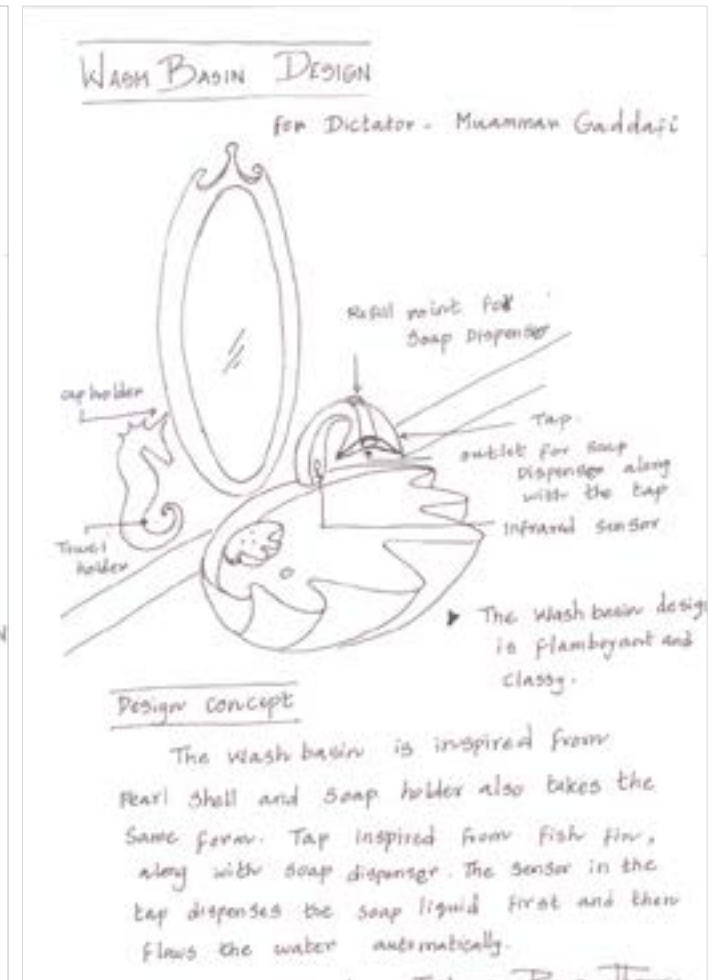
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Wash basin designed for: Dictator Gaddafi
Student: Jai Kumar



Jai Kumar
11/10/2006

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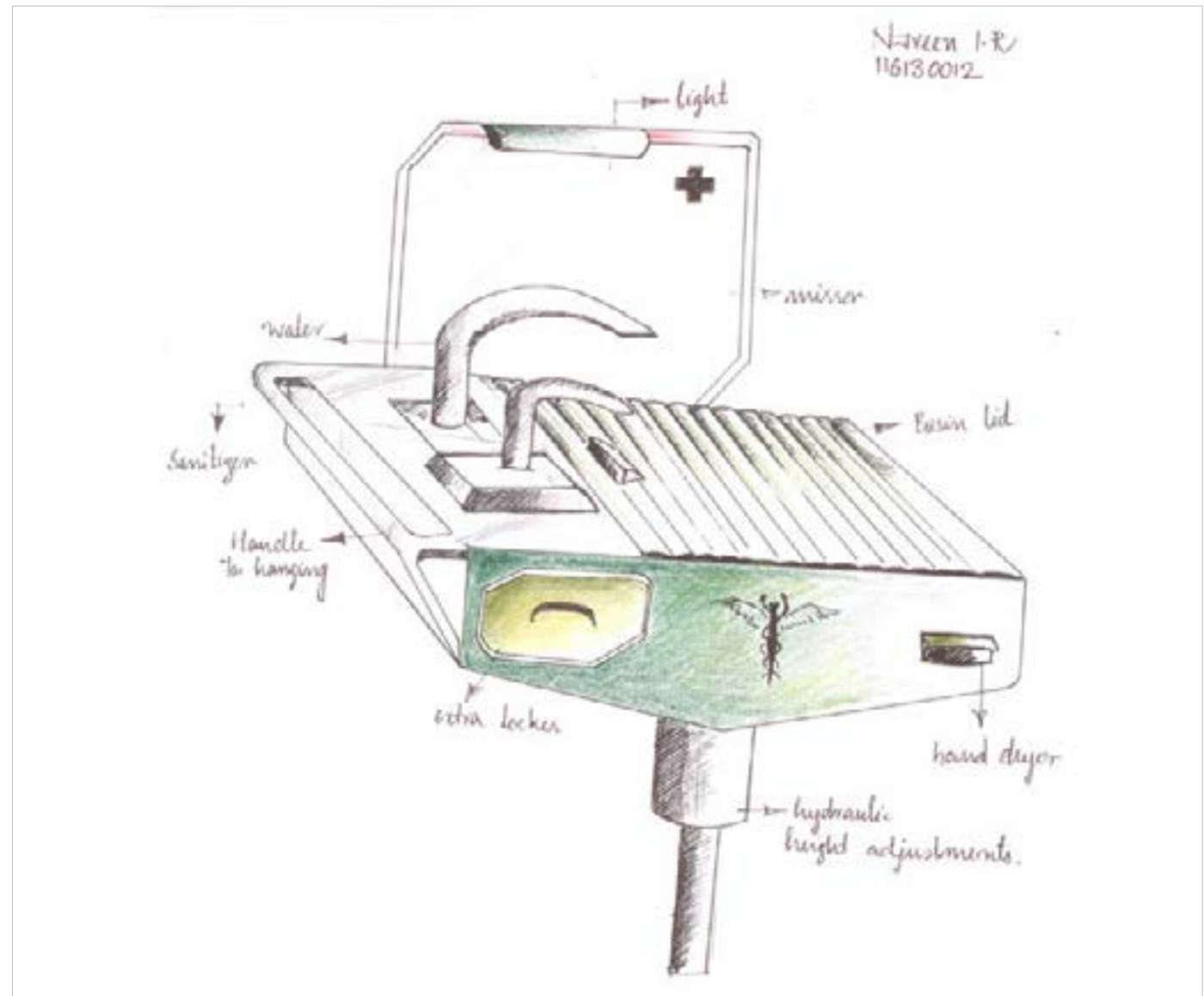
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Wash basin designed for: Doctor
Student: Navin

