KHUSHIYON KA GHAR: VIRTUAL DOMESTIC SPACE TO CONNECT IMMEDIATE FAMILIES IN INDIA

INTERACTION DESIGN FINAL PROJECT
IN II and III - 93

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Project 2 & 3
Khushiyon ka Ghar: Virtual Domestic Spaces
to Connect Immediate Families

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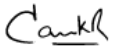

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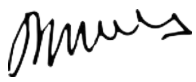
Approval

The Report committee for Interaction design, Industrial Design Centre, IIT Bombay certifies that this is approved version of following report on **Khushiyon ka Ghar: Virtual Domestic Spaces to Connect Immediate Families** by Dani Kalarikalayil Raju, is approved for partial fulfillment of the requirement for the degree of 'Master of Design' in Interaction design.

Guide:



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Abstract

Population ageing is one of the most significant trends of the 21st century. India has around 10 crore elderly at present and the number is expected to increase to 32.3 crore, constituting 20 per cent of the total population, by 2050.

New technologies are radically changing the way we live our lives. As computer technologies alter the communication landscape, they in turn are changing the way we conduct and experience family life. Through this project, we are trying to explore and find new ways for senior citizens to connect with their grandkids.

Khushiyon ka Ghar is an idea that relatedness between a geographically separated grand parent and grandkid can be enhanced through a shared or co-created experience. Environment plays a crucial role in immersive experiences and the initial direction was to create virtual spaces modeled on a real life spaces where grandparents and grandkids can explore, play, share and store content. After the initial trials, we found that this approach hindered the free play of imagination and creativity, as users were limited to the possibility of interacting only with the objects inside a shared virtual living room. We realized experiences will be more meaningful and relevant if they can be created by the users themselves. After having discussions with focus groups of senior citizens and families, various trials were conducted with real users. Trials explored the user's dispositions on making clay objects, creating a fantasy world inside a virtual living room etc. Based on the insights we gathered, we designed a setup which enables the users to create virtual reality experiences.

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Introduction

Population ageing is taking place in nearly all the countries of the world. Ageing results from decreasing mortality, and declining fertility. This process leads to a relative reduction in the proportion of children and to an increase in the share of people in the main working ages and of older persons in the population. The global share of older people (aged 60 years or over) increased from 9.2 per cent in 1990 to 11.7 per cent in 2013 and will continue to grow as a proportion of the world population, reaching 21.1 per cent by 2050.[1]

Globally, the number of older persons (aged 60 years or over) is expected to more than double, from 841 million people in 2013 to more than 2 billion in 2050. Older persons are projected to exceed the number of children for the first time in 2047. Presently, about two thirds of the world's older persons live in developing countries. By 2050, nearly 8 in 10 of the world's older population will live in the less developed regions.

In India with majority of its population aged less than 30, the problems and issues of its grey population has not been given serious consideration and only a few studies on them have been attempted in our country. To reap the advantage of demographic dividend, the focus is mainly on the children and the youth and fulfillment of their basic needs for proper development. Also the traditional Indian society and the age-old joint family system have been instrumental in safeguarding the social and economic security of the elderly people in the country. However, with the rapid changes in the social scenario and the emerging prevalence of nuclear family set-ups in India in recent years, the senior citizens are likely to be exposed to emotional, physical and financial insecurity in the years to come. Senior citizen population which accounted for 6.7% of total population in 1991 is expected to increase its share to more than 10% by the year 2021.[2]

After coming across these problems, emotional insecurity emerged as a problem area where we can intervene using digital tools. The questions which came up was "Why can't we freshly involve new media and technology to connect seniors to their loved ones?" "What if we use innovative ways to connect senior citizens of this country to the care giving systems?" "Can these problems be solved, or improve using technologies?" "What are the existing solutions which were tried for it?" "Is there any way by which technology can bring a change in the attitude of the young adults to be more empathetic towards elderly and once again can we go back to the joint family system of living?"

1.World Population Ageing 2013, a report by United Nations
2.Situation Analysis Of The Elderly in India 2011, a report by Government of India

Initial Research

Understanding the life and difficulties faced by senior citizens in India:

- Visit to NGO- Help age India , Andheri
- Personal Interactions with senior citizens and social workers associated with Helpage India by traveling with the Mobile Medical Unit of the NGO
- Visit to All Saints Home, an old age home for women, Dockyard road, Mazgaon
- Interactions with senior citizens of Chai-Masti program of Dignity foundation, Powai.
- Personal Interactions with a 61-year old female suffering from neurological disorders and her 27-year old daughter who takes care of her.
- Personal interaction with Christi Cherian, MSW student, TISS, Mumbai who is a volunteer with Helpage India

An interaction with Prakash Borgaonkar, Territory head of Help Age India, Maharashtra, Gujarat, Goa, gave me statistical findings and survey of various problems of senior citizens. He pointed out that out of the 1 crore senior citizens in India, around 90% belong to unorganized sectors, 39% people are living alone and 53% of them are widows. Of 2,000 youths, including women, surveyed by HelpAge India for "Elder Abuse: The Indian Youth Speaks Out," 73% accepted that elder abuse exists in society. However, only 4.6% of them intended to report such cases to the police. Even lesser, 1.1% wanted to approach an NGO and 15.6% wanted to intervene and speak to the elder about fighting abuse. In Mumbai, 82% youths admitted that elder abuse exists. According to him new technology, social networking sites are helpful for senior citizens but physical effort needs to be taken in order to create awareness in the society. He stressed on the fact that Loneliness is the most critical problem faced by the elderly and it is common in urban as well as in rural settings. Well being of senior citizens mainly depend upon three aspects:
Physical health, Financial health and Social health. He noted that financial independence is just one factor that will help the seniors and that proper healthcare services and an active social life is also very important for their wellbeing.

An interaction with the Head superintendent of All Saints Home Old Age home, Sharada Joel showed me the harsh side of human condition but also convinced me to look at the beautiful side as well. Most of the residents were inducted into the old age home by their own kids or relatives. According to Sharada they are mentally scared by these experiences . She noted that ,the old age home is not a cage for the elderly, instead, they enjoy their life here as never before. We got an opportunity to talk with the Seniors living there, but was strictly restricted from asking anything related to their family life, as it might trigger

depression and sadness associated with their past experiences. We have also noticed inmates were happy and very welcoming. The daily routine of All saints Home gave a joyful picture about an old age home.

Long and active discussions with a care taker of an elderly mother at each stage of the data collection process enriched my idea about the daily routines of a senior citizen. She explained most of their daily struggles are associated with the adherence to medication and managing household appliances like washing machine and other electrical items. She talks to her mother atleast 4 times a day while she is away from home, mostly enquire about food and medicine. Her commitment to care giving gave me hope that technological interventions can be beneficial to all involved in the care giving process. Spending time with her mother, 61 helped me understand the various difficulties faced by elderly due to cognitive deterioration.

Interview with Christi Cherian, MSW student, Tata Institute of Social Sciences, Mumbai who works as a volunteer with Helpage India gave me an idea into the realities of a large number of seniors associated with Helpage India. He observed that about half of the senior citizens associated with Helpage are coming from distant places in Mumbai to get medicines and that they cannot afford medicines. Most of their children are living a decent life but don't have time for their parents. He was personally involved in instances where children locks up their parents because they feel they bring disgrace to the family. He noted there are many such abuses happening daily in the city of Mumbai. But afraid of being thrown out of the home, senior citizens don't complain about these physical and verbal abuses.

A day with Mobile Medical Unit of Helpage India, location J B Nagar , Andheri

Initial Design Ideas

Initial design ideas concentrated on creating a technology mediated experience to narrow down the gap between the senior citizens and the care givers/loved ones.

Below are some initial design ideas:

- a virtual domestic space to connect to the family members
- a space for wellbeing by connecting senior citizens, doctors/nurses, social workers and care takers
- a media space for peer to peer communication to collaborate on activities like daily exercises
- a personal agent who takes an avatar modeled after the care giver
- a virtual social club for the senior citizens

One of these ideas was taken forward, the chosen idea was to connect the family members with the senior citizens .Based on the initial research, Home was identified as the space with which senior citizen are closely attached.

We wanted to understand in what ways families would use a media space. Would it be used for real time communication and awareness , or for altogether different purposes? Or, would it be fraught with too many privacy concerns thus prohibiting its usefulness? Second, we wanted to understand how a domestic media space should be designed to meet family needs, for example, what privacy concerns would need to be addressed?

My guide asked me to meet more senior citizens to understand the context and users in much more depth. I attended six sessions of the Chai Masti program organized by Diginity Foundation in Powai.

Attending these regular meetings made me realize that Seniors are really good at telling stories. They could articulate complex thoughts through very simple stories. I observed that unlike the youngsters, most of them had patience to listen to the long stories and appreciated whole heartedly. Most of them never had any difficulty to come up with stories related to the discussions that happened over the Chais served during the sessions. Everyone had the wealth of life experiences to quickly tell meaningful stories which is enjoyable to the entire group.
So I started to make scenarios of possible solutions. Idea was to narrate them my concept through stories and offer them an opportunity to contribute to my research by writing the responses in the form of stories.

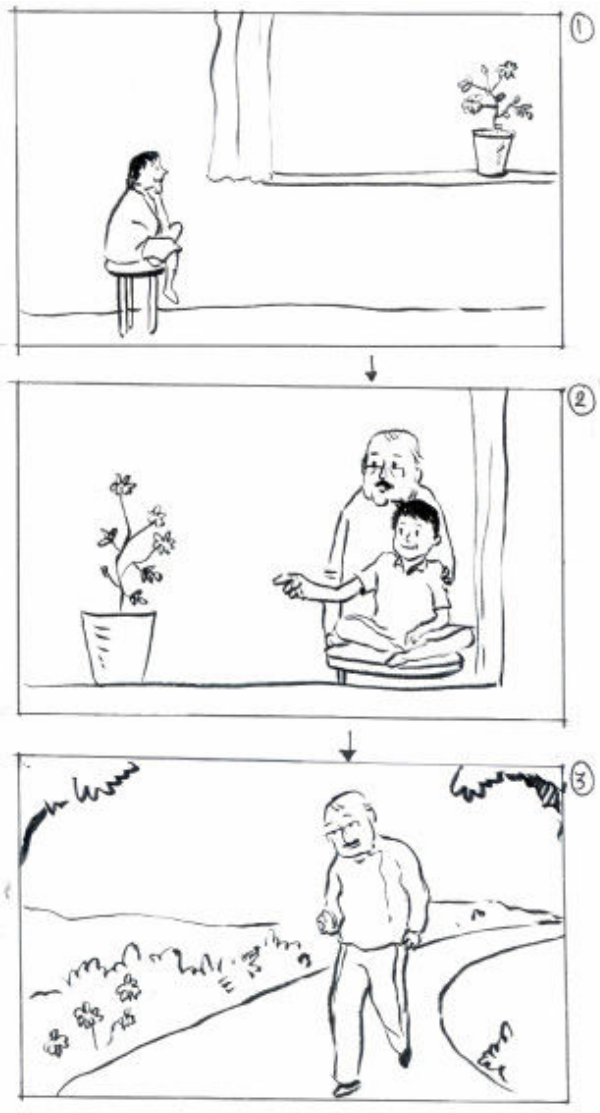
Storytelling Session

After getting permission from Mrs Sushma Shetty, Diginity foundation, Powai to conduct a storytelling session with a group of 20 seniors, chosen initial ideas were converted into scenarios.

