# Sutham: Ensuring cleanliness in slums in Chennai, India

Shruti Bhandari
School of Informatics
Indiana University Bloomington
sbhandar@indiana.edu

Balakrishna Chennupati
School of Informatics
Indiana University Bloomington
balchenn@indiana.edu

Shruti Ramalingam
School of Informatics
Indiana University Bloomington
sramalin@indiana.edu

Sindhia Thirumaran
School of Informatics
Indiana University Bloomington
sinthiru@indiana.edu

## Abstract

We seek to motivate people living in temporary housing in slums of Chennai city in India to maintain their surroundings clean and hence invest in better hygiene, health, and living conditions for themselves and those around them. Sutham looks at the prevailing situation in slums of Chennai and inculcates long term positive habits in people living there to provide both short and long term benefits. Sutham also promotes for better standard of living by making the slums a healthier and cleaner place to live.

## Keywords

Persuasion, Slums, Temporary housing, Hygiene, Health, Cleanliness, Developing countries

## ACM Classification Keywords

H5.2. Information interfaces and presentation: User-centered design.

## Introduction

Home is one's kingdom. People associate emotions of safety, security, and pride with their homes. In this study, we focus on people living in slums in Chennai, India. Urban slums are a phenomenon of mad rush of poor people in developing cities. They have to work long and hard hours to make their ends barely meet and can't afford to invest in proper homes.

Figure 1. Slums in Chennai



Figure 2. Chennai Location



Figure 3. Garbage Accumulation

## Why Slums?

In 1971, the Tamil Nadu slum clearance board defines slum as "area with huts erected in haphazard manner without proper access, without water supply and drainage arrangements, dilapidation, overcrowding, faulty arrangement, lack of ventilation, light or sanitary facilities or any combination of these factors which is detrimental to safety, health or morals" [6]. Poor people like cab drivers, house maids, domestic servants, shop cleaners, porters, janitors who support the rest of city often find no support for themselves. Lack of money force them to take up temporary housing in slums (Figure 1). Though their houses provide them a place to sleep in the night, cook and eat food and store their belongings, it seldom provides them a sense of mental and physical sense of safety and security. The slums can be razed overnight in a bid of city beautification drive or removal of illegal occupation of property by government. Residents of slums face the fear of demolition of their homes while they are away at their work places everyday. The sense of uncertainty, lack of security and safety, unhygienic conditions made us categorize residents of slums as homeless people. Though, not houseless, these people are certainly homeless in the face of uncertainty their house faces. Slums exhibit an organic growth. People living in slums often manage electricity, and water from nearby. However, proper sanitation is not a priority in slums. They often go to places nearby their slum to defecate in open; they often dispose their rubbish outside their house. Such unhygienic conditions are not conducive for development of healthy environment.

## Why Chennai?

Chennai situated on the shores of the Bay of Bengal is the capital of the Tamil Nadu state and it is the fourth largest metropolis in India (Figure 2). Normally, housing availabilities are less than housing needs in a developing city like Chennai. Hence, poor families have to resort to thatched roofs and houses built by junk. In 2001, the number of slum dwellers reached 820,000 in Chennai [6]. Sutham, which is word for "Clean" in local language (Tamil), persuades people in slum to change their attitude towards hygiene and take responsibility of cleanliness and bring a change to their living conditions. People living in slums tend to be illiterate and hence, Sutham with the help of illustrations forces the idea of cleanliness and other social messages to usher in positive changes and perceptions in the lives of people living on the edge of poverty. In what follows we present our design process, concept, evaluation and future work.

## Design Process: literature and user research

Our design process started with an exploration of the problem space. An initial literature survey on developing countries indicated inadequate housing conditions seen among those living on the streets as well as slum dwellers that lived in huts built of thatched roofs. The temporal nature of the huts in the slums lead us to re-examine our idea of what constitutes a home, thus allowing us to define 'home' as one that provides adequate protection and feeling of security. This allowed us to narrow down our focus into ways in which we could improve living conditions in these slums. A considerable number of slums in India lack an effective means for garbage disposal. We wanted to explore how HCI could address this societal challenge [8] in a developing country like India.