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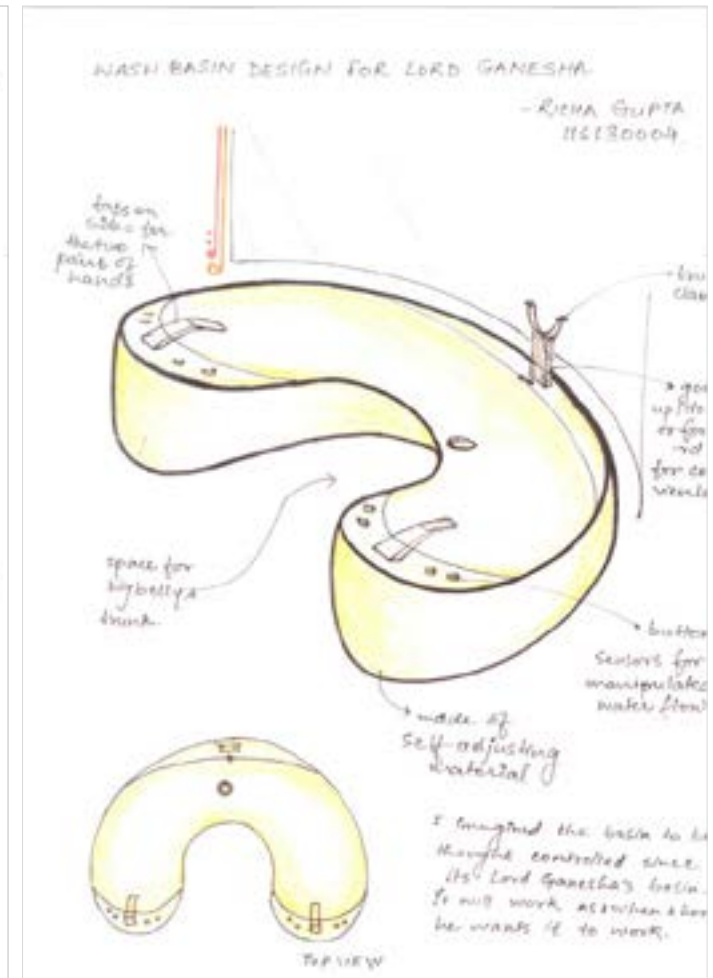
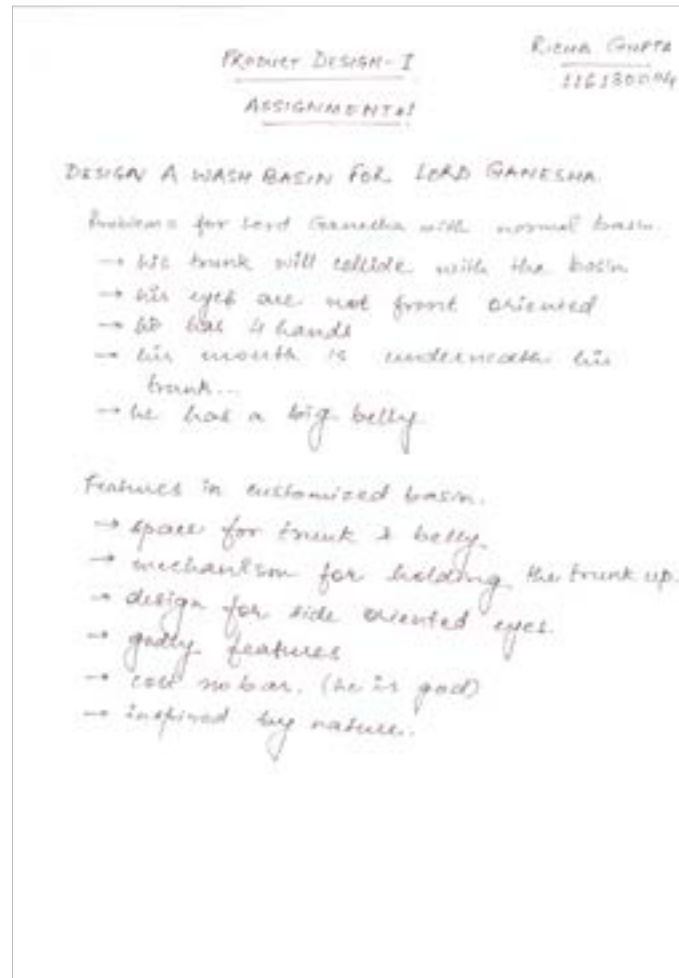
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Wash basin designed for: Lord Ganesha
Student: Rucha

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Wash basin designed for: Tom & Jerry
Student: Aravindan

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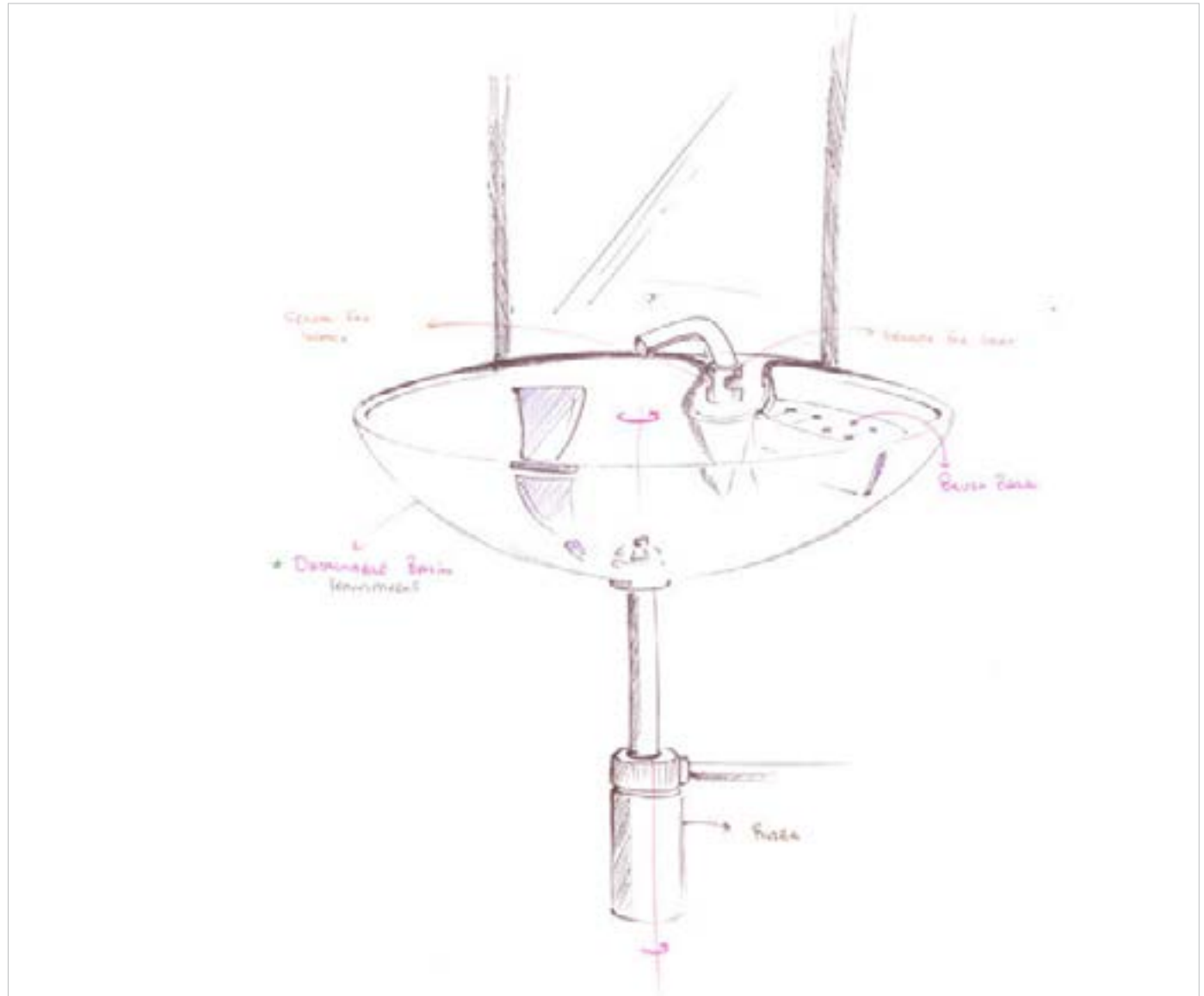
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Wash basin designed for: Painter
Student: Nishant