Participants was briefed that they are part of a research study to understand participatory design process. Session started with explaining that we are trying to make a device to connect grandparents with grandkids. All were invited to help us making the device. Initial prototype (Trial 1- Prototype 1) was shown to give them the idea. We are looking at making interactive environments to connect senior citizens with grandkids. After answering all the questions related to the process, we distributed the printed scenarios , which had pages at the back to sketch or write their stories.

We narrated the story represented by images and minimal texts, there was a lot of questions regarding the concepts. Me and my colleague was conscious of not describing the concept in detail as it would have hindered their free thinking process.

Scenario

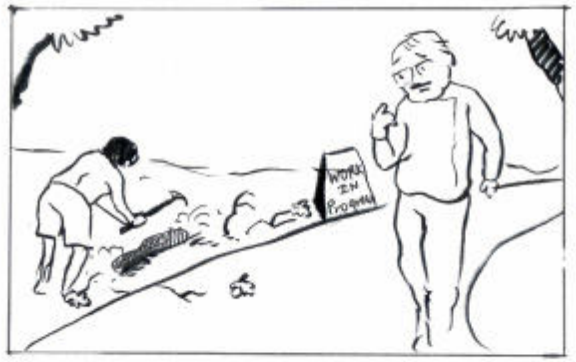


There is a boy named “Appu“. He loves plants. There was a beautiful plant in his house

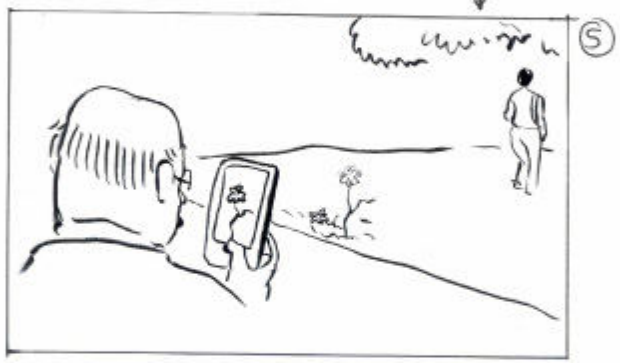
“Dadaji, you promised me to tell the story of this plant. Please , please tell me the story of this plant“

Dadaji -

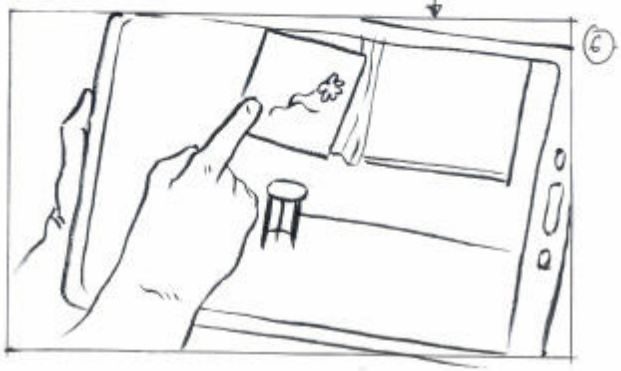
“One day , I was walking through this green lush park on a winter morning. I saw this beautiful plant and his friends near the walk way“



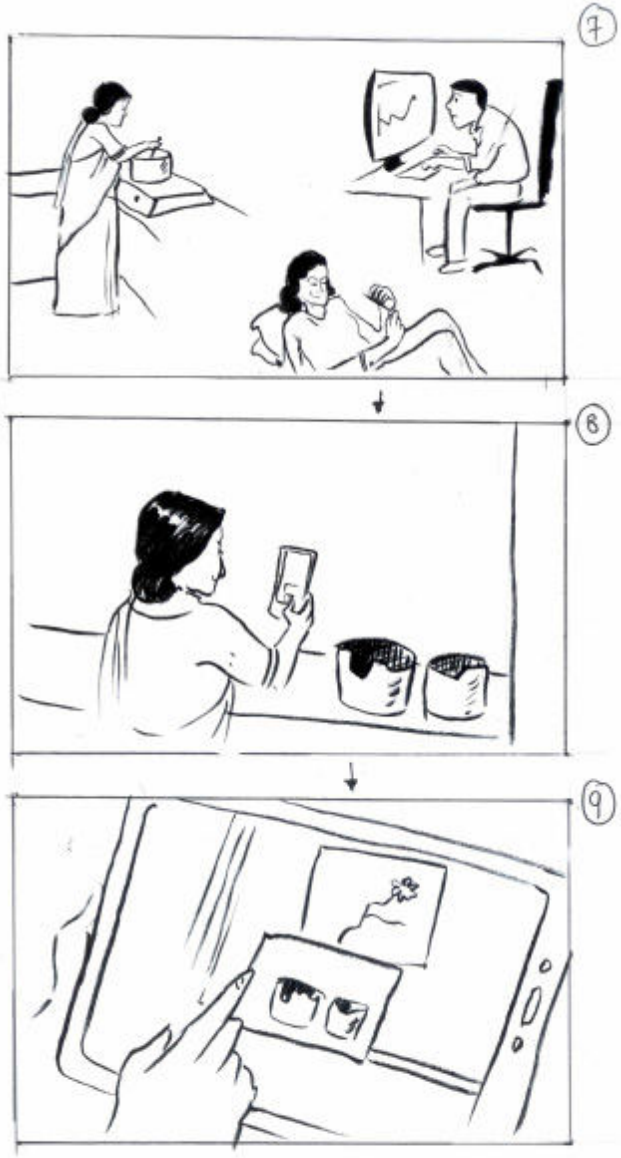
"But after one week, while on my morning walk, I saw that terrible sight. All the plants were uprooted as they started building a sitting bench in their place"



"I got an IDEA. I took my tablet PC , took a picture of it and opened the "Digital Ghar" in the tablet"



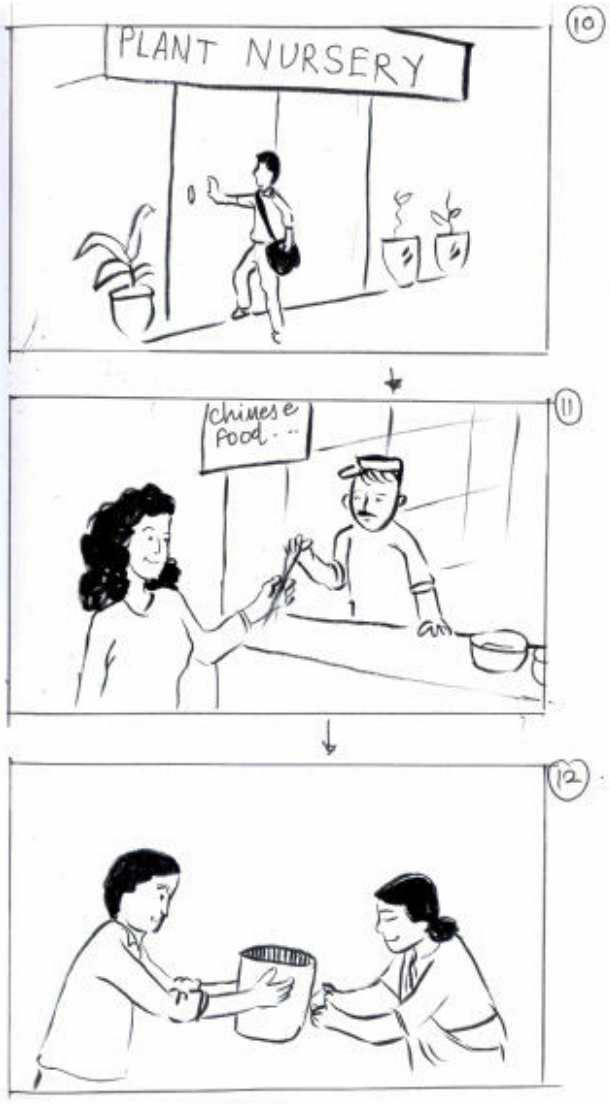
"I placed the picture near the window of our Digital Ghar"



“At the same time, your grandmother was preparing breakfast, your father was already in the office and your mother was busy with her makeup.”

“Your grandma liked the plant and went to the store house , clicked the picture of some broken pots she saved for future use“

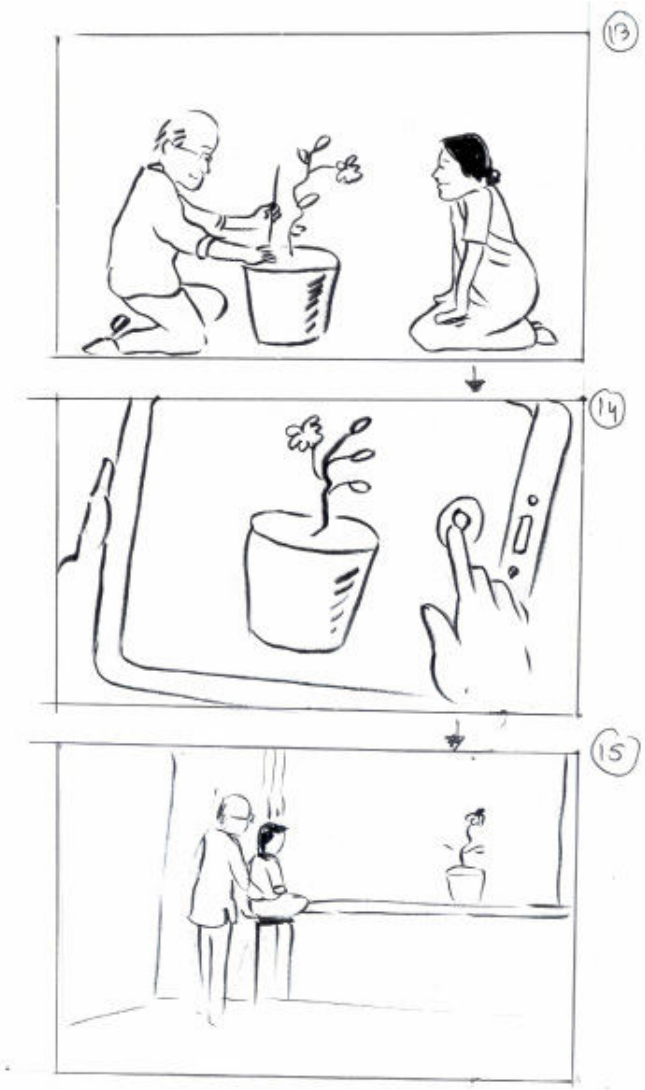
“She placed the picture of the pot under the picture of the plant in our Digital Ghar“



"Seeing that we have only broken pots , your father went to a plant nursery and brought a new pot for the plant"

"Your mother knew that the plant needed support. She got an idea , she went and borrowed two chopsticks from the chinese food corner down stairs"

"Your father brought home the new pot and gave it to grandma. "



“Me and your grandma planted it and kept it near the window of our real house“

“I clicked a picture of it and placed it in our digital ghar. “

“So Appu, Thats the story of this beautiful plant. Now I have recorded this story and kept it in our digital ghar. Now anytime you want ,you can hear it “

“But Dadaji , I want to listen it from you only.. tell me one more time ..please.. “

Scenario inspired from Wonder Window: Interactive Storytelling Device for the Elderly, Shalaka Dighe, Gautam Karnik, IDC IIT Bombay

In total, we received five stories three in written format and two narrated verbally which was recorded.

Three of those stories was real life experiences which went along with the scenarios narrated in the form of stories.