A survey conducted by the National Sample Survey Organization on the condition of urban slums in 692

Figure 4. User Research

slums across India reveals that 16% of notified slums and 47% of non-notified slums have no garbage collection facility [3]. There is a general perception that the people living in slums are not clean, and that they tend to convert any place into a slum. But, a slum in Mumbai's Charkop area has proved those notions wrong. In the slum, a man rings a bell and residents of the slum carry their garbage in plastic bags and buckets to a municipal garbage truck, in what has turned out to be a daily ritual [7]. Thus, the provision of a means for garbage disposal ensures that people dispose garbage and providing those means on a timely basis creates a habit of disposing garbage.  An incentive also motivates people to dispose garbage. The employees of a garbage disposal firm in Chennai who are the residents of a slum have said that they would be inclined to clean their slum if they were paid for it [1].

Looking for existing initiatives that are aimed at ensuring cleanliness in slums, we found a project conducted by students from MIT and the Rai foundation in India to inculcate cleanliness among residents of a slum in Delhi. Their strategy was to provide 175 dustbins in the slum. Their team decided that dustbins were the most effective means for disposing garbage in the slum. The bins would be emptied on a daily basis and the trash transported to the large Municipal Corporation of Delhi trash bin by a community-paid sanitation worker. A second part of their strategy is to engage people in dialogue about the dustbins and cleanliness through skits, posters and pamphlets. The project was implemented recently, and the effect of the initiative is yet to be determined. But the findings of that team from being involved in fieldwork in the slum reveal that members of the slum considered garbage

disposal a great concern and that it would have a dramatic positive impact on the slum community [2].

Whitney and Kelkar of the Institute of design at IIT in their paper, "Designing for the base of the pyramid" [9], explain that since designing for people in conditions of poverty is a complex problem, the way to do it is to use a system-oriented approach with the interconnected parts of the approach addressing several problems at once. Their paper is informed by ethnographic research in slums in the cities of Bombay, Ahmedabad and Baroda in India.

We conducted our ethnographic study (Figure 4) in the slum on Thomas Road, T. Nagar, Chennai.  The focus of our study was to understand the problems dealing with garbage disposal. Field visits to the slum revealed deplorable conditions with respect to disposal of waste. The lanes were stuffed with waste from the neighboring huts and nearby buildings (Figure 3). Interviews with families residing at the slums brought out the fact that they mostly threw garbage outside the trashcan. One reason being, after the can gets filled the government authorities do not immediately empty out the garbage causing residents to throw outside the can due to the overfill. Another reason is that once garbage starts accumulating around the trashcan, no one wants to go very near it and they start flinging their garbage from a distance, thus the area around the trashcan is filled with junk and compost. All trashcans do not have a lid and all this open garbage creates a stench in the area and also a fertile breeding spot for mosquitoes and flies. The interviewees mentioned that there were only two trashcans distributed across the entire T.Nagar slum which spanned across two streets habited by approximately 1000 families. Families who lived farther from the trash create their own niche nearby for
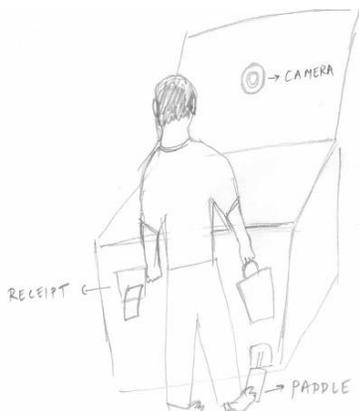
Figure 5. Attitude towards open garbage



Figure 6. Sketch of concept

disposing trash. The A study conducted by the corporation of Chennai in the slum of Odama Nagar in Chennai, revealed similar issues [1]. Despite the fact that the slum was equipped with trashcans, residents were unmotivated to throw waste into it. Instead waste would be thrown wherever convenient, thus collecting in large piles.

