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# Energy Conservation and Interaction Design

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**Abstract**

Bringing attention to critical issues through fun, playful yet informative way is a challenge in Interaction Design. In this paper, we describe one design module exercise focusing on creating awareness to energy efficiency and conservation through interactive installation. It showcases design ideas and methods, few initial concepts and learning during the module.

**Keywords**

Energy efficiency and conservation, awareness, interactive installation, new interaction techniques

**ACM Classification Keywords**

H.5.2 User Interfaces, Input device & strategies D.2.2 Design Tools and Techniques, User Interfaces D.2.6 Programming Environments, Interactive Environments D.2.10 Design, Methodologies

**General Terms**

Design, Experimentation.

**Introduction**

With the growth of economy, the demand for energy has grown substantially. The demand for energy is growing manifold and the energy sources are becoming scarce and costlier [1]. Furthermore, the high level usage of energy intensity in some of the sectors is a matter of concern. India is presently the sixth greatest electricity generating country and account for 4% of

the world's total annual electricity generation. India is also currently ranked sixth in annual electricity consumption, accounting for about 3.5% of the world's total annual electricity consumption.

In such a scenario efficient use of energy resource and their conservation assume tremendous significance and are essential for curtailment of wasteful consumption and sustainable development [2].

As a starting point, our approach is to focus on a specific segment of energy conservation, which is electricity efficiency and wastage. We introduced a design module focused on creating awareness of electricity consumption, efficiency and reduce wastage through interactive installation. The module aimed at designing an interactive installation that can create awareness about the specific topic through new interaction techniques.

Here, we present introduced design module, designed examples and learning through the module.

### **Background**

There are significant amount of efforts happening by Bureau of Energy Efficiency (BEE) including several activities and events such as bachat lamp yojana [3], national educational awareness programs, state level painting competitions in schools, conferences, online tips for energy conservation in domestic environment [4], training programs and many more. Additionally, few state government electricity boards distribute paper materials to people in villages, towns etc.

The key problems in these forms of awareness are illiteracy/semi literacy, sometimes boring textual formats and inability to reach appropriate audience. There is an essential need of designing a system that

can reach larger audience overcoming barriers such as literacy, age group, distance and ability to reach to more number of villages and towns.

### **Introduced designed module**

We look at existing programs around; we realize that the problem is not just limited illiteracy or age group or distance, but also fun, playful and engaging element through which the messages have been conveyed.

The module is introduced with an objective

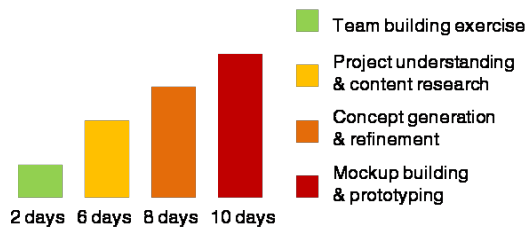
- To design an interactive installation that can work as standalone communicative element as well as an integrated part of a larger exhibition.
- The information is in the context of electricity usage in home environment.
- As the installation will have to reach to the widest possible group of people overcoming above mentioned barriers, interaction modalities have to be chosen carefully and needs to be engaging and playful installation.

The designed projects are focused on showcasing different ways of energy conservation, use of energy efficient appliances etc. in fun, playful and interactive way. The installation should not be only be engaging to visitors, but also showcase relevant information to the home context. Installation should be designed in such a way that it can be carried to different places and can be a part of a larger exhibition later on.

Students are given specific keywords: energy conservation, interactive installation, awareness, engaging, playful, stand alone, prototyping, tangible interfaces.

The design module also aims at nurturing the imagination towards new interaction [5] techniques and more tangible installations. By constraining the theme to electricity conservation & efficiency, we encouraged

students to think about small yet important issues such as standby power, use of energy efficient appliances, and use of sun light etc. Students are also encouraged to use creative representation of the data. For example, instead of showing power wastage in unit format, it can be shown in money format so people can relate power wastage directly with money wastage. This can help users to relate the electricity wastage with known facts such as money wastage, deforestation etc. Though the theme is restricted to electricity usage in home environment, students are encouraged to research and ideate in other areas for better understanding of energy conservation. The module is conducted among 15 students of final year Bachelors in Design, dividing them into 5 groups with 3 students each for 26 days



**figure 1.** Graphical representation of day wise structure of design module.

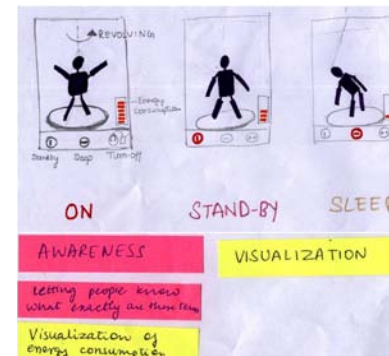
The module starts with a small fun exercise on team building to build a good understand among group members. It is followed by few sessions on understanding energy conservation, existing work & projects and mainly to understand the domain of interactive installation. Due to non technical background of students, maximum numbers of days are given to prototyping.

