

TECHNOLOGY AS A DESIGN STRATEGY FOR PRODUCTS USEFUL FOR ELDERLY PEOPLE IN INDIAN CONTEXT

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ABSTRACT

The number of Elderly People in India is increasing and this has opened up a new area in products and services to cater to this need. Until now due to the prevailing joint family structure, elderly people were cared for by family members themselves. With the growth of Nuclear Families, where both the husband and wife are bread earners, taking care of the elderly has become a challenge now. In addition to their psychological need, their physical requirements are also to be taken care of. However, products and services to take care of the elderly people are nonexistent in India. To keep them physically independent as long as possible, designers need to design products that are affordable in the Indian context and adaptable by the elderly. This can be only achieved through use of technology and design strategy. Designing of these products and services has to be entirely based on technology. Through scrutinizing and scouting various technologies to create products and services to meet user requirements of elderly people, a range of ideas for products were generated. To physically realize the ideas, available technologies were again studied and products realized. In a few cases, the process generated product specification and forecasting for certain products and services that actually came into being later. The entire process was part of Product Design Education involving master and doctoral research scholar of the department of Design as a part of their academic activity.

Keywords: Elderly, technology, design strategy

1 INTRODUCTION

Percentage of elderly persons is gradually increasing in India. This is attributed to factors such as enhanced longevity of human being due to improved medical facilities, improvements in standards of life etc. Increasing elderly population has also created newer challenges for the society in terms of special care required by the senior citizens in various front.

Some of these challenges are due to gradual loss of physical capabilities in terms of muscular strength, loss of eye sight and hearing loss, loss of memory as well as gradually declining self-care abilities as age increases to name a few.

Increase in nuclear family and decrease in joint family even in rural areas is creating difficulty in taking care of the growing senior population. In the urban area, challenges are in case of housing; both husbands and wife working for livelihood and thus elderly persons being left alone in the house.

Another problem emerging very fast in both urban and rural area is that elderly people are left entirely alone to fend for themselves due to the fact that their offspring do not stay along with them, not to mention about increasing trend of off springs not residing in the same city or country. This led to their vulnerability to robbery and murder. In India social security for elderly people is yet to materialize.

Shortage or rather lack of public parks, walkways etc. in Indian cities are another concern for the welfare of the elderly. Elderly people are not able to walk and exercise in open space and parks and within average small house, it is not practicable for them to walk or exercise. There is plethora of indoor equipments available for normal human being but these are not always suitable for the elderly. For them specially designed equipments are essential.

Regarding socio-economic status of the target population, i.e., elderly, they are spread across all the spectrum of the society. Those in the Higher Income Groups are better off in some cases, since they

can avail various specialized services, but Middle and Lower Income Groups are always at a disadvantage because of the rising cost of living.

Elderly people can use various types of assistive devices to help with daily activities and to maintain functional independence despite physical and cognitive decline. To enable the elder to live safely, independently and happily, thus improving self-confidence, self-image and self-care abilities; caregivers can base on the needs of the elderly and select the appropriate assistive devices. Suggested accessories and devices are divided in various categories as under:

An integrated system comprising of:

Physical Fitness enabling devices

Assistive device to help maintain poise and walk without tripping/falling due to loss of strength of lower limb muscles.

Assistive devices for vision enhancement such as for attending mobile calls

Assistive devices for audio enhancement and voice recognition software for communication

Assistive device for home control through remote and automation

Assistive device for medication and self care

Integration of infotainment with the system

Assistive device for emergency care

Assistive device for ease of access to private vehicle like car.

It has become imperative that designers instead of designing consumer durables and luxury products also gets involved in designing products for elderly and academic institutions involved in design education has a strong role to play in motivating designers. Department of Design in IIT Guwahati encourages students in all levels to work in this area. Department of Design had initiated various design exercise as an attempt for solving some of the above mentioned problems. However no integrated solution was initially attempted in absence of appropriate funding.

Expertise in design of various items for differently able persons such as motorized/ non-motorized tricycle etc helped in this project.

Similarly application of voice recognition software, pattern recognition software was also found to be handy. With state of art Ergonomics lab, one can measure various aspects during use by the elderly.

2 OBJECTIVES

The research objectives were as under:

2.1 Provide an integrated system for the elderly (leading a sedentary life) for enabling various day to day works, including regular exercise for keeping them fit built within the system; without requiring human attendant. It can also provide infotainment.

2.2 The system can be used as resting place in the day time, exercising station in the afternoon and as a bed if under nursing. The system will assist the elderly person to have their medicine in time, attend calls in mobile phone and an intelligent warning system to help them prevent any untoward incident. Remote monitoring of the elderly person will be possible.

2.3. Second part will concentrate on the travel aspect of the elderly persons. As they get older, it becomes difficult for them to get in and out of automobiles, specifically in personal vehicles. System will be designed for the elderly so that it is easier for them to get in and out easily and the same system can be used by normal people also without compromising on safety and comfort.