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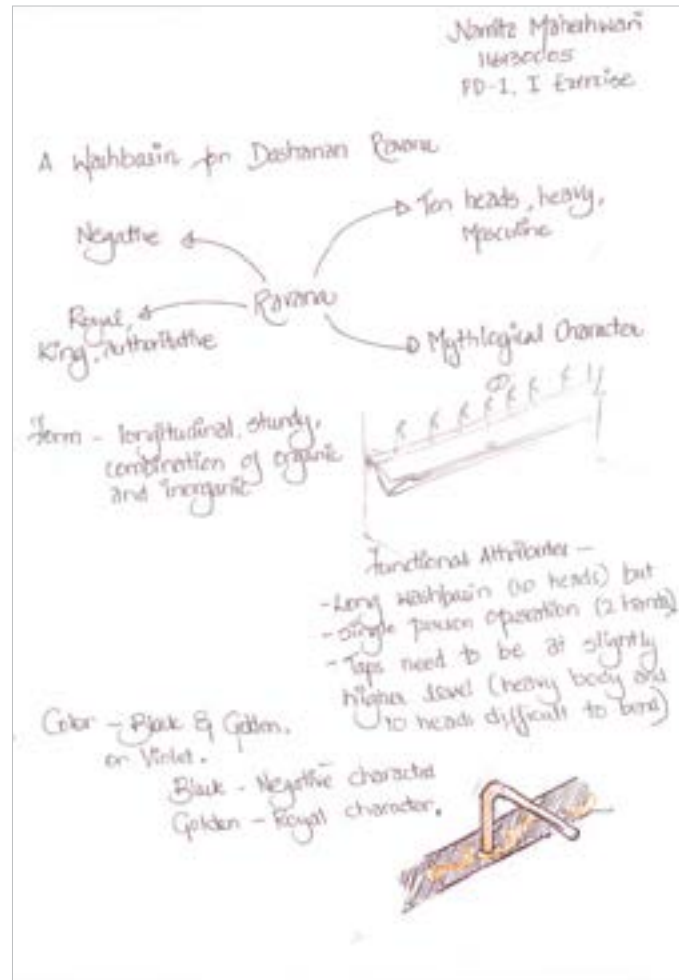
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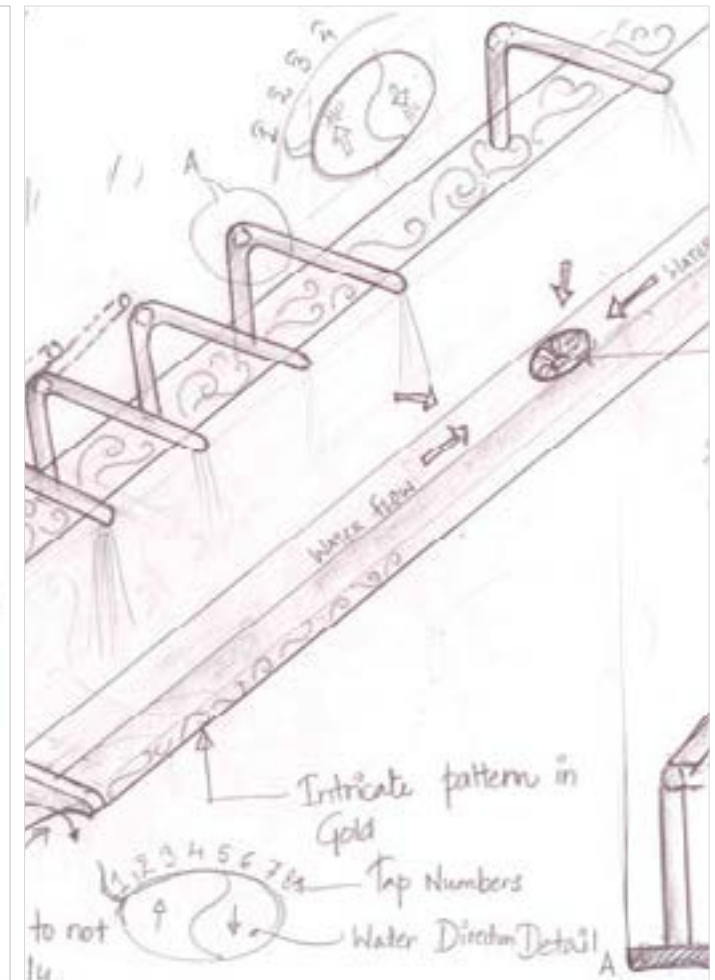
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Wash basin designed for: Dashanan Ravana
Student: Namita



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Wash basin designed for: Dentist
Student: Ameya Shukla