## Results

Content understanding and ideas are noted down through mind maps and storytelling. We found that mind mapping and storytelling helped students to explore wide varieties of design ideas from tangible installations to screen based installation. Here, we present some of the initial design ideas highlighting varied range of solution.

### *Dancing Puppet (fig 2a.)*

People have tendency not to switch off the main power supply in tv, computers, CD players etc. wasting ample amount of electricity through putting theses appliances on standby mode. Dancing puppet (fig 2a.) explores the term of "standby power". The idea is aimed at bringing people's attention to electricity wastage due to standby power. 3 main buttons having ON, STANDBY, OFF icons are showcased. Pressing ON & OFF makes puppet dance & sleep respectively. Pressing STANDBY makes puppet to dance a little, indicating small but unavoidable wastage of electricity. A dancing puppet is used as a metaphor to convey specific information.

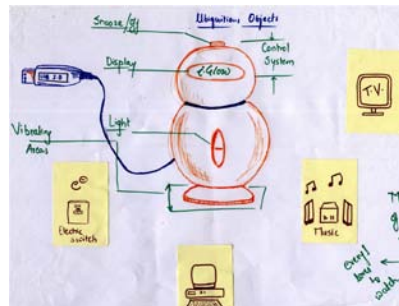


**figure 2a.** A designed idea showing puppet dancing, moving

and sleeping based on ON, OFF and STANDBY condition respectively

#### *Glowing pot (fig 2b.)*

Increment and decrement of light intensity is used to convey information about electricity consumption of a particular appliance. A set up of glowing pot and few household equipments like fridge, AC, tv, computer, CFL, bulb etc. is created. Connecting a particular appliance to glowing pot will increase the light intensity of the pot based on the electricity consumed by that appliance. Glowing pot is aimed at showcasing electricity consumption through glowing variations instead of units, making people aware of electricity consumed of different household appliances.

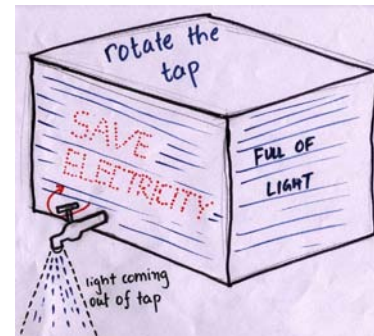


**figure 2b.** A pot glows more based on the device connected to it

#### *Electricity conservation message through tap metaphor (fig 2c.)*

When we see water being waste due to leaking tap, we go and close it to stop water wastage. This concept uses the same metaphor to convey the message of electricity being wasted. Opening the tap will lighten up the box & start flowing electricity from the tap. Due to

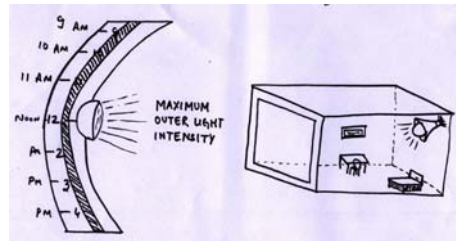
the flow from tap, the box lighting will gradually decrease showcasing the electricity being wasted through leaking tap. Complete leakage displays a number of messages such as save electricity, stop electricity wastage etc.



**figure 2c.** Tap metaphor is used to convey electricity conservation messages.

#### *Efficient use of day light (fig 2d.)*

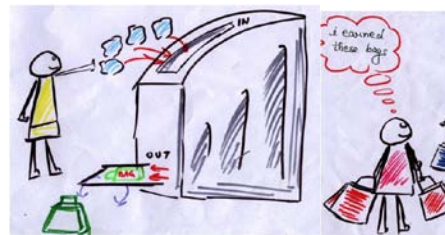
Use of daylight source is an important element to save electricity. One of the ideas is aimed at informing people about efficient use of day light. A scaled drawing room environment is made with windows, furniture etc. A slider with Sun metaphor and time controls the home lighting and curtain positioning. For example: sliding the Sun to 12.00 noon switches off most of the lights and open curtains of home as the day light is maximum at 12.00 noon. This encourages more usage of day light, reducing the use of electric appliances among people.