## Insights

From our observation and interviews we found that an individual's action is directed by that of other group members [7]. Hence in this case, when one person in the community acts by throwing waste at his convenient location, others start to follow him without any feelings of guilt. This leads to a lack of feeling of responsibility by a single individual over public space, even that surrounding one's home. Over time the habit cultivates as part of a life style and gains invisibility and even acceptance among community members (Figure 5). We found the residents of the slums to be at this stage, giving rise to the need for an intervention that would be effective at least long enough to make the practice of cleanliness a habit and what residents would consider a basic need rather than extraneous. We wanted to explore the persuasive domain to be able to change people's behavior and attitudes towards improving living conditions in the slums [5]. A study by Consolvo et al. have proved that even simple incentives like receiving a virtual butterfly on the mobile screen have proven to be powerful since they persuade and motivate people to change their behavior [4].

With respect to the government workers, they are not aware of when the trash gets filled since trashcans in different spots gets filled up quickly or slowly depending on the number of people using it. This

pattern is not identified and the workers who collect trash have a set routine that leads to overflowing of garbage in many areas within the city, especially the slums.

## Concept

Our concept is a trashcan enabled with a mechanism to keep track of the people who are disposing garbage, coupled with an incentive program that awards people who regularly dispose garbage into the trashcan. The main goal is to ensure that people throw garbage inside the trashcan without emptying it all over the place. Also, to facilitate regular alerts to the workers as and when the garbage gets filled putting an end to overflowing trashcans. The incentive is to motivate residents of the slum to dispose garbage, and considering the low economic status of the slum residents, is food based. Currently, the government of India provides people such incentives by means of a ration card. The ration card is a paper card given to each family so as to give them access to subsidized rations each month. The individual takes the card to specific government outlets where he or she can then claim their ration. On an average, a family with four to five members receives 20 kilograms of rice, 3 liters of oil and 2 kilograms of sugar from the ration outlet. Our concept involves the use of this already well established system to motivate cleanliness in the slum community.

The trashcan is provided with a cheap digital camera on the inside of its lid. When a person needs to dispose garbage into the can, he pushes the provided paddle with his foot and the lid opens. The camera takes a picture and the trashcan being equipped with face recognition, recognizes the person and records that he has disposed the garbage for the day. [When the

Figure 7. User Evaluation

trashcan is opened by someone for the first time, a picture is taken by the camera and this first picture acts as the basis for face recognition]. The person is informed that the picture has been taken using sound feedback. When the trashcan has recorded ten such acts by the person, the trashcan generates a receipt. The individual can then take the receipt along with his ration card to claim more ration. For a day, a person is recorded only once, preventing misuse and encouraging only one trip to the trashcan per day (Figure 6). After ten acts are recorded, the trashcan begins to record again and generates a new receipt after ten disposals. A person who disposes garbage on a daily basis will get a maximum of three receipts per month and thus receive more ration. Hence, the person is motivated to have a habit of disposing garbage on a regular basis. The receipt will contain a picture of the person since that will serve as identification in the ration outlet and also avoid any possible thefts. Photographs also work as simple yet powerful incentives. People get the feeling of being rewarded for what they have done. These receipts also contain messages and pictorial representations educating people in the slum on health and cleanliness.

The trashcan will be equipped with a sensor that recognizes when it is three quarters full and triggers a phone call to the authorities at the municipal corporation alerting them of the location of the trashcan that needs to be emptied. This alert could be done by connecting the trashcan to the government owned underground phone lines. The concept is a step towards creating a long term habit of cleanliness. By tying up incentives to food, and providing awareness through the receipts generated by the trashcan, it also tackles the issues of food scarcity and lack of awareness. Our concept can function as part of a system of concepts that are aimed at improving the overall quality of life in the slum, and it takes the system oriented approach described by Whitney and Kelkar [9].