One of the participant shared memories from her seventieth birthday. She narrated how her grandchildren was decorating the house for her birthday. She gave them some old decorative items and they laughed about it. Then she told them that those were the decorative things their father and mother made when they were young to celebrate their great grandfathers birthday . When their parents arrived for the party they saw those old decorative items and recognized it was made by them. Afterwards there was a crowd around it to take pictures with those old wall hanging paper pieces.

More than anything else , these stories helped me understand that each household is a box filled with a large collection of stories

Loved Ones

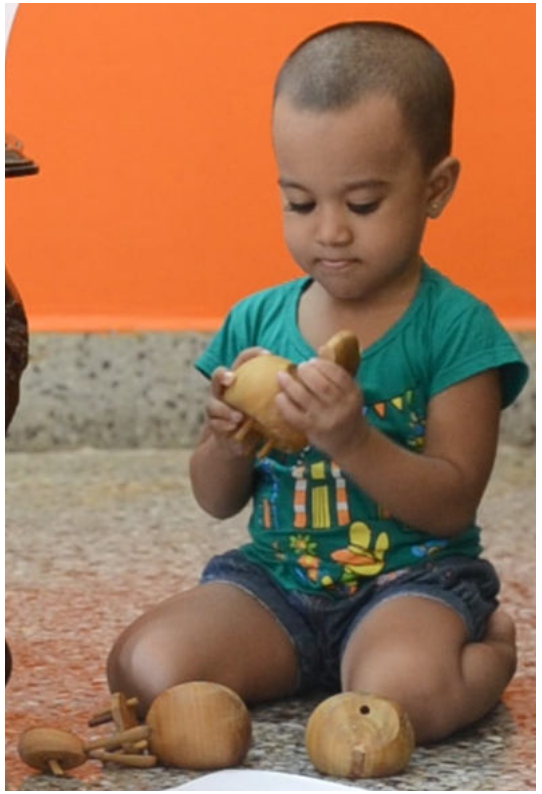
From our interactions with the Senior citizens we realized that Grandparents have a longing for their grandkids. Whenever they talk about a grandkid , we could feel a smile on the faces of the seniors. From the story telling exercise, we have found out that most of the stories have a grandkid as part of the stories. Seniors are proud to show pictures of their grand kids to friends and relatives and talk about them. These led us to consider grandkids between 5 and 12 years as our secondary users.

Most of the primary research on grandkids was carried out on the campus by visiting parks and IITB Quarters. There are a large number of families living inside and adjacent to IITB Campus.

Grand Kids

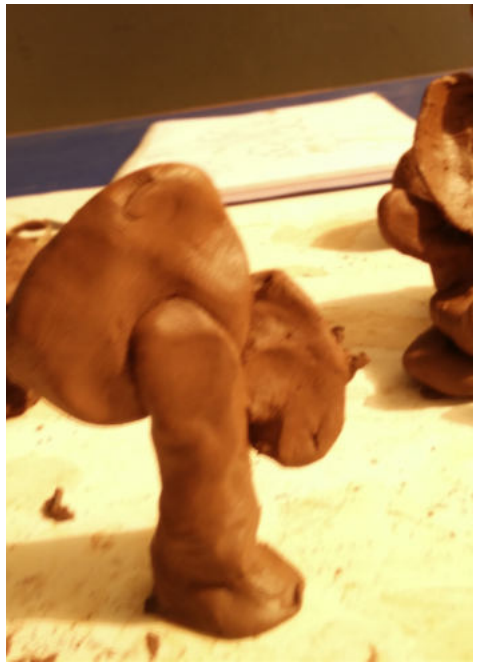
We got an opportunity to observe a grandparent and grandkid playing and learning from each other. Grandfather was making 3d objects from sand using a plastic mold. Grandfather was making the shapes and was asking the kid to point out to different part of the animal. I felt it was a great way to teach basic anatomy.

Later on, I gave them plasticine clay and asked the grandfather if he can use that material instead. He obliged happily but it turned out to be a bad alternative for the sand as plasticine got attached to plastic mold and was difficult to remove the cast from the mold.



I met Shanvi - three and half year old, in one of the staff quarters of IIT Bombay. I went there with a friend to record and observe her playing with the toys that my friend made for kids. We observed that while playing with the toys , she sometimes talks to the toy and sometime she was acting as if she is that toy. She found great fun in mixing and matching different animal parts for example elephant head on a monkey's body and so on. She never waited for any instructions , she learnt things by trial and error.
On probing her storytelling abilities, she started telling stories while holding toys in her hand. She was mashing up stories she knew and making up what ever that was on her mind. It was a liberating and a creative experience and gave me the confidence that kids can engage effectively with interesting story objects and can come up with a narration.

During the course of my research, I had an interesting conversation with young Najeeb, 11 years old. I met him during one of my travels and we became friends quickly. He was attracted to my phone more than any thing else. He never used a smartphone but have seen it in other people's hand and in advertisements . I showed him how to click a picture with my smartphone. He clicked some pictures of me and started clicking his surrounding. After a few minutes as I was about to leave , I went to him to take back my phone. To my surprise , he was already adjusting advanced features like exposure settings and clicking pictures. I probed him and realised he understood the concept of exposure by looking at the icons and the resultant photographs which he took at different exposures. After sometime we said goodbyes and I walked back , my soul touched by the brilliance of Young Najeeb.



I met a family of four- a mother, a grandmother and 2 kids adjacent to IIT Bombay in a place called PhuleNagar. After explaining the project , they warmly agreed to help me out in my research. I have visited the family eight times and they visited IDC four times. Initial trials were based on understanding the ability of grandkids to make objects with clay.

Interesting abstractions were noticed . Kids were having difficulty in making three dimensional objects and was interested in making clay reliefs on the desk.
In the second stage , demonstrated making a Ganapati with basic forms like cylinders, spheres and triangles. After watching me making 3d objects , they started making a tree and erected it on the ground.

Mumbai is infamous for its contrasts in lifestyles of its inhabitants. The gap between the rich and the poor is at an alarming proportion in the city. It was heartbreaking to see many people who belong to my target user category in such inhumane conditions.

Observations

India despite of rapid and consistent economic growth, will have a huge aging population who may be far poorer than their counterpart in the West as most of our senior citizens belong to the unorganised sectors.

A large number of senior citizens are excluded from participating in daily life events of their immediate families because of spatial and temporal differences.

They lack adequate accessibility facilities as well as interactive platforms allowing them to participate in daily life events of their loved ones.

Older adults who feel lonely are more prone to behave in ways that may cause other people to not want to be around them. Solitary seniors have a tendency to further isolate themselves by pushing people away and not making efforts to engage with others.

About 65 per cent of the aged had to depend on others for their day-to-day maintenance. Less than 20% of elderly women but majority of elderly men were economically independent. Problems faced by females are more critical compared to those men due to a low literacy rate. A majority of women not having had secure jobs during their prime, adds to their challenge. Most of the Senior citizens we met in Helpage Medical Camp was women.

A large number of senior citizens are facing psychological problems like loneliness, depression, forgetfulness, confusion and disorientation caused by Dementia and Alzheimer's disease. Some of them are having difficulty in accepting an old age

Senior citizens are also victims of verbal, physical and financial abuse, Social isolation and neglect. Some of them considered themselves as a burden on society

Older people are especially vulnerable to loneliness and social isolation can have a serious effect on the health. It's shockingly easy to be left feeling alone and vulnerable, which can lead to depression and a serious decline in physical health and well-being.

Kids are capable of understanding communication systems as they have been practicing the process of trial and error.

It is difficult for kids to make 3d models , if they dont have any prior experience. They love to make 2d abstractions of the 3d forms.

Senior citizens who went through difficult experiences showed amazing courage and grace. They also move on and try to make the most of out of life. We learned that there is a greater sense of sharing in places like an oldage home. As Mrs Sharada Joel of All Saints Oldage Home puts it, "Wo bhi dukhi, Mein bhi dukhi"

Inferences

Although senior citizens are the most respected people in the society, very limited technological research devoted to them in India. Technological interventions can play an important role in the well being of senior citizens. From connecting seniors to their loved ones to personal healthcare ,there is a huge scope for social entrepreneurship in these areas.

No political system can single handedly take care of our ageing population. Government policy changes can drive meaningful initiatives for their wellbeing and bring in a new sense of empathy in our society towards elderly

Elderly abuse is a reality in our cities. Property and inheritance issues, attitudinal issues and addiction related behavior issues of young adults are common causes for these abuses. Keeping their finances organized and remaining socially active could help in stoping these crimes.

Most of the Senior citizens are good story tellers , they are capable of communicating profound ideas through very simple stories.

For many Senior citizens, the word 'Home' invokes many memories from their past. Home is a box of stories and memories , which they are willing to unravel to their circle of friends and acquaintances.

Senior citizens have a vast amount of life experiences, patience and time on their hands.

Seniors feel reluctant to reach out to younger family members when faced with difficulties related to new technologies. They feel ashamed when their kids or grandkids laughs at them for not knowing 'these simple things'

Seniors cherish the idea of giving to their next generation what they receive from their older generations.

Loneliness is one of most common problem faced by an elderly in an urban context. A large number of seniors who have lost their partners withdraw themselves from active social life and are more prone to depression.

Grandkids needs a lot of attention while playing with seniors. Assurances can be of any following form: eye contact between the grandfather and the grand kid, affirmation sounds of the grandfather.

Grandparents have the patience to spent time with their grandkids because the very act of spending time with their grandkids gives them happiness

Secondary Research

After spending considerable amount of time with the senior citizens , care givers and care takers, my guide asked me to look into existing solutions from around the world to understand the strategies one use to tackle problems specific to senior citizens. As most of the developed countries have been facing the challenges of population aging , there was a vast amount of solutions and research work from those parts of the world.

After primary research, loneliness and depression emerged as one of the most common problem faced by senior citizen. Following section looks into existing solutions which connects senior citizen with other people. Based on the input I received during the group feedback, I explored the works of an experience designer, Marc Hassenzahl. Previous works in the areas of close relationships and relatedness was studied and documented.

Family Story Play

Family Story Play, a system that supports grandparents to read books together with their grandchildren over the Internet. Family Story Play is designed to improve communication across generations and over a distance, and to support parents and grandparents in fostering the literacy development of young children. The interface encourages active child participation in the book reading experience by combining a paper book, a sensor-enhanced frame, video conferencing technology, and video content of a Sesame Street Muppet (Elmo).[1]

Although the concept engaged the grandchildren, it lacked engagement from the grandparents , as they preferred large monitor screens to see the kids reactions. In the research paper published by the creators, they have mentioned further opportunities to create an asymmetrical system in which children have a tangible Family Story Play system and grandparents have a more traditional desktop based Story Play software application

The Family Window

The Family Window is a video media space deployed within the homes of two families for eight months and four families for five weeks. It is an always - on video that can lead to an increase in feelings of connectedness by providing availability awareness and opportunities for sharing everyday life.

The key finding of the research included features based on the expectations of the users.

Notification- local family members needed a way to notify remote family members that they wanted their attention

Handwritten messages- Families can leave handwritten messages for each other by writing on the background of the video and share short bits of communication

Time shift recording - Families were always not active with the system (different time zone or work schedules) and to solve this problem family window added a time shift mode. Only video containing activity is recorded. This is sensed by comparing the difference between successive video frames

Activity timeline- Families do not necessarily know each other's schedules A timeline showed how much activity occurred infront of the family window.

Privacy- Blinds were added to the screen based on the metaphor of real world window. User can adjust a slider to open or close the window

Another interesting observation was the use of the system as a tool for discerning availability, which they could then use to easily move into interactions like a phone call.

