9 USER ASPIRATION MODELING TO PREDICT FEATURES FOR THE DESIGN OF A NEW GROUP INTERACTIVE MUSIC DEVICE FOR THE YOUNG IN INDIA

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Understanding user behaviour and expectation is the core of all design activity especially in Interaction Design. While the approach and emphasis in product design has been on the individual user, groups of users that form a collective cultural unit is being addressed in this paper. Lifestyles of users of young generation in India has been studied and modelled so as to be able to project their future expectations and aspirations as well as usage patterns of their living environment. A user study was conducted involving 52 users belonging to the age group 16–30 years, to study their aspirations and attitudes towards current music devices. The questionnaire was hosted online. The needs and expectations surrounding a music device were extracted in-terms of User's requirements such as connectivity, size of device, novelty and usage location. Using this data an aspiration model defining the space of such a device, as is expected to fulfil the present lifestyle of the young, has been developed. Based on the result of lifestyle modeling, prototype of a new conceptual device for collectively operating and enjoying music has been designed & constructed.

Keywords: Lifestyle Modeling, User Aspiration Model, Tabletop Interaction, Music Device.

1. INTRODUCTION

Cognitive–affective model of consumer satisfaction shows that the key affective factor that determines satisfaction is "arousal", as opposed to "pleasure", which has a non-significant effect.[1]

The cognitive element is also important for determining satisfaction and future behavior intentions, and all of the antecedents are independent in the satisfaction process.[1] With the competition growing voraciously in the present market, where a product comes in before a user can think about it, modeling future expectations of users acquires great importance for Design strategy and Marketing.

In this paper we intend to investigate the changes in peoples' lifestyles to model their future expectations and aspirations in effect to their living environment and usage patterns along with, how deviation from generic and from personal lifestyle models play a role. This study will in turn help in developing predictive models of future purchases and customer expectations based on consumers' current images of their lifestyle aspirations. Further we describe modeling of user's lifestyle to understand, analyze and extract information from the trends that are followed. It provided us useful insights about preferences aspired by users which we incorporated as interactive and adaptive features during designing

our new product (an interactive music device).This is a novel approach for new product design and development.

The focus of this paper will be on describing the approach we adopted to model customer expectations and further incorporate the same to conceptualize and develop our product. We will also be discussing in brief about the technology and cost effectiveness of our new product that we developed following the same lines.

2. LIFE STYLE AND LIFE STYLE MODELING

Lifestyle is the outward expression of a consumer's needs, desires and values, reflected through patterns of demographics, purchasing behaviors, activities, interests and opinions.[3] Lifestyle is an ever changing and ever evolving phenomenon.

The behaviors and practices within lifestyles are a mixture of habits, conventional ways of doing things, and reasoned actions. A lifestyle typically also reflects an individual's attitudes, values or worldview. Therefore, a lifestyle is a means of forging a sense of self and to create cultural symbols that resonate with personal identity. Consumer lifestyle can change dynamically under social environmental influences.[2]

2.1. Lifestyle Modeling

Lifestyle Modeling investigates the changes in peoples' lifestyles to model the future expectations and aspirations of the people in effect to their living environment and usage patterns along with, how deviation from generic and from personal lifestyle models play a role.[3] It has gained a great importance in market and industry in the view of existing competition level as it helps in deriving the customer expectations. This in turn helps in developing predictive models of future purchases based on consumers' current images of aspiration lifestyles.

Analyzing, understanding and extracting information of expressed lifestyle aspirations is termed as Life style modeling. It gives us useful insight about the preferences of users which in turn helps to incorporate them as interactive features thereby building in usability within the engineering process.