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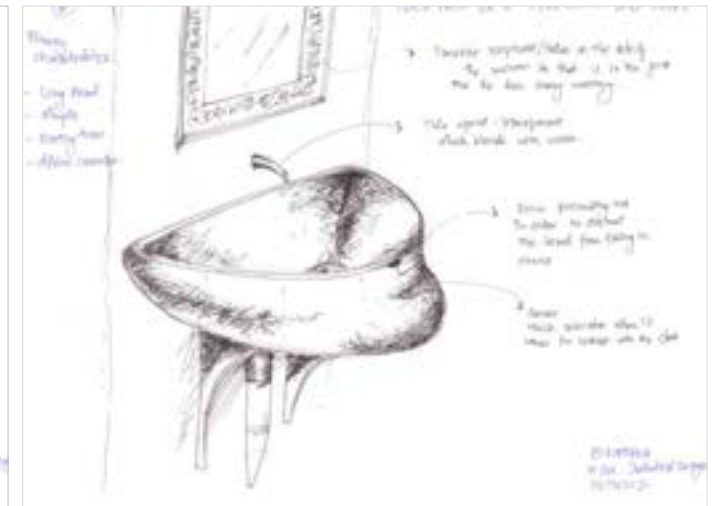
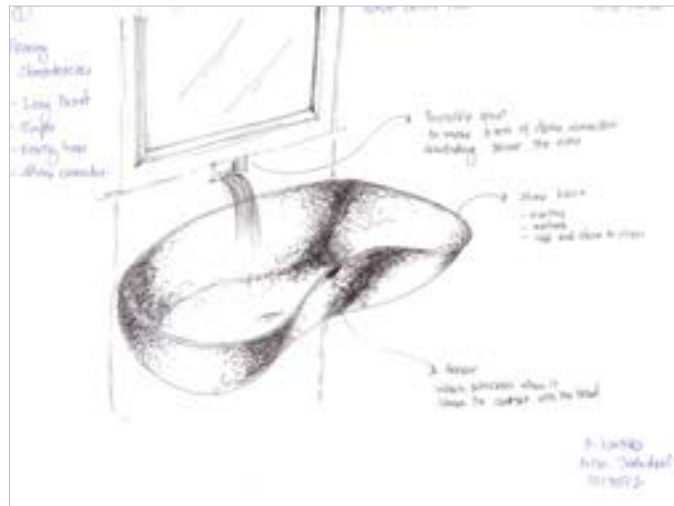
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Wash basin designed for: Long beard Sadhu
Student: B. Karthika



Wash basin designed for: Women in burkha
Student: Prandeep Gyanvir

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Theme of the Module

After the start-up assignment Professors revealed their true plans for Product Design-I by announcing the theme for this year's Introduction to Product Design module.



- Lifestyle products - with wire form
- Products with LED lights - a reading light
- Water storing devices - everyday objects
- Wooden toys - pull-along toys for toddlers.

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The theme topics were intentionally kept wide open thus offering ample opportunity and challenge. The topics were evenly distributed in the class of 12 students with three students working on each topic. Students were to work together in a group till the initial data collection stage.

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Idea Generation-Brainstorming

Students were little amazed to start with after hearing the theme and were soon filled with queries and doubts. Professors were expecting this and announced the need for a brainstorming session. The naïve students were not fully aware about the brainstorming session and its effectiveness. So, Prof. Bapat told them few basic rules of brainstorming like there should not be any criticism of any idea however impracticable it may sound to begin with. He also told students that in brainstorming session idea should not be elaborated or detailed because it may lead to blocking the way of new ideas. Prof. Bapat became the group leader for a brainstorming session.



The session was started with a topic - new ideas for sketch pens. The starting topic was kept different than the theme topics to loosen up the students' minds. Prof. Bapat kept on encouraging everybody to contribute by pitching in with ever new ideas, at the same time he stopped students who tried to judge other's ideas. One of the students was asked to volunteer to write down ideas rising in the discussion.

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After about 5 to 7 minutes of intense sessions, Prof. Bapat noticed that the students were getting exhausted with the ideas. He asked everybody to think about the craziest idea for a sketch pen; thus drawing in ever more exceptional and unique ideas from students. At the end of the session, the board was filled with ideas. Prof. Bapat then told everybody another important thing about the brainstorming session. The ideas generated in the session should not be owned by anybody. One should improvise and mount on the unveiled ideas. The Professor also showed students his own collection of sketch pens which he collected from all over the world.

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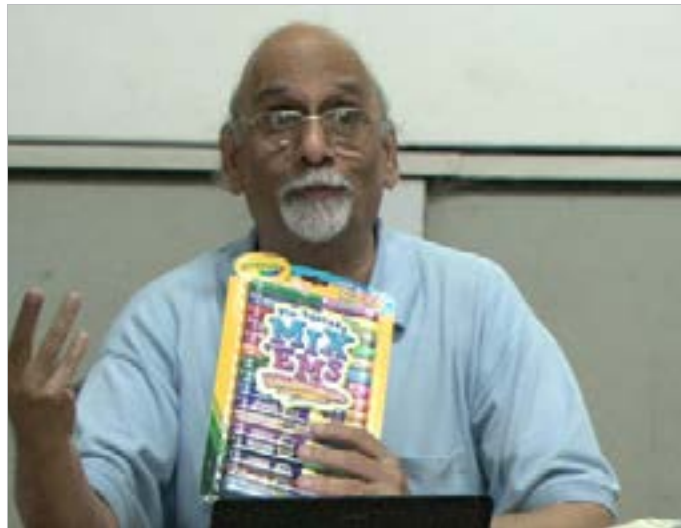
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The warm-up brainstorming session served its purpose by helping to throw away the confused look from the student's faces. Students were enjoying and smiling with admiration while reviewing the board filled with ideas thrown by them. Prof. Babat decided that it was the right time to start with the actual theme topics. Then he asked students to brainstorm the ways in which water is stored around us. Students were asked to conduct similar sessions within themselves for the remaining three topics. The results of the brainstorming sessions were left with students. They were asked to review them and decide on a particular topic of their interest from the generated list. They were also asked to start sketching their ideas about their selected topics. Prof. Bapat insisted that each one should have a minimum of 15 sketches i.e. 15 ideas by next day.

Students were also shown a case study of bicycle design analysis which included functional analysis, aesthetic remarks, and synchronic and diachronic analysis. It also explained how such analysis can be useful for taking a new direction in design.



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Arriving at Design Brief

The next day students had a list of objects in their respective theme topic. The lifestyle products with wire - group had a list of products that can be made with wires like tissue paper holders, soap holders, magazine holders, etc. Water storing devices were also with a list of possible ways to store water for example buckets, tanks, glasses, bottles, jugs, pitchers, etc. LED reading light group was ready with a list of reading light applications for example portable book lights, bedside lights, lights for traffic police, etc. The pull-along wooden toy group was full of a list of animals, insects and everyday objects like cars, buses, etc. which can be used as a subject for pull-along toys.



But, professors soon understood from the discussion with students that no one was able to decide on the topic for further exploration. So, groups were given feedback collectively by discussing each one's case. While discussing with students, Professors were also going through the student's drawn ideas.