One drawback of the design was that what awareness information is important to families is not always clear. Researchers suggest that awareness appliances should be adaptable or allow users to change what information is presented to them.

Carman Neustaedter , Andrew F. Kurtz, Tejinder K. Judge "The Family Window : The Design and Evaluation of a Domestic Media Space", Proceedings of CHI 2010.

Design for relatedness

Marc Hassenzahl's work in the area of relatedness helped me shape my ideas about experience design.

> Experience is prime, and the product only a means. Accordingly, one of the basic claims of Experience Design is to consider the experience before products. Experience Design urges us to set the story straight before we start thinking about how we can create this story through a technology. An experience is an episode , a chunk of time that one went through - with signals and sounds, feelings and thoughts, motives and actions, closely knitted together, stored in memory, labeled, relived and communicated to others. An experience is a story , emerging from the dialogue of a person with her/his world through action.
> Marc Hassenzahl , 2010

In an experience - oriented design approach , all choices regarding form, function and interaction were aligned with the intended experience. In the home, the focus is on using awareness to produce feelings of presence and closeness, often coupled with strong emotions between distance-separated family members. This comes from sharing aspects of everyday life. Thus, it is also about building, maintaining, and strengthening relationships.

In his book In the blink of an eye, Walter Murch discusses experience from the stand point of film making
"what they finally remember is not the editing, not the camera work, not the performances, not even the story---it's how they felt."

Another interesting take on experience based mediation is by Dutch philosopher Peter-Paul Verbeek.
"Designers cannot simply inscribe a desired form of morality into an artifact. The mediating role of technologies is not only the result of the activities of the designers, who inscribe scripts or delegate responsibilities, but also depends on the users, who interpret and appropriate technologies, and on the technologies themselves, which can evoke emergent forms of mediation ."

Marc Hassenzahl, Kurt Mehnert, Matthias Laschke, "linked. – a relatedness experience for boys", Proceedings of NordiCHI'10

Strategies for relatedness

In the research paper titled "All You Need is Love: Current Strategies of Mediating Intimate Relationships through Technology", six broad strategies to create and mediate the feeling of relatedness is discussed : awareness , expressivity , physicalness, gift giving , joint action ,and memories .

This research paper provides a review of 143 published artifacts (i.e., design concepts, technologies). Based on this, present strategies used by designers/ researchers to create a relatedness experience was discussed

Physicalness focuses on the physical aspect of relatedness, while awareness attempts to create a cognitive copresence. Expressivity particularly considers the emotional and affective aspects of intimate relationships and their deliberate exchange. Joint action addresses the importance of behavioral interdependence, while memories attempt to foster the commitment to an established close relationship.[1]

1. Marc Hassenzahl, Stephanie Heidecker, Kai Eckoldt, Sarah Diefenbach, " All You Need is Love: Current Strategies of Mediating Intimate Relationships through Technology", Proceedings of TOCHI 2012

Close relationships

People of all ages are most likely to thrive when they have significant people in their lives who are responsive to their needs and deeply invested in their welfare. Just as children look to parents for protection and nurturance in response to threat or uncertainty, romantic partners look to one another for support and care during times of adversity and personal challenge.[1]

The caregiving behavioral system : Attachment theory proposes that human beings are born with the capacity to develop caregiving behaviors aimed at providing protection and care to others in need (Bowlby, 1982, 1988). According to the theory, these behaviors are organized by a caregiving behavioral system that functions to pro- mote the health and well-being of offspring and other communal partners. From a normative perspective, the caregiving system alerts individuals to the needs of others and motivates them to provide protection, comfort, and assistance to those who are dependent upon them or temporarily in need. (Collins & Feeney, 2000; George & Solomon, 2008; Hazan & Zeifman, 1999; Kunce & Shaver, 1994; Shaver, Mikulincer, & Shemesh-Iron, 2009).

Attachment theory highlights the importance of closeness and intimacy for the development and maintenance of trust and felt security - Bowlby 1988

1. Collins, N. L., Ford, M. (2010). Responding to the needs of others: The interplay of the attachment and caregiving systems in adult intimate relationships. Journal of Social and Personal Relationships

Project Brief

"Building a interactive space to engage senior citizens with their distant loved ones"

As stated earlier , one of the major problem faced by the senior citizens is the loneliness that they feel throughout the day, especially in the case of senior citizens living alone distant from the families of their children and relatives. After discussing with my guide, project focused on connecting the senior citizens to the people they care about. Based on the brief, initial design ideas were created.

Khushiyon ka Ghar

Trial 1

Khushiyon ka Ghar is conceived as a virtual domestic space modeled on a real life space where grandparents and grand kids can explore, play, organize, share content and store it for ever. Through this trial, we were trying to connect senior citizens with their loved ones in a space familiar to them.

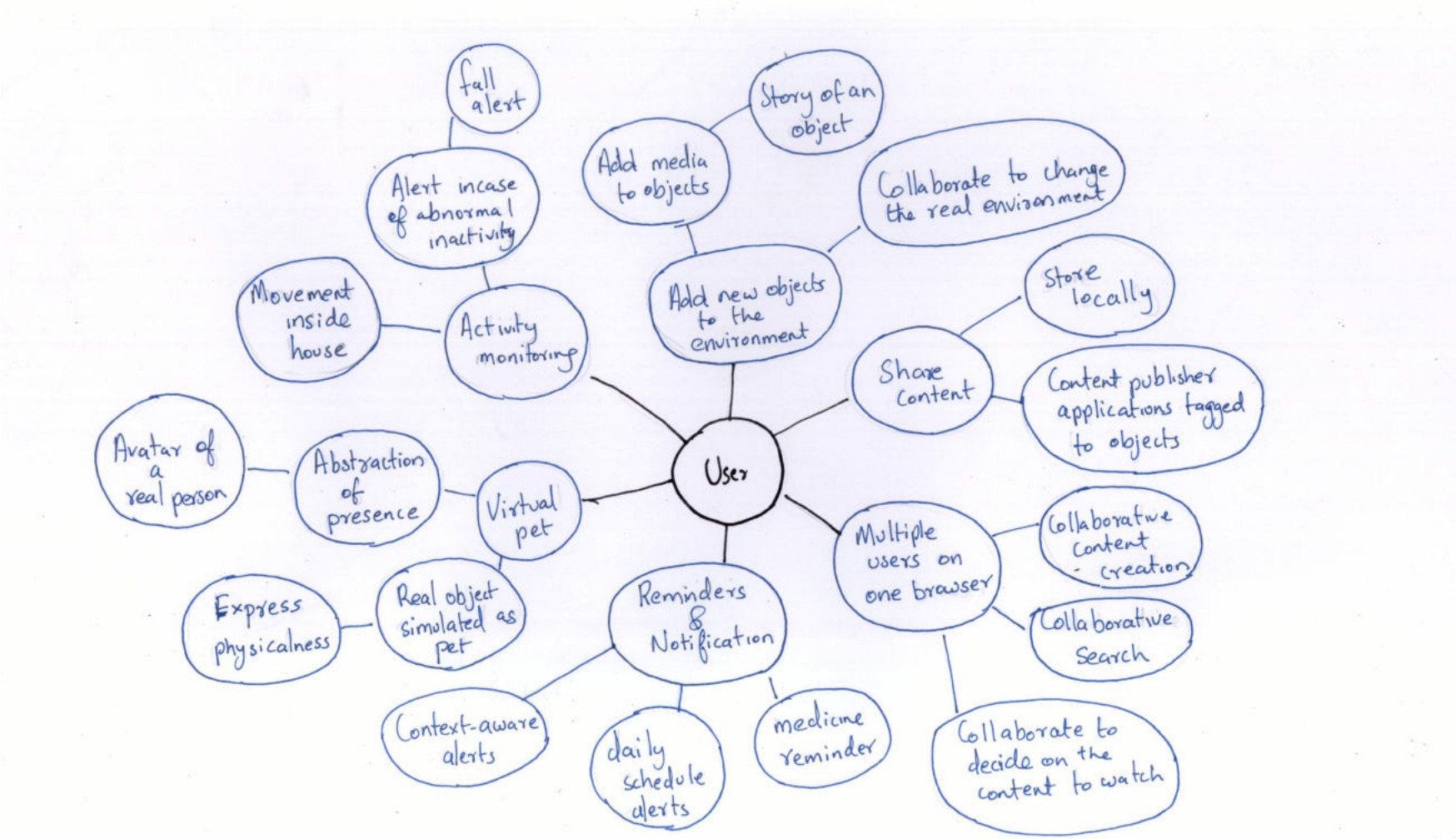
The domestic environment is more than a place where to live. It is a territory of meaning, a place where pleasure, affect and aesthetics are deeply interwoven with the functional and utilitarian dimensions. With the aging process, the home is progressively invested with new meanings and functions, and becomes the emotional center of older people's life.

With Kushiyon ka Ghar , we intend to convert these domestic environments into interfaces where users will be more free to express themselves. It is a space designed to have playful interactions by using real world objects and virtual environments. We believe present day interactive systems are "too tightly" designed which compel the user to respond in specific, directed ways.

Major features of this concept is that the grandparent / grandkid can scan any real world object and can have that object saved in the Khushiyon ka Ghar. All objects in this virtual living space would be smart objects, which can have videos, photos, texts, annotations tagged on to them. Walls of this virtual home could be used as an interactive browser. Behaviors of this virtual objects can be programmed by the grandkids . Grandkids and Grandparents can share and discuss video content from the internet. They can tag these kind of activities onto objects like television present in the virtual space. These choices can be made through the collaboration of grandparent and grand kid based on their conceptual models about these objects

One of the aim of the project is to create an interactive space that allows exploratory interactions. As the interface itself is based on the existing conceptual models of the users, these interfaces will likely to have a very low learning curve. Interface would require considerable amount of exploratory play. We believe both grandkid and grandparent together might make a great exploration team.

Data Privacy is a major concern in these systems. Nobody wants to see advertisements on the walls of their homes,virtual or real. Authorship of data should always remain with the user. User should have absolute control of the data generated by these systems. If personal data is money , it should remain in the wallets of people who generated them.



A mindmap was made to explore the possibilities of the concept

Trial 1 - Smart objects

All the daily products present in the real environment of the household is converted to a smart object in the virtual environment. It is not, however, the technology itself that makes them smart but rather the way in which the technology is integrated, and their smartness surfaces through how people are able to interact with these objects. Hence, the key challenge for making smart objects successful is to design usable and useful interactions with them.

We will use 'smart object' to refer to 'a computationally augmented object with an established purpose that is aware of its operational situations and capable of providing supplementary services without compromising its original appearance and interaction metaphor'

Features of a smart object can be the following:

- Context awareness is the ability of an object to adapt its behavior to changing situations of use.
- Proactive behavior is the ability of an object to look ahead, acting in preparation of potential forthcoming situations.
- Internalized knowledge is the internal application of knowledge based systems, in particular, a reasoning component capable of producing new facts during runtime. While such technology is, in theory, not required for creating more powerful systems than those based on other, more conventional programming paradigms, practical experience shows that they usually exhibit more adaptivity and flexibility.
- Object-to-object interaction is the dynamic coupling with peer, embraced, and embracing products. Smartness in this respect is exhibited if collaboration with other objects – either at the same level or in a hierarchical setting (smart environments) – is supported even if the interaction with the partnering products has not been anticipated entirely. Such behavior can, for example, be supported by knowledge-based technology, such as planning technology.
- Object-to-user interaction is a particular form of smartness related to behavior at the object-to-human interface. It is essentially the capacity of intelligibility, conveying to users what the object knows, how it knows it, and what it is doing

A key element is the ability to determine the exact pose of smart objects in the scene. The basis for determining the pose is a generic recognition algorithm that is parameterized by a geometric model that is provided by the smart object. Common features of smart objects (e.g., the ability to store digital information and internalize knowledge) are cleverly used to enhance user's interaction with them.