In our efforts to model the user lifestyle for musical devices, we studied the generic evolution of these devices ever since the invention of gramophones till iPod. The trend followed with respect to evolution of the product features, like storage size, connectivity, screen size, interaction pattern, social aspect, adaptability to prevalent lifestyle, etc, has been used to predict the features of the new device of Next Generation. It is assumed that features of the products studied, reflect the preferences of the generations of the users, as products evolved. To further support this assumption, lifetimes of these devices from gramophone to iPod along with their respective drawbacks giving way to the new product have been reported. To summarize this study a table has been developed in the form of matrix with all the devices listed along the x-axis and features along the y-axis. The matrix has been augmented to state the derived features of the next generation device. Please find the complete table on the link (http://sites.google.com/site/musicinspirationproject/Home/lifestyle-modeling). To verify the results of this study rating of the same features of all the devices (gramophone to iPod) were done based on factual data and user survey, which is discussed in the next section.

2.2. Data Collection to Understand the Trends of Music Device F eatures

To understand the trend followed by device features over the period of evolution of musical devices, a set of ten devices was considered ranging from gramophone to iPod. These devices were rated for their different features (both physical and intangible) on a 20 point scale (0 being the lowest rating/value and 20 being the highest).

The physical features of these devices (inbuilt storage size, Device Size, Ratio of screen size with device size and Connectivity) were measured and normalised on a 20 point scale by us based on the available factual data. The intangible features (looks, Excitement in interaction, Social Aspect, Mark

of status quo, Novelty and Surprise) were rated by a set of 52 users through a questionnaire hosted online. The users were asked to rate these ten devices (from gramophone to iPod) on a 20 point scale for the intangible features (as stated above) of these products.

The profile of these users was—
Age group – 16–30 years
Economic status – mainly Middle and Higher Middle class
Occupation – Bachelors, Masters and PhD students and young professors and lecturers

The motive of this study was to recognize the fluctuations and trends that have been followed since the origination of musical devices, with respect to their features. The results of these ratings has been summarized in the form of graphs to be able to analyze the trends effectively —

X-axis – Music devices ranging from gramophone to iPod
Y-axis – Rating of the device for the specific feature on a scale of 20

2.2.1. Observation and analysis of study, data collection and user survey

With the graphs of different device features developed from study, data collection and user survey we bifurcated the features into two parts –

1. The features in which the graph could be extrapolated to predict the next trend and
2. The features where fluctuation was observed with respect to the trend followed and so extrapolation was not feasible.

It was observed that in all the features except social aspect of a device, a continuous trend was observed. The features of storage size, Ratio of screen size with device size and excitement in interaction in musical devices show a continuously increasing trend (refer Figures 1, 2 and 3). On the other hand device size shows a continuously decreasing trend (refer Figure 4). An important observation was made for feature of social aspect which changed at random and hence fell into our second category of

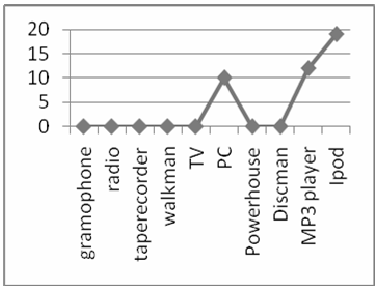

Figure 1. Inbuilt storage size.

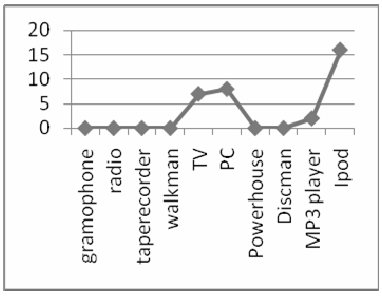

Figure 2. Screen size/device size.

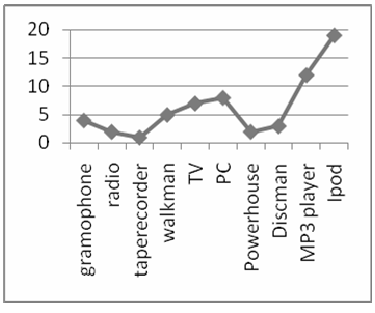

Figure 3. Excitement in interaction.

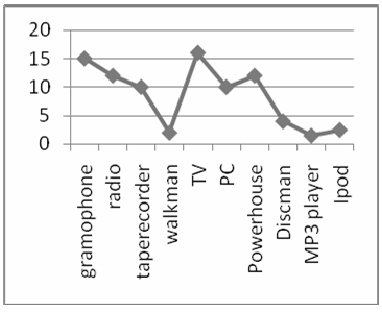

Figure 4. Device size.