At this stage, the one question that many students asked professors was, 'How to select a topic that is challenging at the same time worth investigating?'

Prof. Bapat explained and assured them that any topic they chose for learning the design process would be as challenging as any other topic. He further explained to them that even the design of a simple bucket can be improved if only some designer is ready to take on challenges like:

- Cleaning of the bucket
- Transporting water
- Storing water - space constraint, scenario understanding
- Storing empty bucket/s
- Other possible ways in which buckets can be used - for example table, washing machine drum, etc.

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- Needs of users like sweeping floor, washing clothes, bath, pouring water in drum or washing machine or the garden, etc.
- Storage capacity of the bucket
- The formal and color statement of the bucket - bucket as a lifestyle product
- Possibility of new material and process for bucket manufacturing and so on



Investigation in each area with a designer's perspective will yield a new solution. The solution then can be successfully marketed by its Unique Selling Proposition (U.S.P.).

Professors also reminded students about the first-day fun exercise of designing a wash basin for specific users. Students were designing bottle shapes, earthen pot shapes, and LED table lamp shapes; all of that was just an unrestricted exploration resulting in more confusion. Professors asked each one of the students to define the user and user profile for their chosen topic or contraption.



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Importance of Explorations

The pull-along wood-toy group was asked to work on a variation of a simple eccentric mechanism to save crucial time in developing and proving new mechanisms. Lifestyle wire product group was asked to look into the lifestyle products and were asked to decode their beauty with words. The wire group was also advised to make scaled or 1:1 models in AI or GI wire as imagining and visualizing the drawn wire forms was difficult. Along with writing the design brief, all students were suggested to make the quick-scaled models of their ideas.



The main intention of letting students to decide on the topic in the given framework and also letting them to select the user and user profile for their topic was to develop an ownership of the project and end result. As Prof. Bapat told them the end result of the Introduction to Product Design assignment will be their own creation and in one way their own child which should have that 'WOW' factor.

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While the students were writing their initial design brief with user at its center stage Prof. Bapat also shared gadgets and toys from his collection of objects like - LED lamps, pull-along wooden toys, and pull-along plastic toys. He also shared his previous real-time design consultancy work for industries, with students. The intention of showing various interesting gadgets, contraptions and case studies to students was to widen their vision and to make them appreciate design in a way that only a designer can. Prof. Bapat also made a silent point about the expected output quality of the Introduction to Product Design assignment by showing his own old case studies to students.

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IDC, IIT Bombay

Source:

<https://www.dsource.in/course/product-design-1/importance-explorations>



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<https://www.dsource.in/course/product-design-1/design-appreciation>

Design Appreciation

The next in-class exercise involved identifying problems in everyday stapler and designing a new stapler to solve those identified problems.

Simple questions like who? What? Where? When? Why? How? helped to trigger the creative thinking of students. This exercise was in line with the status of students' Introduction to Product Design projects, providing indirect hints but also serving to increase student's design appreciation. The significance of the assignment didn't end there. After going through each student's identified problems and their proposed solutions, Prof. Bapat appreciated their efforts for a very limited time and with calculated words.



Some of the problems identified in the stapler were:

- Loading of pins is difficult
- No facility for storage of pins
- Size is not good for carrying; portability
- Stapled paper bunch increases in thickness
- Removal of wrongly stapled pins is not easy
- Aesthetically not appealing

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- Number of remaining pins cannot be seen
- No ergonomic considerations

Without wasting further time Prof. Bapat showed students his huge collection of staplers. Students were amazed to see that the problems which they identified were already solved. Not only solved but solutions were sold in the market in the form of new products i.e. staplers. Stapler with an additional pin storing facility, stapler that can operate with minimum effort, stapler that can even staple a pin in the middle of an A4 page, stapler for wood-working, stapler for medical application, smallest stapler, stapler that can stand on its back instead of resting on its faces so that it's easier to lift – were some of the highlights of the big collection.

Source:

<https://www.dsource.in/course/product-design-1/design-appreciation>

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Source:

<https://www.dsource.in/course/product-design-1/tools-transformation>

Tools of Transformation

The stapler collection was also used to introduce students to another idea generation technique in the form of 'Tools of Transformation'. The following points were explained to students with the stapler collection.

- Put to other uses
- Adapt
- Modify
- Magnify
- Minify
- Substitute
- Rearrange
- Reverse
- Combine



Stapler + Paper punch

Features: Easy pin loading, sliding lock stops staple pushing action during punching operation.

Transformation tools: Put to other use, adapt, combine, modify.



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<https://www.dsource.in/course/product-design-1/tools-transformation>

Features: Appealing and comfortable form, easy loading of staples, space for additional staples.

Transformation tools: Modify, rearrange, and combine.



Staple Gun.

Features: Staplers are not limited to papers only, but extended to stapling canvas or flex banners to wooden frames. Staple is pushed out with such a great force that, it is called as Staple Gun

Transformation tools: Adapt, magnify, modify, rearrange



Features: Different type of mechanism that uses reusable clips for clipping a bunch of papers.

Transformation tools: Modify magnify, rearrange, and substitute.

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Source:

<https://www.dsource.in/course/product-design-1/synectics>

Synectics

The very next day Mrs. Sharmila - IDC, IIT Bombay, a PhD student was asked to tell students about the use of yet another idea generation technique to students - Synectics.



The term Synectics is from the Greek word synectikos, which means “bringing forth together,” or “bringing different things into a unified connection.” Synectics is about making connections.

Synectics is an art of thinking with the help of metaphors and analogies. The techniques of Synectics - Personal analogy, Direct analogy and Fantasy analogy, were explained with the help of appropriate examples.

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Analogical thinking is a comparison between two things that are similar in some respects, often used to help explain something or make it easier to understand. Metaphorical thinking is when one thing is used or considered to represent another

Architect Buckminster Fuller summed up the essence of synectics when he said all things regardless of their dissimilarity can somehow be linked together, either in a physical, psychological or symbolic way.

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Direct analogy
The idea is to describe a clear, straight forward relationship between the problem and some object, thing or idea.

▲ Chair as caterpillar ▲ Porcupine grater

Symbolic analogy
Symbolic analogy uses objective impersonal image to describe problems.

▲ Musical plate - repetition, spread ▲ Poble' plate : exquisite dining experience, gracefulness, fluidity, balance

Personal analogy
The method involves stating the problem in simple terms and imagining the parts as one-self or imagining one-self to travel into that particular situation.

▲ Imagining one-self as a coffee cup - warm and inviting; wanting to be hugged ▲ Imagining one-self as a pottery

Fantasy analogy
Sigmund Freud's wish fulfillment theory is adopted as fantasy analogs. A particular problem is tackled by imagining things to happen as in a fairy tale.