Daniel Schreiber, Kris Lyuten,Max Muhlhauser, Olive Brdiczka, Melaine Hartman"Introduction to the Special Issue on Interaction with Smart Objects"
Molyneaux, Gellersen, Finney"Cooperative Augmentation of Mobile Smart Objects with Projected Displays"

Trial 1 - Interaction Model

Khushiyon ka Ghar is a space populated with different types of objects. Real world counterparts of these objects don't have any embedded processing and decision capabilities. In this model, the mobile device takes care of the processing, storage, identification, sensing, interface and communication capabilities of these smart objects.

Users of this system would be able to:

- Customize the responses of interaction with a given object to induce actions, e.g. 'if I touch the picture frame, photo and video album starts playing in the Virtual TV'; 'if I click on a particular face in the picture frame , it takes to his/her social network profiles'.
- Make an object respond to a given order configured by the user. E.g. 'if I clicks the medicine box and my medicine timings are not near, display the amount of medicine remaining in the box'.
- Provide intuitive configuration of the smart environment through actions in the mobile device. E.g. 'if I shake the phone, Music start playing '
- Configure/activate features in the mobile device depending on environmental events. E.g. 'if device is put to sleep, the room is silent and it is Sunday midnight, configure my mobile alarm clock'

Smart objects will be able to publish event and action 'modules'. A 'module' will implement a number of logic interfaces to hide the operational complexity to detect an event or perform an action. An 'event' is any episode of change happened in the virtual and real environment (e.g. changes in temperature, light, pressure, etc.). An 'action' is any task that may be performed by or on the object (e.g. 'display an image', 'change my color'. Modules may be configurable by the user, depending on their function.

The mobile application is the central element to manage interaction. It is divided in to three main building blocks: core , application interface and modules . The core manages the modules' lifecycle: it dynamically retrieves them from the infrastructure and loads them into memory, manages the interaction between events, conditions and actions and, finally, provides the GUI. The application interface defines the data structure for the communication between the core and the modules. A module offering may include none, one or more than one of each (events, conditions and actions)

Daniel Schreiber, Kris Lyuten,Max Muhlhauser, Olive Brdiczka, Melaine Hartman"Introduction to the Special Issue on Interaction with Smart Objects"
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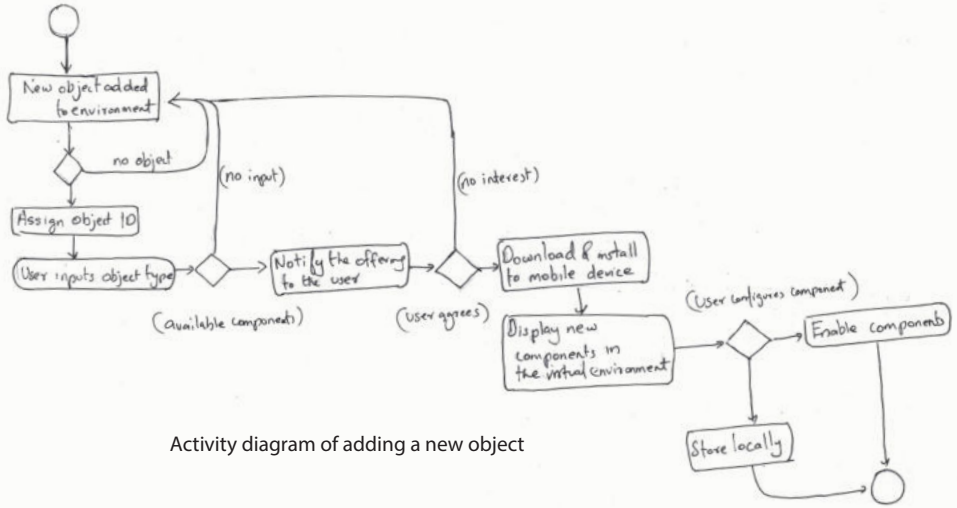
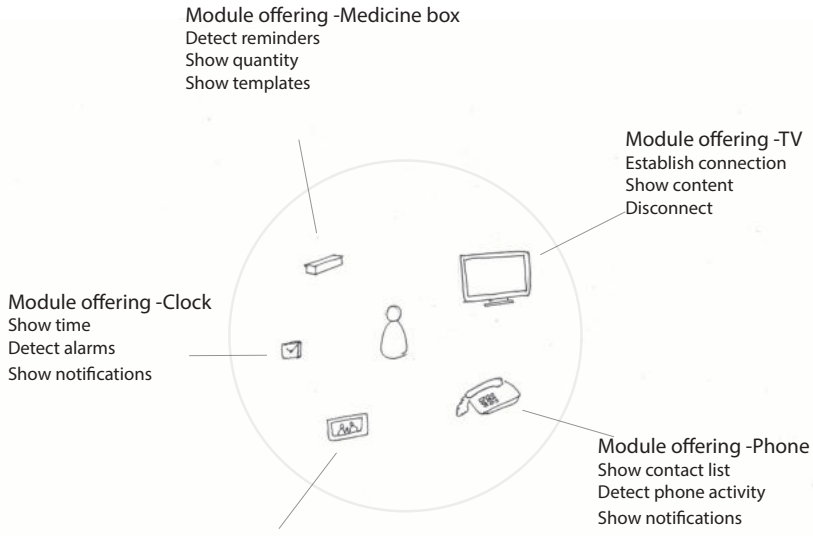
Trial 1 - Interaction Model



Activity diagram of adding a new object



Ecosystem of smart objects

Daniel Schreiber, Kris Lyuten,Max Muhlhauser, Olive Brdiczka, Melaine Hartman"Introduction to the Special Issue on Interaction with Smart Objects"
Molyneaux, Gellersen, Finney"Cooperative Augmentation of Mobile Smart Objects with Projected Displays"

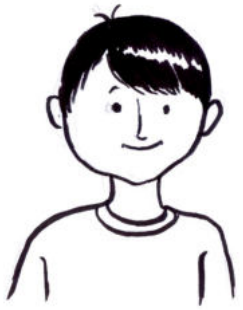
Smart objects and stories

Ability to tell stories with the help of smart objects is one of the main feature of Khushiyon ka Ghar. Any real world object can be scanned and made into a 3d model. These models are then shared to the virtual environments. Once shared on to the virtual environment these objects are capable of internalizing knowledge . It can connect and collaborate with other objects in the house to make life easier and fun for both seniors and grand kids. For example, a scribble on the wall by the grand kid asking grandpa to go to a doctor to look into his persistent wrist pain might get converted to a notification over the telephone reminding Grandpa to book an appointment.

Sharing instances from daily life is one of the ways to develop closeness between the grandparents and grandkids. Although a very limited possibilities are discussed here through scenarios , we feel there is a huge number of possibilities for using it to communicate care and affection.

Profiles

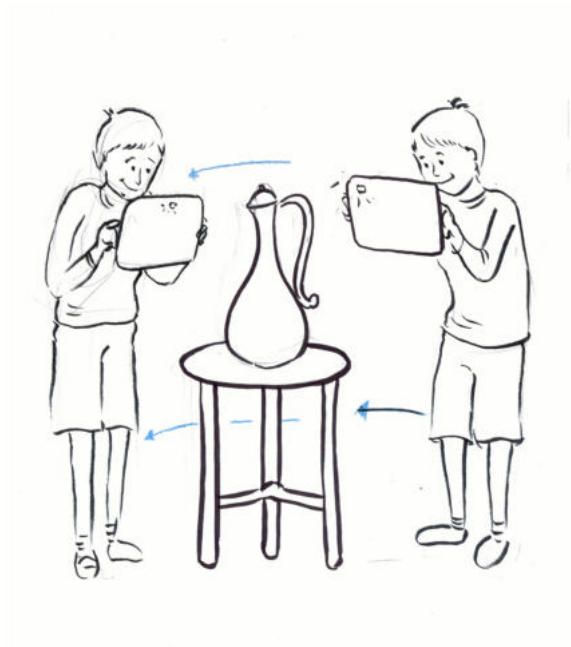
- Name: Sudhir Sharma (Dadaji)
- Age: 67
- Retired Professor of Humanities
- Staying in Kharghar, Mumbai
- His wife passed away three years ago, supported by Sukhdev who helps him as a maid and driver
- Active participant at Chai Masti programs organized by Dignity foundation, Kharghar.
- Suffers from age related ailments
- Big fan of Satyajit Ray, calls his grandson Appu.



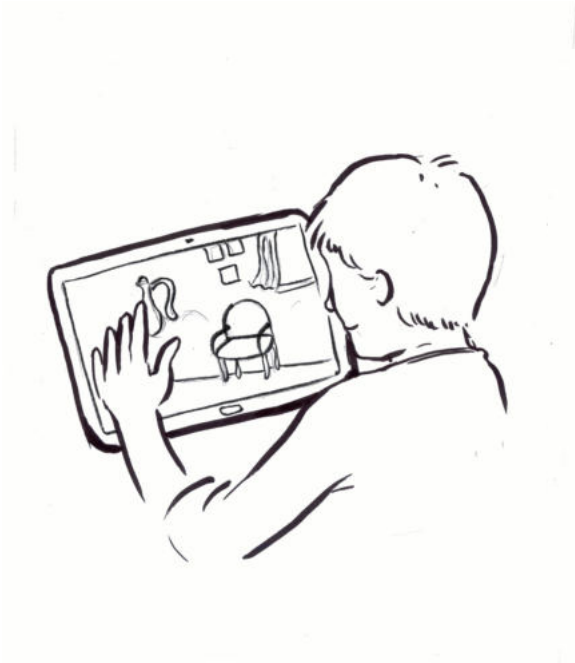
- Name: Arpit Sharma (Appu)
- Age: 14
- Ninenth standard student
- Staying in Powai, Mumbai
- Dreams to become the Prime Minister of India
- Attends Guitar classes in the weekends
- Loves Dadaji, spends week long vacations with Dadaji at his home.
- Loves riding cycle gifted to him by Dadaji

Trial 1- concept scenario 1

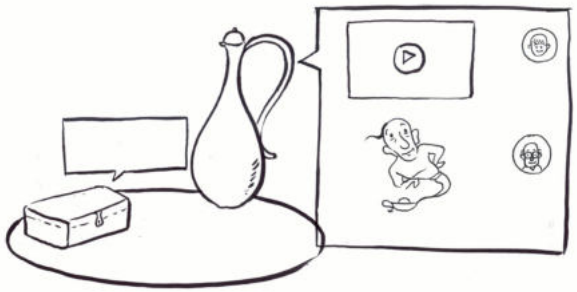
Smart Objects and Stories



Appu sees an interesting object while visiting his friend's house.



He scans the object, makes a 3D model and places inside Khushiyon ka Ghar



He adds a video to the object and Dadaji shares his thoughts and a conversation begins in the Khushiyon ka Ghar

Trial 1 - concept scenario 1

Context aware objects

Khushiyon ka Ghar can provide context-aware output. It can access the sensor data from the device and use it in the real time contexts of the user. It is capable of integrating the visual output with the environment and appearance of the objects.