3 WORK PLAN

The greatest challenge in designing for elderly and differently able persons is to make the effort appear very normal and equipments designed to appear like normal day to day used items. This is essential specially to imbibe positive feelings in them, so that they do not feel as disabled or dependent upon others for their needs. This will keep their moral and confidence high and helps in accepting various enabling accessories and devices.

Initially study was carried out to validate the earlier findings and assumptions made for the project through actual interactions with elderly people residing at home and inmates of old age home.

Based on the validated data, design of various sub-systems was taken up one by one such way that these forms a part of an integrated system design.

Finally selective items were prototyped, tested and made ready for technology transfer for immediate commercial manufacture.

4 REPORT OF PRELIMINARY INVESTIGATION

4.1 Problem identification

As a part of academic intervention, study was conducted in a limited way to understand various difficulties faced by elderly people in their life.

Findings are summarized below:

Most of the elderly people are staying with their married son or daughter.

They expressed that they face loneliness when other members of the family goes to work and school etc. In the day time they spend the time alone and as far as possible attend to various house hold chores themselves or are assisted by maids etc. In the evening whenever possible they try to go out and meet people of same age group. They also take walk together. However this is valid only with those elderly people who stay in housing colony having open space, parks and walk ways etc. For those people staying in an area in a city that do not have above facilities, they either visit their neighbor if any with similar age group or remain confined to their home. They expressed their desire for walk and exercise etc. but hardly do it within the house. Only a very few determined persons do pranayam etc. to stay fit.

In many cases, these elderly persons are considered as burden in a family, when they need attendant to help them in day to day work of theirs, rather than an asset and many faces discrimination even from their own offspring.

Common symptoms of elderly people are gradually reduced physical strength, losing eyesight and hearing capacity, loss of memory to remember regular schedules such as taking medicines etc. and lack of physical exercise when confined to house. These require various adaptations like use of spectacles, hearing aid, electronic and electrical exerciser etc. Even then they face difficulty in reading news paper, attending to mobile phone and lack of exercise leading to insomnia, lose of strength on muscles etc.

4.2 Need Assessment

Elderly people expressed their desire that if they were motivated by others, to do some exercise within the house, they are happy to do so. They also expressed that instead of getting helping hand to them (elderly), they want to live dignified way with self help if assisting device and systems are provided.

Various problems associated with elderly people are that due to advancing age, many of them face problem of eye sight. Although they may like to spend time in reading news paper, books etc., due to failing eye sight they find it difficult. Some of them, who are very adventurous, go to the extent of taking a magnifying glass to read. However this in the long term is detrimental to their eyes. What they need is uniform magnifier system to see the reading matters magnified in all directions. Although there is provision for spectacles to solve these problems, at advance age, with high lens power, many try to avoid these.

Similar is the problem with hearing capacity. Although there is facility of hearing aids, not many elderly people are keen on using hearing aid unless condition is severe. System to help them hear without obtrusive device may be of great help.

Walking confidently in public place is another aspect many elderly people wish to maintain; however due to frail health and crowded place; they found it difficult to achieve this. There are many assistive devices available in the developed countries. However their suitability from the point of view of human dimension, cultural aspect requires consideration and adaptation in Indian context.

Another aspect is for temporarily paralytic patients. Elderly person with partially paralytic condition require special care. Assistive/ enabling devices are required for this kind of persons too so that they can attend some of their need themselves including exercises for recovery.

4.3 Technology gap

Although many of the technology intended for incorporating in the assistive/ enabling device system are available in various forms, these are not integrated or used for the purpose proposed in this research work.

4.4 Present Status

Very little intervention has been made in the area of Technology Intervention for the Elderly in India as of now. With awareness being generated at present, initiation has started in this direction.

4.5 Need for intervention

In absence of proper equipments to assist the elderly population in their day to day activities, they not only remain unproductive, but they require additional helping hand to support them in their day to day affairs. In absence of the above, their life become uncomfortable and in India where old age home and state funded facilities for the elderly are missing, intervention in this area is essential.

5 PROJECT DURATION AND AREA OF IMPLEMENTATION

The proposed project duration was for 3 years. However, deliverables was available from the end of 1st year and based on actual trial results, was released for actual use.

5.1 Profile of Project area

Initially, the project covered Guwahati city, Assam in India and its adjoining areas. Guwahati is called as the Gateway to North Eastern Region (NER) of India and it is the largest city in the region. IIT Guwahati is located in the northern bank of the river Brahmaputra across Guwahati. Project will be initiated in Guwahati city. It has different types of terrain, valley, hilly as well as water body. It has various modes of public and personal transport and city is spread across huge area. Guwahati experiences all the seasons and is ideal for the type of project proposed.

Once the project is completed, it is expected that the outcome will be implementable all over the country in general, except in special context such as different geographical terrain.