▲ A product to increase awareness about global warming - use of heat sensitive ink ▲ Fantasy analogy for increasing awareness of effects of pollution

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<https://www.dsource.in/course/product-design-1/concept-models>

Concept Models

Professors were meeting students after a weeklong Diwali vacation. Prof. Bapat and Prof. Purba had a meeting with each student before the beginning of vacation. They had given them the necessary feedback on their initial design brief and also instructed them that from now on they would like to see the quick-rough-models, scaled or 1:1 whichever best suits the type of contraption on which they are working.

After taking review in the first meeting after Diwali, Professors were not happy with the progress of the projects. Wire group members were asked to make more models and also cautioned to monitor their workmanship as the smooth curves and bends play an important role in the beauty of wire form products. The student working on champagne bottle holder was asked to get an empty champagne bottle and feel its form, and weight and was also asked to use it for explaining the further explorations. The other student from wire form group working on magazine holder was also asked to get real magazines and use them for explaining and showing further explanations.

The other three groups were also asked to make more quick models as professors wanted everybody to explore that elusive WOW factor in their design. A discussion with the toy group helped the

Students cleared their doubts about mechanism issues, but it still needed to be tried out in actuality. Students were asked to make a function-proving model before working on the formal aspect of the design.

Not enough,

Explore more...

It was time for many students to go back to drawing book and ideate or search for that WOW factor.



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Water storing devices group members were asked to look more into the user needs and scenarios in which their proposed contraption was going to work.

For Example:

A student working on a design of a water bottle for a regular jogger was asked to jog with the simulated conditions of weight, size and mounting position of bottle.

The other student who was working on bucket design was asked to priorities his list of desired features as two concepts having different features cannot be compared on the common ground.

For example:

A bucket which is good in stacking may not be comfortable for moving water from one place to other. But if a bucket designed to move water from one place to other can be stacked, along with serving its main feature of ease in transporting water then it will definitely score high in the concept evaluation chart.

LED reading lamp group was asked to explore more formal possibilities for their lamp. They were also cautioned to remember the practicality of the concept. Professors told them that along with gelling with the environment the lamp should also function i.e. battery space, charging cable place, necessary buttons, stable base, mounting details if required, hinge details, fixing and assembly details, parting lines and so on.

Not enough,

Explore more...

Students working on problem solving design brief, were asked to put themselves in the shoes of user and others were also guided on formal and aesthetical aspects.



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Explorations

Professors were meeting students after a weeklong Diwali vacation. Prof. Bapat and Prof. Purba had a meeting. Few explorations done are mentioned below:

- Mag-Stack - Magazine holder
- Crescendo - CD holder
- Golden Wing - Champagne bottle holder
- Elite - Executive LED lamp
- Collapse - A collapsible reading lamp cum torch
- Jogbot - Water bottle for joggers on the run
- Neer - Model: Alloy Drill: new bucket form
- Jalaj - An earthen pot designed to fit in the modern urban lifestyle
- Drago-Dragon - A friendly dragon whose movement is a sinusoidal waveform
- Tic-Tic Chintee: A familiar ant which makes tic-tic sound when pulled along
- Miku Bites - A nosy mouse; that opens and closes its mouth as if for biting when pulled

Mag-Stack - Magazine holder:



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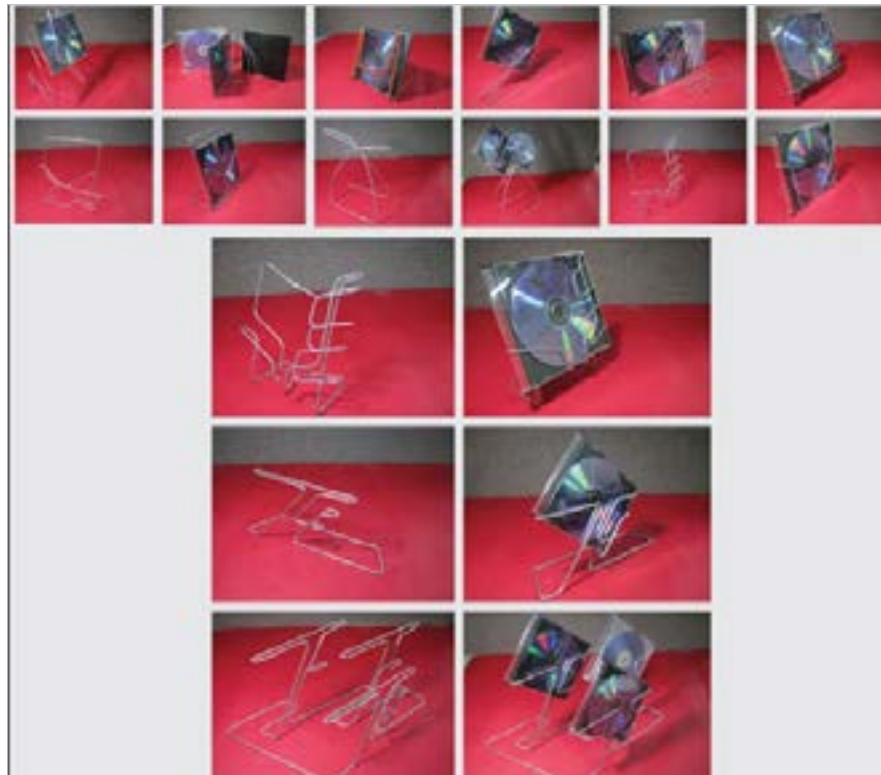
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Crescendo - CD holder:



Golden Wing - Champagne bottle holder:



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Elite - Executive LED lamp:



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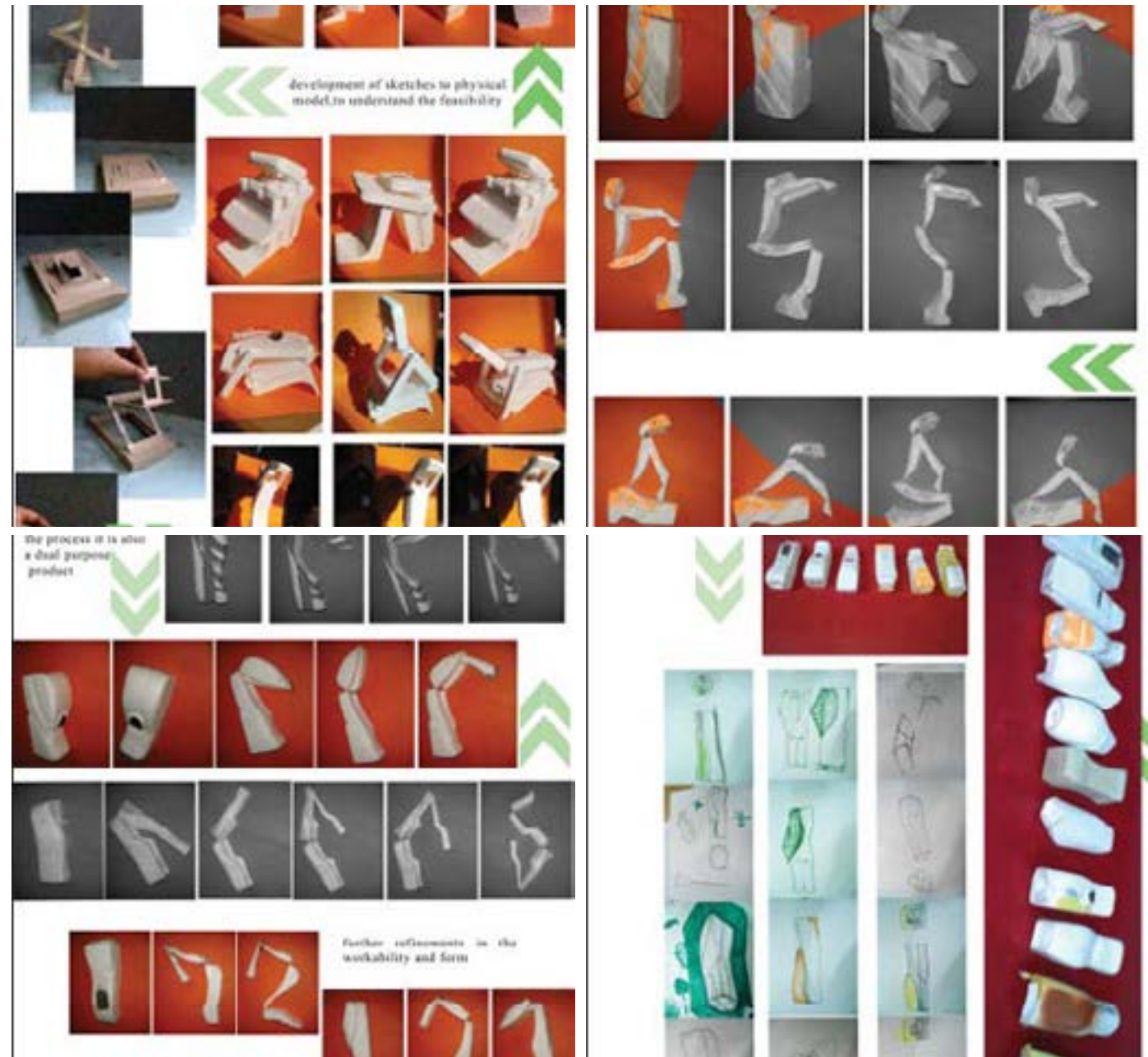
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Collapse - A collapsible reading lamp cum torch:



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Jogbot - Water bottle for joggers on the run:



Neer - Model: Alloy Drill : new bucket form:



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Jalaj - An earthen pot designed to fit in the modern urban lifestyle:



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Drago-Dragon - A friendly dragon whose movement is a sinusoidal wave form:



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Tic-Tic Chintee: A familiar ant which makes tic-tic sound when pull alonged:



Miku Bites - A nosy mouse; opens and closes its mouth as if for biting, when pulled:



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Sell your Product

In the next meetings with students, professors realized that students were missing out on some obvious points in their ideas. For example, each rough model of a student working on LED lamps for working executive's office desk was pointing towards different formal directions. Toy group members were also not able to decide on the subject for their toys. A student working on bucket design was still pulled in different directions like solving water transportation problem, bucket staking problem, bucket cleaning problem as well as use of bucket for different household purposes. Wire form group members were also not sure about selecting a definite direction for further exploration and fine-tuning.

To move ahead from this stagnation point, Professors asked them to divide themselves into two groups with 6 students in each group. Each student was then asked to 'sell' his concept across to other group members. While doing so, the student was asked to mention the features and USP of the proposed concept. The other group members were asked to review the offer from user's and buyer's perspective. The passage for constructive criticism, flow of new ideas and improvisation of earlier concepts was also kept open in the group discussion. The motto of arranging such sessions was to open up students in their minds and teach them to become a constructive critics of their own ideas.

This activity also enriched students with different viewpoints of their own colleagues and thus helped in enriching overall tempo of the class.



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Learn from each other - Be your own critic

Every student got feedback on his/her concepts from 11 budding designers. This gave a whole new perspective to students about how their ideas are perceived by others and ultimately by end users.

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Concept Evaluation

By this stage, students were also asked to decode words like elegance, sporty, friendly, funny, modern and executive-ness by finding images that depict similar characters. Those collected images worked as a mood board for the product form development.

The concept evaluation and selection was done keeping in mind the review of received in group discussion session and feedback from the Professors in one-to-one interaction. After this stage, Prof. R. Sandesh also interacted with students to give them guidance for the refinement and fine-tuning of formal treatment of the concepts.



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Model Making

Projects:

This time the message was loud and clear from him, he wanted a quality model output for the Introduction to Product Design assignment from students.



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IDC, IIT Bombay

Source:

<https://www.dsource.in/course/product-design-1/model-making>



Prof. Bapat also shared his years of model making experience with students. He told them that making a model also requires planning and selecting suitable materials. The know-how in making quick styrene models, 0.5 mm Al sheet models and thermocol model making and painting techniques were elaborately shown to the students.



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6. Arriving at Design Brief
7. Importance of Explorations
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9. Tools of Transformation
10. Synectics
11. Concept Models
12. Explorations
13. Sell your Product
14. Concept Evaluation
15. Model Making
- 16, 17, 18, 19, 20

Design Course

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Source:

<https://www.dsource.in/course/product-design-1/result>

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The Result

Product Designs:

- Lifestyle products with wire form
- LED Reading lamp
- Water storing applications
- Pull-along wooden toy for toddlers

Lifestyle Products with Wire Form:



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LED Reading Lamp:



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Water Storing Applications:

	<p>Jogbot Water bottle for joggers on the run. Designer: Richa Gupta</p>
	
	<p>Collapse A collapsible reading lamp cum torch Designer: M. Aravindan</p>
	
	<p>Neer - Model: Alloy Drill Stores 15 liters of water, stackable in filled condition, easy to carry when filled by dragging. Designer: Nishant Kamboj</p>
	