Users often perceive interaction with objects as "smart" when interaction with these objects is initiated on the basis of the local context. However, the user can override this default behavior of the system by manually and explicitly switching to a remote location. We want the end user always in control, an important strategy when it comes to object-to-user interaction.

Continuing from the earlier scenario, Dadaji keeps using the template created by Appu, systems knows when the medicines are going to get over. Sensing Dadaji to be out of the home , it generates a notification to buy the medicine as explained in the following scenario

Dadaji is on his way to meet his old friend Mr Sharma. Alarm started ringing in his device while traveling on the local train.

He sees the medicine box in Khushiyon ka Ghar and a reminder to buy medicines as his stock is getting over by tomorrow

He visits a chemist's shop to buy the medicines.

Kawsar, F., Fujinami, K., Nakajima, T. 2008. Prottoy Middleware Platform for Smart Object Systems. International Journal of Smart Home , vol. 2, no. 3

Users can share content to the Virtual TV in the khushiyon ka Ghar. A chat window shows the history of sharing and comments on the share. A book object lying on the table is used as a news reading application. Notifications from subscribed content publishers are pushed and notified to the users.

Home screen of the application will have notification displayed on the objects. A chat window is displayed with recent chats on the left side of the screen. Users can modify the modules attached to a particular object.

Trial 1 - Prototype1

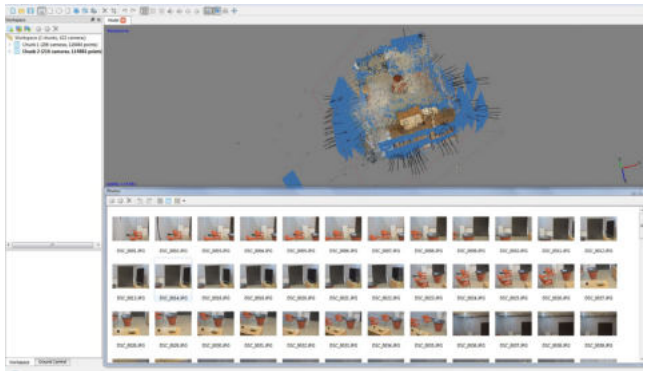
Initial prototype was made by creating a 360 degree photographs of a real household environment . Three 360 degree photos were used to make the prototype. One of the photograph contained the living room , another contained the bedroom and last one contained the kitchen. All the three photographs were taken to unity software where it was mounted on top of a sphere with a camera inside. These three spheres were then linked with buttons. 3d objects were imported on top of these environments , but it was not visually merging with the environment.

This environment was shown to the participants while discussing the scenario during the storytelling session at the Chai masti program organized by Diginty foundation. Although there were no detailed interactions designed or implemented on this environment, it helped me to introduce the participant about the virtual environments and the possibility of using them as interfaces for new communication devices.

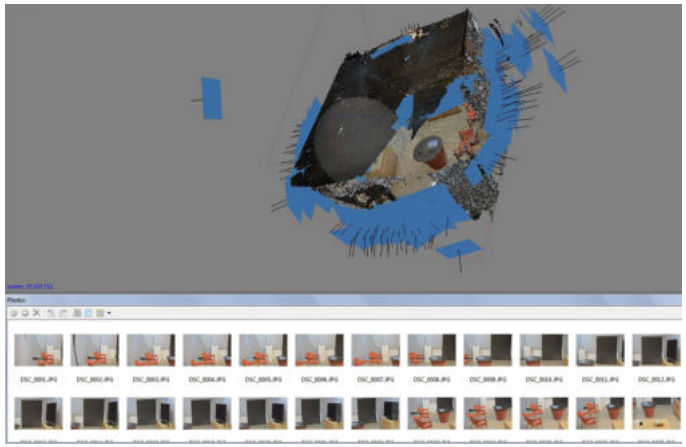
Trial 1- Prototype 2

My primary goal was to make a 3d model of a household environment. After making initial prototypes with a 360 degree photos, it became clear that to have simulatons of interactions with the environment a 3d model is required, as it is easy for other 3d models to blend in the environment opening up a wide range of possibilities.

Possible technologies were explored. Photogrammetry was chosen because it gave the real texture and light of the environment in the 3d model. Future for this technology also seems good, as more and more powerful cameras would be available to the masses through mobile devices, everyone would be able to make their immediate environment into 3d spaces where they can have interactions.



A point cloud of the space was created by using Agisoft photoscan. Cameras are created in the model by taking into account the parallax between the photos uploaded to make the model . Software named Agisoft photoscan was used for this modeling.



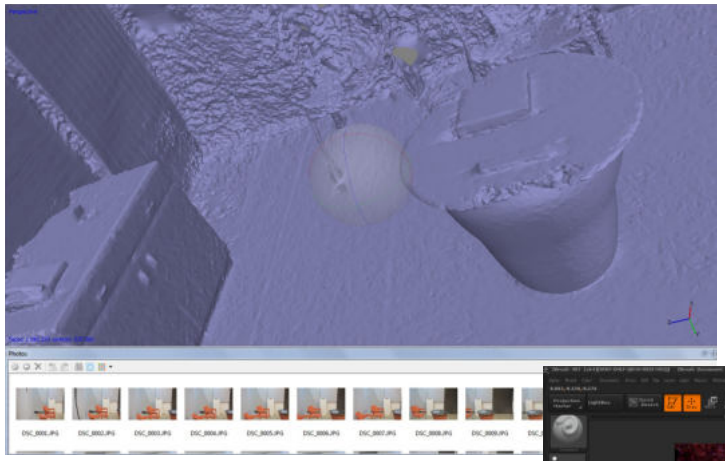
Some of the white spaces in the environment was not registered in the model. Photoscan is still not refined enough to create good 3d models. Most of the time retopology is done on top of these models

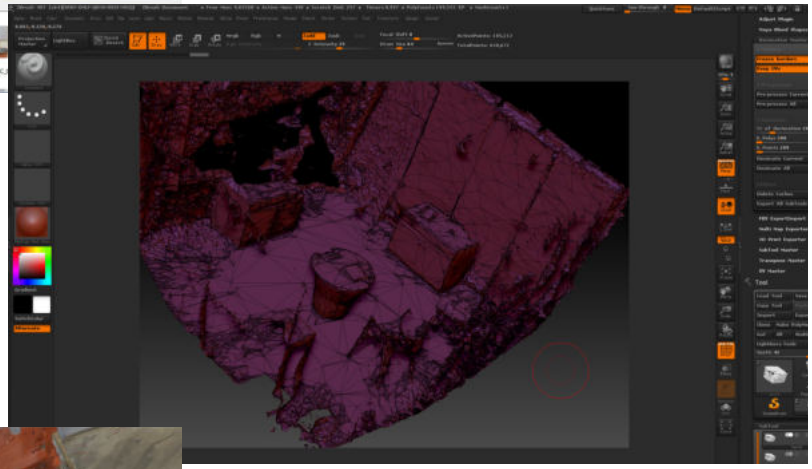
A dense cloud is created using the point cloud, which is then converted into a mesh. This mesh contains a wireframe and is made up of a large number of polygons

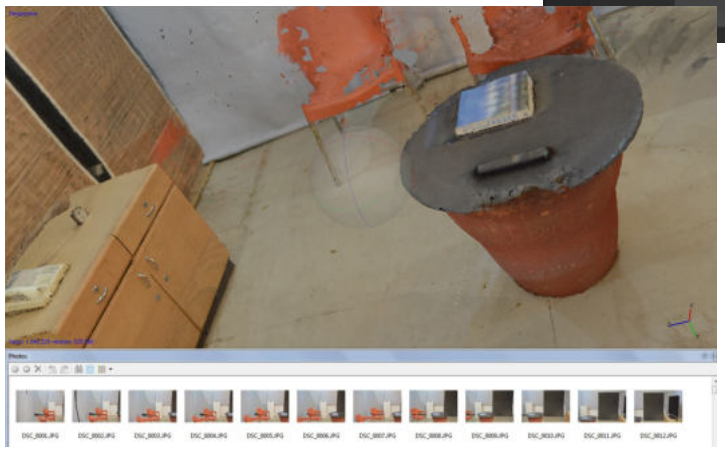
As the mesh created by the process is too heavy for programs like Unity to make a standalone android application with this 3d model. The mesh was then converted into a Low polygon model using Zbrush - (plugin - Decimation master). The mesh created after this process was 70% lighter than the one created using photoscan

Low polygon mesh was brought back to photoscan. Older mesh was deleted and replaced by the new lighter mesh. As cameras are already created , original texture of the model was imposed on the new mesh to create the environment

Final step for modelling included retopology in Maya. Empty spaces were hidden using planes. Television in the actual environment was distorted in the scanned model which was also replaced by a 3d model made in Maya. This model is loaded on to Unity and additional 3d objects were added and interactions where simulated.



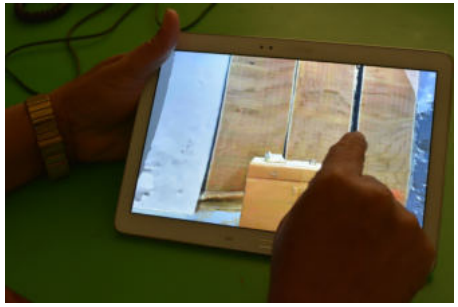


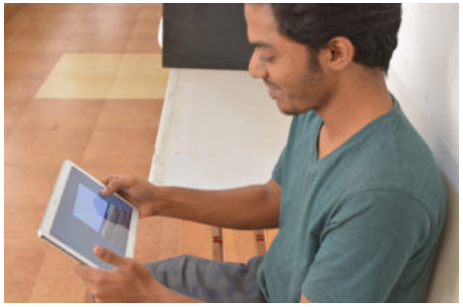


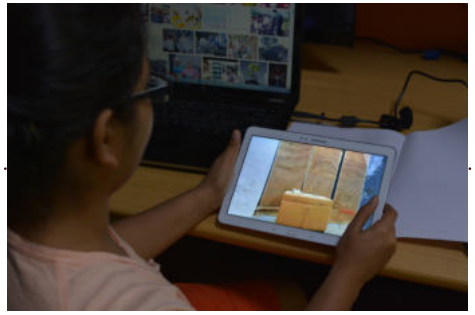
Prototype for this concept was made and tested on an Android tablet. Prototype implements a virtual environment made from a real environment using photogrammetry. Additional 3d objects where added and interactions where simulated. This prototype works on various devices.. One of the primary concern was to make this prototype available for tablet because larger portable screen was required to give a sense of space of a real environment. Some of the functions (Various Modules, Object recognition) in itself are very heavy to be executed in short duration of time, hence the prototype supports a basic interface with simulated interactions.

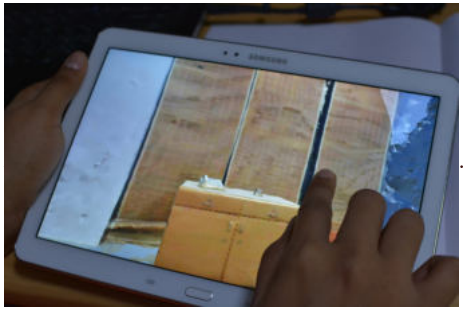
Following observations were made while the user interacts with the prototype

- Users were clicking on all the objects to understand the interactions possible, indicating device can enhance exploratory play
- Users wanted to control real world object with the device
- "Where should I start" there is no beginning point in the interface. One user finds this annoying.