**figure 2d.** Showcases the idea to motivate the use of daylight to save electricity. Slider with Sun metaphor at 12.00 noon.

*Recycle trash (fig 2e.)*

In addition to electricity conservation, ideas are presented to encourage the use of recyclable products. Recycle trash (fig 2e.) is aimed at encouraging use of recycle products and to encourage the use of trash bins. Once paper trash is thrown into the trash bin, it creates a recycling sound and gives a recycled paper bag with a energy conservation message written on it. The critical issue of the use of recycled products is presented through a fun activity.



**figure 2e.** People throwing trash inside the bin and a recycled bag comes out

*I WILL (fig 2f. and fig 2g.)*

I WILL is aimed at motivating people for resolutions such as I will reuse, I will recycle, I will save power etc. The idea is expressed through a simple quiz asking

people to place iconic cubes on the table to fill the incomplete sentences. A person's silhouette is presented as "I" and "WILL" written on the wall. The incomplete sentences are projected on the wall after "I WILL". The projected surface has incomplete sentences as a part of quiz that asks people to use iconic cubes to complete the sentence. Right answers are indicated through smiley and sound. LED trigger is indicated asking the person to place himself instead of silhouette. Once the person places himself on silhouette, camera is triggered to take a picture that is followed by a print of complete sentence. For example, I (person's picture) WILL REUSE. This allows a new print every time with a different person.



**figure 2f.** I WILL installation with silhouette, WILL & projection of a quiz



**figure 2g.** Person keeping relevant cubes to complete the quiz

These ideas are currently into prototyping phase

### **Learning**

The design module leads to creative discussions in forms of mind maps and alternative ways of data representation. One clear observation was that mind map helps exploring the contents in keywords format that leads a narrowed focus to the context, eventually nurturing design decisions. Discussion included usage of relevant metaphors suitable to the context, metaphors that can convey message in simplistic yet entertaining manner, its relevance to everyday activities and different interaction modalities.

The aim of these ideas is to engage people for 45 seconds to 1 min and inform them about critical issues of electricity conservation. Design explorations indicated that adding contents and features to the installation would not have helped convey the message well; instead a good idea is to focus on a single message and present it through a meaningful way. Additionally we found that using tangible metaphors in the installation will involve more engagement to the installation than just a screen based solution. It was also found that students designed wide varieties of solution in different interaction modalities, ranging from gestures, sliders, tangible metaphors to screen based solution and representation techniques ranging from a smiley, money metaphor, recycled gift to a simple text based message.

### **Conclusion**

We feel that this design module is helpful as an exercise to encourage rethinking energy conservation, new interaction techniques and different ways data representation. We have tried to show that awareness

about energy conservation need not to be always through advertisements, paper sheets etc. but it can be a playful learning activity and can engage wide variety of audience. Due to the time constraint, we had to limit the number of days to understand energy conservation; more time to domain understanding would have helped nurture our design decisions.

This design module adds a new angle to existing design exercise [6] by concentrating more on different interaction techniques and alternative ways of representation.

### **Acknowledgements**

We thank all the students of Interactive Communication Project class at Indian Institute of Technology – Guwahati.

### **Example citations**

- [1] Bureau of Energy Efficiency [www.bee-india.nic.in/](http://www.bee-india.nic.in/)
- [2] Resources to save energy  
<http://www.saveenergy.co.in/resources.php>
- [3] Bachat Lamp Yojana  
<http://www.beeindia.nic.in/content.php?id=2>
- [4] Tips for energy conservation for domestic  
[http://www.bee-india.nic.in/useful\\_downloads.php](http://www.bee-india.nic.in/useful_downloads.php)
- [5] Angela Chang, James Gouldstone, Jamie Zigelbaum, Hiroshi Ishii "Simplicity in Interaction Design" Proceeding of TEI'07, 15-17 Feb 2007, Baton Rouge, LA, USA, ACM Press (Feb 2007)
- [6] Harrison, S. and Back, M. (2005) "'It's Just a Method': A Pedagogical Experiment In Interdisciplinary Design" Proceedings of CHI 2005, alt.chi, Portland, OR, ACM Press, April 2005.