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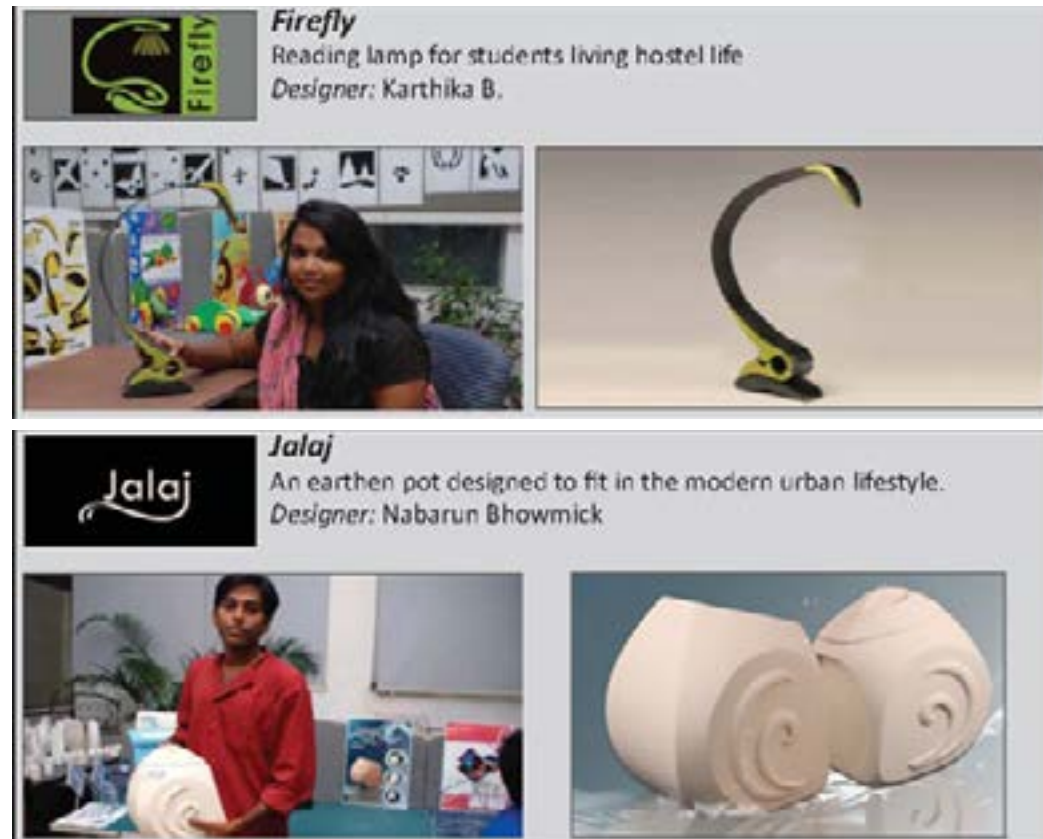
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Pull along - Wooden toy for toddlers:



Miku Bites
A nosy mouse; opens and closes its mouth as if for biting, when pulled
Designer: Nitin Kumar






Drago-Dragon
A friendly dragon whose movement is a sinusoidal wave form
Designer: Jaykumar Ranganathan






Tic-Tic Chintee
A familiar ant which makes tic-tic sound when pull alonged
Designer: Namita Maheshwari




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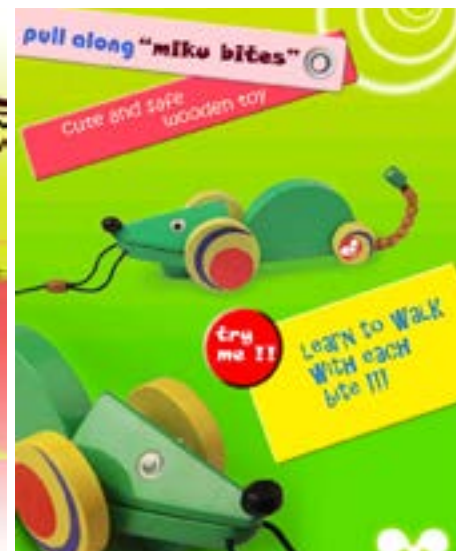
<https://www.dsource.in/course/product-design-1/posters-products>

Posters of the Products

Posters of the Products 1 - LED



Posters of the Products 2 - Toys



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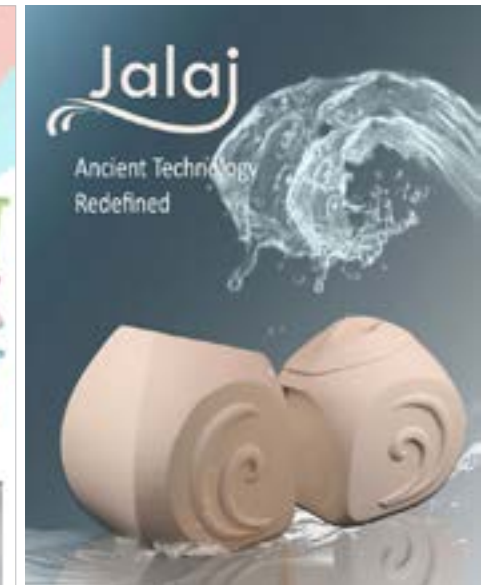
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Posters of the Products 3 - Water



Posters of the Products 4 - Wire Group



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Source:

<https://www.dsource.in/course/product-design-1/documentation-feedback>

Documentation & Feedback

At the end of the course, Prof. Bapat and Prof. Purba gave feedback to each student on their PD-I work. Students were asked to make their reports self-explanatory and were asked to improve on the model finish before final presentation. Though Professors appreciated everyone's efforts; they also asked them not to lose this momentum in the next semester's Product Design- II.

Students who thought by professors were weak in formal treatment, color and engineering detailing; were asked to work on improving it in the coming vacation.

The PD-I, 2011 came to an end with smiles all around and students and professors sharing their experiences, thoughts, and opinions over a cup of tea.



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Source:

<https://www.dsource.in/course/product-design-1/video>

Video

The video is about all the fun of being a student of Product Design. Students talk about their designed products after following the design process in the Introduction to Product Design module. Stating design brief, brainstorming, overcoming mental blocks in ideation, the need for explorations, significance of making physical study models, mock-up models, and scaled models; are a few of the many things that are mentioned by students when asked to share their experience.

Also, the importance of mentors for giving the right direction to student's thinking and giving timely corrective advice is also highlighted. The video gives a sneak peek into the design studio/classroom of IDC. It tries to answer and also increase the curiosity of a Product Design aspirant.



Introduction to Product Design



Interview of Prof. Bapat

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Contact Details

This documentation for the course was done by Professor Vijay P Bapat and Professor Purba Joshi, faculty at [IDC, IIT Bombay](#).

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

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