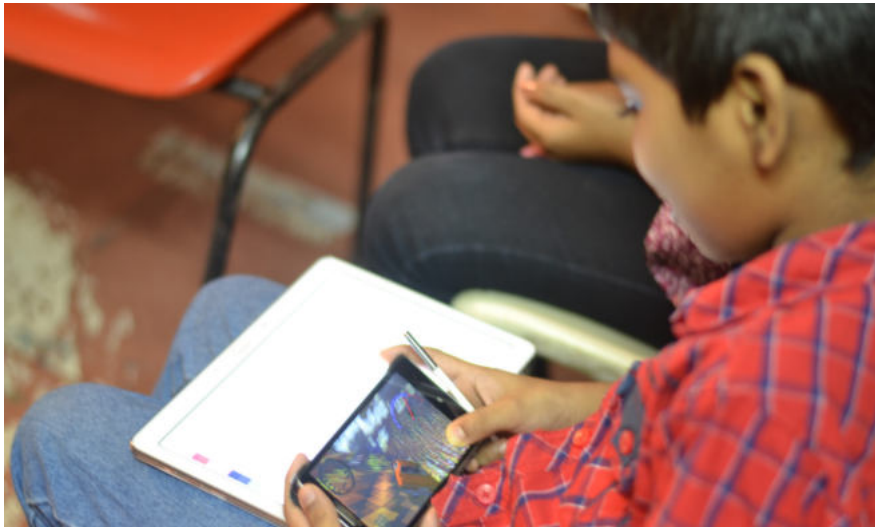
Trial 2

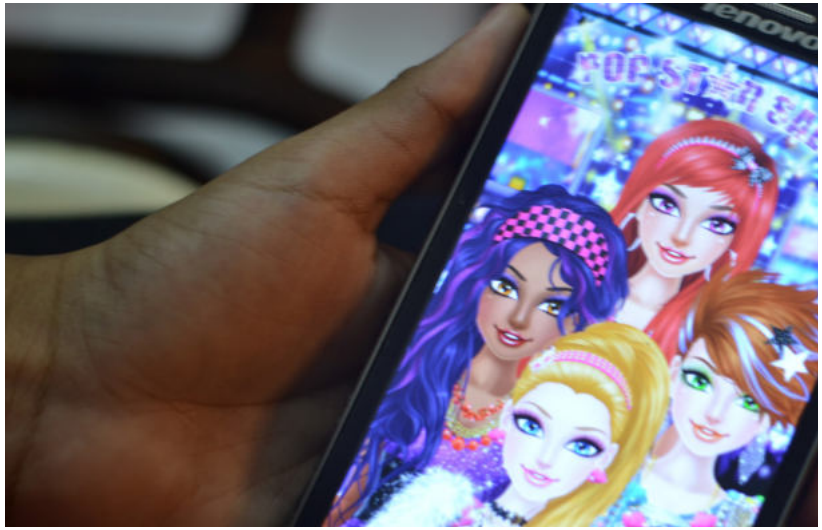
Khushiyon ka Ghar is conceived as a fantasy place co-existing within an environment modeled on real life space. Idea was that users would be able to create an experience based on their fantasies and bring those fantasy elements to the environments made from their real life spaces.

From the discussions I had with the users, it turned out to be a rather difficult task for grandparents or grandkids to imagine and share their fantasies possible in a virtual environment.

To test out this idea, an experimental setup was required. I along with help from many of my friends made a 1:12 scaled model of a house. The set was inspired from a similar set made by my senior Swati Agarwal for her animation movie ' Lakshmi Aayi Hai '.

Set had three area: Living room,Veranda and a forest. Inside of the house was furnished with miniature furnitures and outside forest had miniature trees and animals.





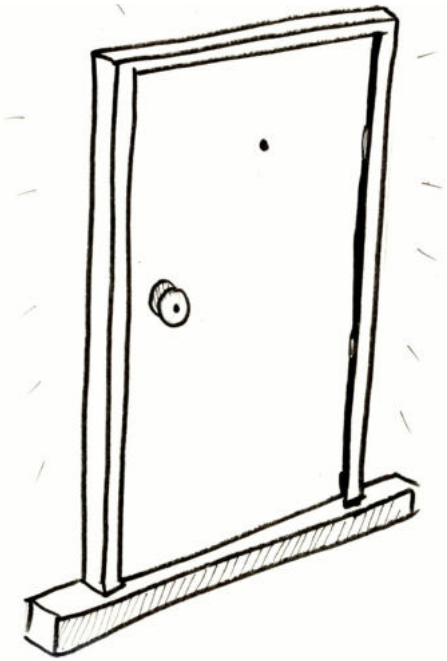
As Fantasies and Imagination is very much influenced by the culture and the environment one grows up, one family was recruited to work along with me in this exercise. Mrs Leelavati 61, Shalini 11 and Deep 8 Lives together happily in a one bed room residence in Phule Nagar

After having a long discussion about my intentions , the family agreed to be a part of the exercise and gave me consent to use their pictures and names to be in the documentation.

I exposed them to Virtual reality through 360 degree photographs on a head mounted display. The environment we created in the studio is shown to the Kids and grandmother to gather their feedback and possibilities.

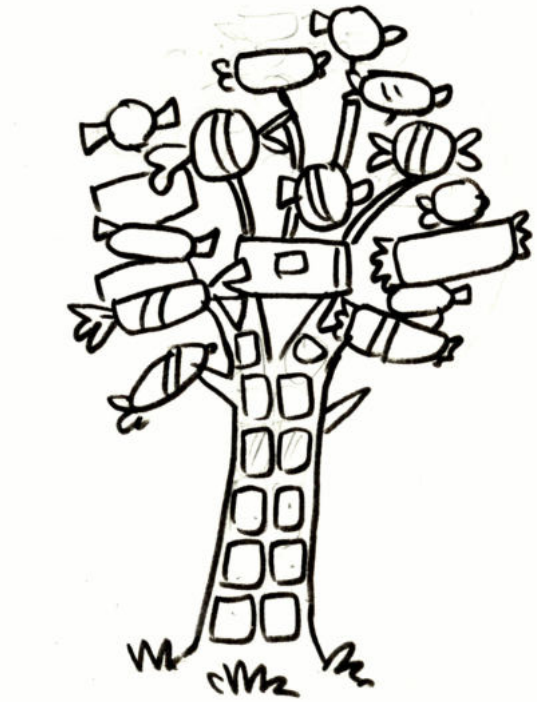
After the initial discussion, books and pen were given to each of the kids to write or draw their fantasies. Things that they want to be in the house.

I felt it was too much to ask from the kids to imagine things then and there. So I left them that day and met them after three days. I felt the kids were excited about the medium and we all started feeling closeness by the end of that day.



Anywhere door : A door that can take them to any place. To the place where grandmother works , to their school , to Thailand , all through the same door.

Pegasus : A flying horse to carry their message around.



A tree made from chocolate toffees. Chocolates hanging all around, so that they can have chocolates all day.

Anywhere door : A door that can take them to any place. To the place where grandmother works , to their school , to Thailand , all through the same door.

Pegasus : A flying horse to carry their message around.

A tree made from chocolate toffees. Chocolates hanging all around, so that they can have chocolates all day.

I made Pegasus , the chocolate tree and made one of the doors in the house as an Anywhere Door. Shot a 360 degree video from inside of the set along with music and showed it to the kids. They were excited to see their wishes coming to life. They complained about the Anywhere Door because they visualized it as a door standing in the middle of the ground .

After showing the Video, I showed them a 360 degree picture of their own house on a HMD. I probed if they can imagine any of these objects coming to their real life.

They happily agreed it would be great if they can have these elements in the virtual environment of their living room.

I noticed that they dont want to see their real house, as the time they spent looking at their own house was very less compared to the time they spent in the fantasy space

On probing about the different medias that can be placed inside the house, Grandmother suggested the chants she practice everyday could be saved in the house for the kids. She is of the view that kids dont understand the importance of the prayers and she is willing to spend one hour record the prayer and keep it in the fantasy land for the kids to hear whenever they want.

Deep wanted to have a ghost in the environment. Whenever his sister is looking through the HMD, he should be able to release the ghost to frighten her.

He wants to drive his favorite cars from an android game to be in the environment and wants to drive around in the environment.

Observations

Excersice was able to capture the fantasies but failed to validate the idea that users would be able to create an experience based on their fantasies and bring those fantasy elements to the environments made from their real life spaces.

Mapping between two different environments proved to be a difficult task with this family and with using the current setup.

Grandmother was willing to spend her time to create content for her grandkids

Kids dont show particular interest in looking at their own home through the HMD.

Kids would love to share the experience with other kids from school.