5.2 Possibilities of activity becoming self-sustainable

If technology transfer for the designed items is carried out to micro and small enterprises, the activities of manufacturing the assistive devices, their marketing etc. will become self-sustainable.

6 INDICATIVE TECHNO-ECONOMIC VIABILITY/COST-BENEFIT ANALYSIS

Although it is difficult to quantify the techno-economic viability; in reality, if intended design interventions can be implemented, it will make the desired product with appropriate technology locally available in India in an economically viable cost. This will improve the life of elderly as well as reduce the burden of the other members of the family in caring for the elderly.

Considering cost benefit analysis, till date a very few assistive devices are available in India and in its absence, significant amount of productive time and money is lost while caring for the elderly. If intended assistive devices are available, this will reduce this time and money lost in caring for the elderly and will enhance the quality of life of the elderly and reduced dependence on others will boost up their morale and self esteem.

7 LIKELY IMPACT ON ADJOINING AREAS/SOCIETY

Impact on the society will be significant. Due to excessive care required by the elderly in absence of assistive devices, other people sometimes feel them as burden and this create social tension. With appropriate integrated assistive devices, elderly people will be able to reduce their dependence on other members of their family and will be able to care for themselves to certain extent. This will reduce the social tension.

Another aspect is, brutal murders of the elderly people staying alone in many places. With an integrated assistive device, they can be protected. Also in case of medical emergencies, they can get medical help in absence of other member in the house.

8 SUGGESTED PARAMETERS FOR MONITORING EFFECTIVENESS OF INTERVENTION

Parameters for monitoring effectiveness of intervention during and after the completion of the project can be the following:

- Percentage reduction in dependence of the elderly for various activities on others and increase in quality of their life.

- Reduction in cost of elderly care in terms of reduction in care givers.

- Numbers of items in use by the target population over a period and its trend (increasing or decreasing)

Numbers of enterprise engaged in production of the assistive device and the systems.
Annual turnover of the manufacturer producing these devices.
Recommendation of the systems by the initial users to others.

9 ACTUAL WORK DONE

Based on various objectives set, design concept generation was initiated and following milestones were achieved:

A system of chair-cum-bed (that is easily convertible, Figure 1) was designed. The system is fitted with electric motors and could be used as chair cum wheel chair and with toggle of a switch it can be converted from chair to bed (Figure 2) and vice versa. This process can be also operated by another person using a remote control hand set. Motor operated system can place a table in front of the seated person coming out of the hand rest/side of the chair and can be used for keeping books, news paper to read and also for having food. Reading is facilitated by integrated magnifying glass to compensate for loss of eye sight due to old age and provides undistorted magnification.



Figure 1. CAD model and functional prototype of the system as chair



Figure 2. CAD model and functional prototype of the system as bed

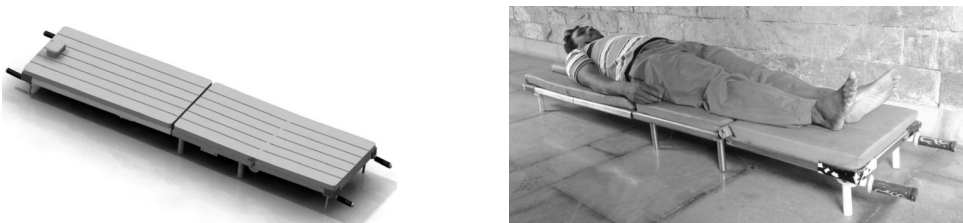


Figure 3. Seat and backrest can be used as stretcher in emergency

The greatest challenge of mobile phone handling, remote monitoring and home management including security and instead of designing a new product/system, the problem was solved with newly introduced iPad with additional Apps for calling others like a normal mobile or using facilities like Skype providing audio-video/ calling and receiving, elderly could see and be seen by his/her near and dear ones. With integrated stand for iPad provided in the system, problem of attending a mobile phone was no more a hassle. Through Bluetooth technology, the iPad was used for replacing a closed circuit TV receiver. Additional system was provided with remote control to remotely close and open door of house/apartment after verifying the identity of the visiting person.

For taking care of physical exercising need of the elderly, an exerciser system was provided as optional that can be purchased by the elderly based on his physical state. Existing vibration based system was found to be stimulating for back and thigh muscles and can be fitted optionally with the system. Another system with reciprocating motion for legs, arms and body was also designed.

For the hearing impaired elderly, rather than using a hearing aid which none of these people like at all, the system is provided with speakers near the head that can amplify sound as desired by the user.

10 ACHIEVEMENT AND RESULTS

Once the system was prototyped, this was tested with actual users. The main concern expressed was the cost of the system when all the facilities were provided. Based on this feedback, modularity is introduced in the system so that mass customization is possible and cost can be based on the exact need of the user and options can be added later if required.

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