## Evaluation

For the evaluation, the concept was detailed with sketches and storyboarding to slum residents in Chennai in order to elicit their feedback (Figure 7). They all felt that alerting the government authorities was the best way to deal with overfilling of trashcans. One subject (translated from Tamil): "Open drainage and garbage all over the place is a great problem since kids get sick all the time, we have to take them to hospital and they can't go to school. If the garbage can be taken out as soon as the can is filled then this area will become much cleaner". Another subject: "everyone comes and throws garbage here since they think slums are dumping spots they don't care about the people living here…cleaner environments will give us a better place in society. Also, since the place is dirty there is no value for the land that we live in". Another subject: "closing the trashcan with a lid would stop all the mosquitoes and flies from swarming the cans". They also felt that ration card as an incentive would motivate people to dump their garbage in the trashcan and also be very effective since the ration that they receive is not sufficient and they always have to buy a few extra kilograms of rice and sugar at a normal rate from outside shops. They were also excited about receiving pictures after 10 days. One participant: "I am 35 years old and I don't have a picture of myself. It will be nice to get a picture…but will I have to give it to the ration shop or can I keep it for myself?" One concern which was raised was about how they usually send kids to

throw the trash and now they would have to do it since the kids are not tall enough for the picture to be taken by the trashcan.

## Strategy and Future work

Several of these trashcans will be placed in the slum such that they are spaced evenly. At present, the government has undertaken a lot of initiatives for the slums such as mobile restroom facilities, low cost housing units etc [6]. The government spends a huge amount in cleaning the slums very often but it gets back to its usual filthiness, because the core of the problem is not addressed. Hence in this design, we hope to address the core of the problem using technology and incentives to persuade slum dwellers to engage in healthy practices. We feel that the government would be willing to fund the project since they have invested a lot in cleaning the slums but with unsuccessful results. Also, overfilling of trashcans happens all over the city, with slums being the worst affected. This design with just the alerting system could be adopted by the entire city making it a cleaner place to live (Figure 8). As a future work, we also plan to look into community based incentives when the entire slum works together to make their colony clean. For example, something like a subsidized phone booth that could benefit the entire slum population. Also, individual incentives within community incentives like making a free phone call after every 10 garbage disposals could also be explored. We also want to talk to government authorities in visualizing the alert system with respect to the trashcan location which could be effectively used by the workers.

## Conclusion

Our concept addresses the problem of garbage disposal in slums in Chennai. It creates the habit of regular garbage disposal among residents of the slum. Since the presence of open garbage has an adverse affect on the health and the living conditions of the residents, the disposal of garbage on a regular basis will improve the quality of life of people living in the slum.

## Acknowledgements

We would like to thank Prof. Kay Connelly and the participants for their help and support during the study.

## References

[1] Bhandari, Mridu. Trapped in Stench (2004). Connect! South Asian Women's Forum. http://www.sawf.org/newedit/edit1206200/infocus.asp
[2] Catherine. (2007). Where does trash go? - In the trash bin! http://catinworld.blogspot.com/2007/07/where-does-trash-go-in-trash-bin.html
[3] Condition of Urban slums. (2002): Salient Feature. Ministry of Statistics and Programme Implementation. Government of India. http://mospi.nic.in/mospi_nsso_rept_pubn.htm
[4] Consolvo, S.,Everitt, Katherine., Smith, I.E., Landay, J.A. (2006) Design requirements for technologies that encourage physical activity.
[5] Fogg, B.J (2002) Persuasive Technology: Using computers to change what we think and do. Morgan Kauffmann.
[6] Government of Tamil Nadu, Chennai Metropolitan Development Authority. (March 2007.) Draft Master Plan–II for Chennai Metropolitan Area, 2026.
[7] Sharma, Kalpana. (2007). The great garbage rush.http://www.hindu.com/mag/2007/02/25/stories/2007022500080300.htm
[8] Tscheligi, M. (2007) The importance of HCI for solving societal challenges. Volume 14, Issue 5
[9] Whitney, P., Kelkar, A. (2004). Designing for the base of the pyramid. Design Management Review.

Figure 8. Government workers emptying the overflowing trash can in the slums