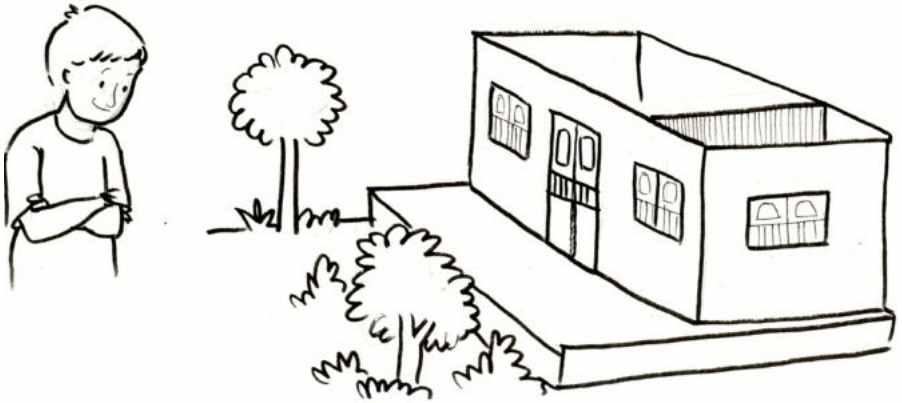
Final Design Concept

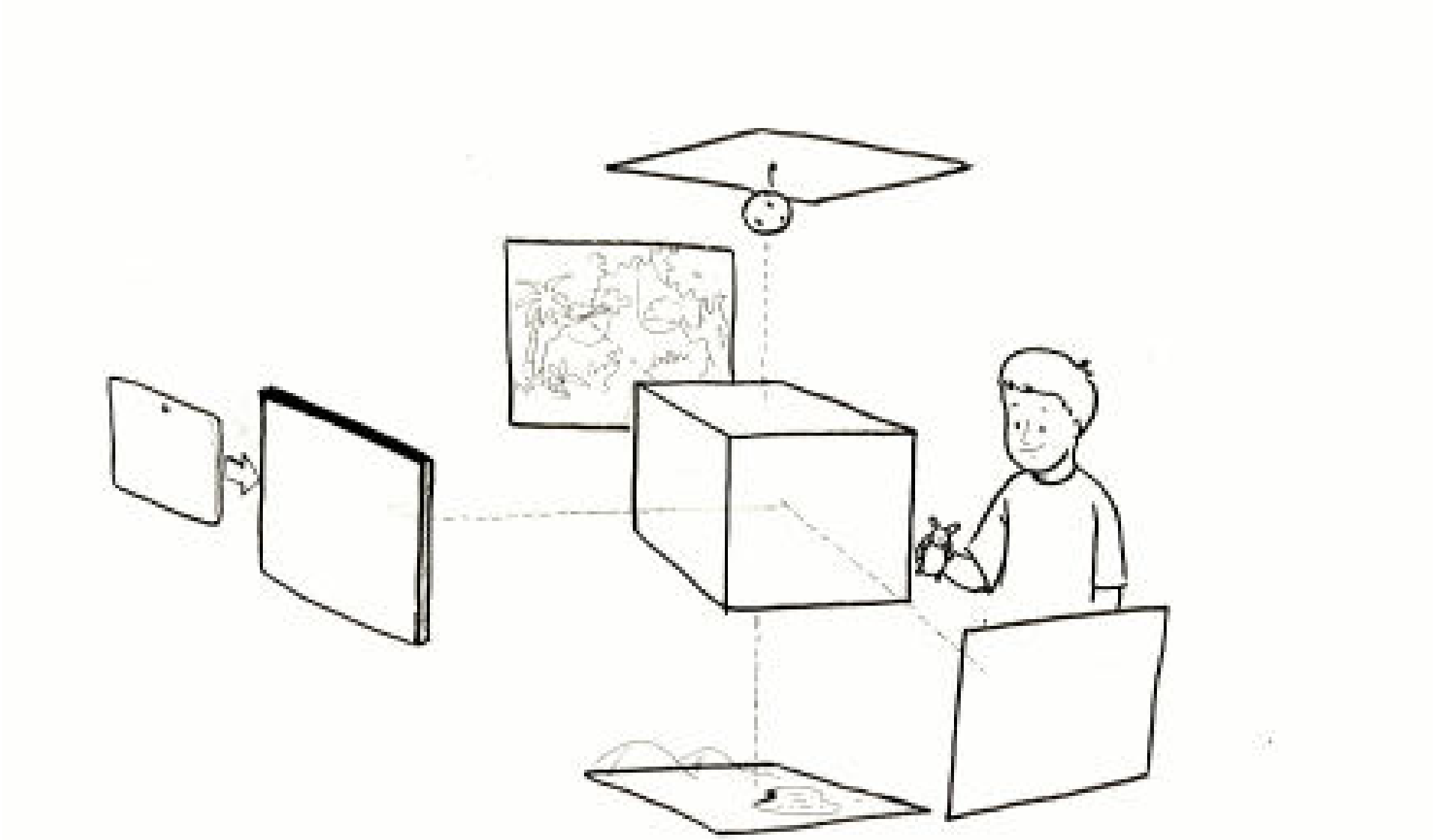
Based on the insights gathered through primary research, secondary research and exercises final design solution was conceived.

Final concept is a setup which enables the users to co-create virtual reality experiences while having a real time face-to-face communications.

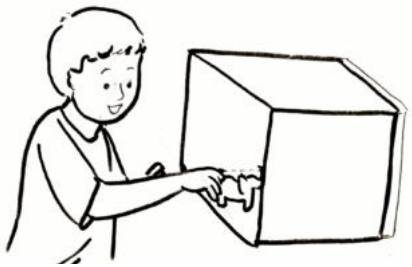
Important aspects considered for the mediation are:

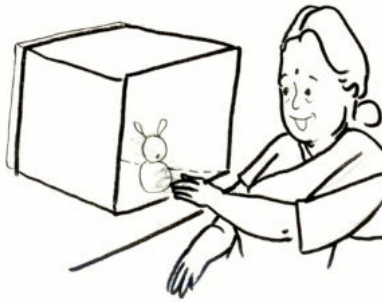
Face to face communication.
Ability to capture stories
Co-creation of stories
Usable in different modalities
Freedom to the user to create



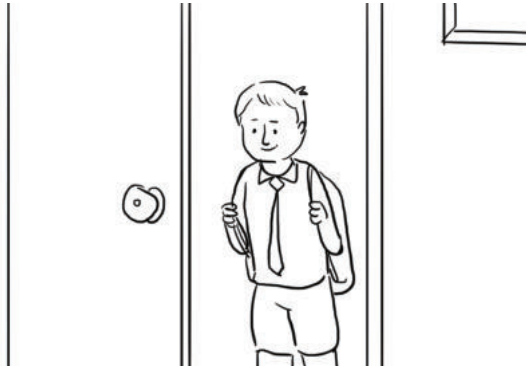


Setup consists of a closed box of five sides. Templates are placed on four sides, camera is hanged from above and a tablet is kept on the opposite face to where the user stands. This setup will allow to have a real time video conferencing and create Virtual environments. Completely closed immersive environment can be created by keying the user window and the tablet window with the template.





Final Concept Scenario



Appu returns from school

Dadaji calls Appu and inquired about his day at school

Appu is happy and ask Dadaji for his help to complete a storytelling assignment.
Dadaji happily agrees and they mutually decide on the story of the Lion and the Mouse

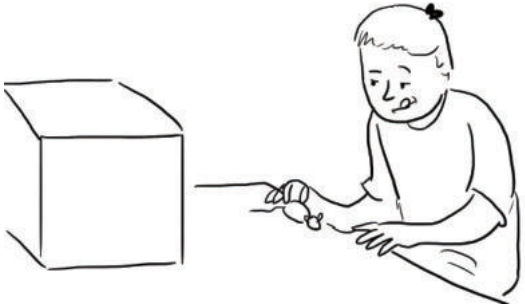
Final Concept Scenario

Dadaji starts making the box by using the pages from the template book in his house,

Appu starts making the box by using the pages from the template book in his house,

Dadaji make a lion and Appu makes a mouse using soft paper clay

Final Concept Scenario



Appu hangs the camera inside the setup and keeps the tablet inside the box for him to see Dadaji.

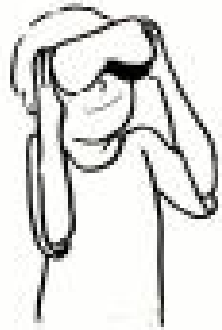
Dadaji start telling the story by moving the lion inside the box
Appu delivers the dialogs of the mouse.

They complete the story and had great fun while recording it

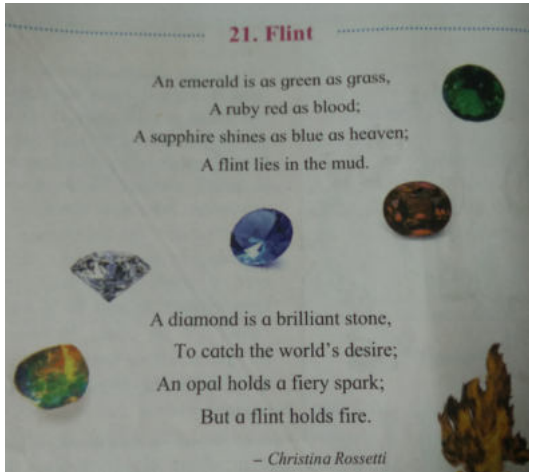
Final Concept Scenario

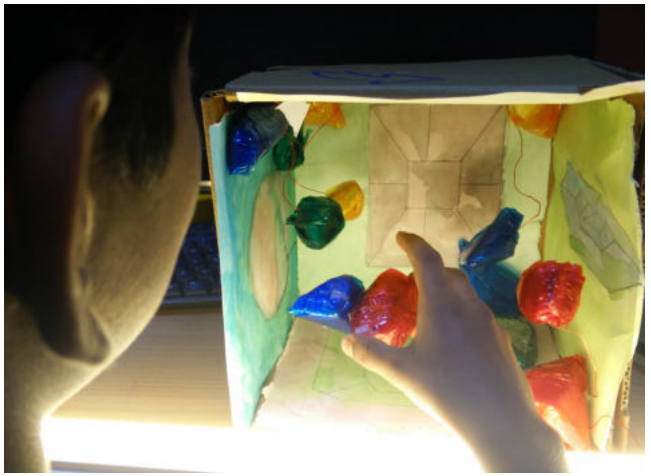
After the recording , Dadaji starts watching the 360 degree video on his tablet

Appu starts looking around in the virtual environment and the story begins.



Final Concept Prototyping





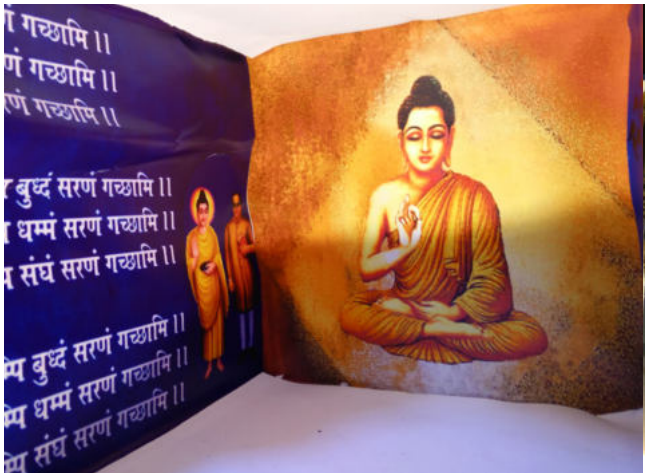
For the final concept prototyping , I worked with the family I was collaborating for my trials.
Deep decided to make a poem he learned in his class to a virtual experience. The poem is about precious stones and he made precious stone look alikes out of thermocol and tinted plastic sheets. He narrated the poem and recorded the timelapse of the environment.

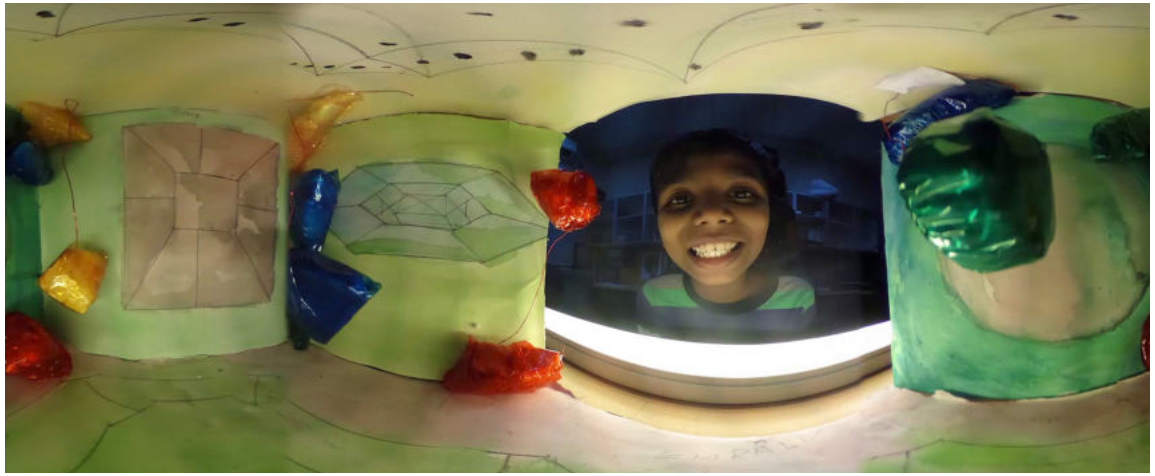
Mrs Leelavati decided to add a prayer. She narrated and recorded the prayer. She wanted her environment to have pictures of Buddha and a prayer with its text. She recored a video of her reciting the prayer.

Shalini decided to convert her collection of princess's stickers into a virtual experience. she stuck stickers she collected on to the setup and created a timelapse

I collected all the experiences and edited it to come up with the final prototype.

Final Concept Prototyping





Final Concept Prototyping

All of the three experiences were mapped on to the fantasy place created in trail two. Populated environment is shown to the users and feedback was documented.

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And, as imagination bodies forth
The forms of things unknown, the poet's pen
Turns them to shapes, and gives to airy nothing
A local habitation and a name

William Shakespeare,
A Midsummer Night's Dream

Project 3
Khushiyon ka Ghar July - Dec 2016

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