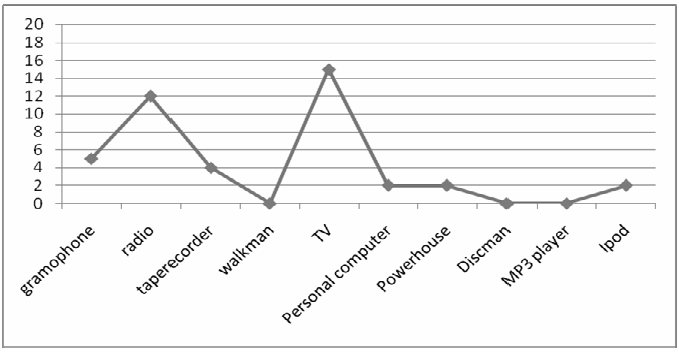

Figure 5. Social aspect.

device features (where the graph cannot be extrapolated). Therefore while it is of utmost importance to follow the trend in other features, social aspect is a feature that can be experimented with. This was an important conclusion for us as in the Indian scenario the sense of collectivism is far more superior to individualism.[4]

India's strong sense of community and group defined orientation means a greater acceptance of hierarchical settings.[5] A collaborative device for Indian society should thus be designed by taking into consideration the hierarchical structure existing in the Indian society. The collaboration desired for the device should not contrast with its social structure. In Indian scenario a social device is needed which can, not only be operated by more than one person but the result of collaboration reflects combination of every individual's preference.

2.3. User's Perception of a Next Generation Music Device

A second set of experiment was conducted in continuation to the first one to directly record user expectations regarding product features. The same user group of 52 participants was asked about their expectations and perceptions for a next generation musical device and also their usage preferences. This was also done through an online questionnaire. The results of this second part of the user study is as follows –

Majority of the users (46%) wanted a slim and sexy look instead of a sporty or heavy look for their product. They emphasized on the need of products with smaller (53%) or same size (42%) as iPod nano. They wanted better connectivity to other devices through bluetooth (45%) or wifi (21%). Also platform portability and various file type support was desired by (32%) of the users.

As far as the usage is concerned most of the users use music devices at home (28%), during outings (26%), and while playing sports (16%). They prefer headphones (63%) to speakers (37%). Also in a social outing desirability of a companion device (29%) and music (28%) is felt.

2.3.1. Observations and analysis of second part of user survey

Based on this survey we can say that, as per user expectations and perception of the next generation musical device, it should be a personal device which is small, slim and has a good wireless connectivity with other devices. Also the device should be able to serve as a companion which the users could carry with them anywhere. But for social gatherings a group device for collective recreation and entertainment was desired along with music.

The motive of this study was to extract from the users their idea of a next generation music device in terms of feature requirements and also to understand their usage pattern. We then tried to combine this user study with the previous one where we had asked the users to rate a set of ten devices for their physical and intangible features to understand their trends and extract the features of next generation music device. We then compared and combined the observations from the two studies to come up with

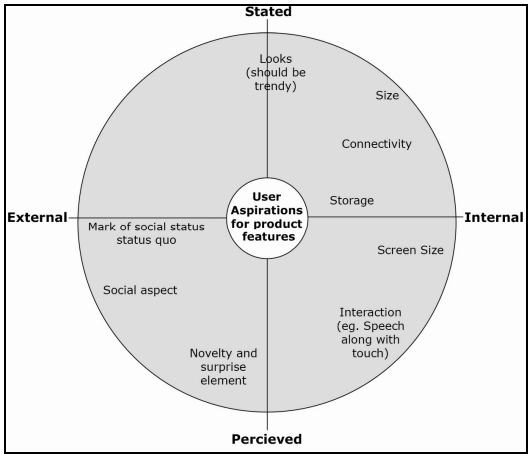

Figure 6. Aspiration model.

a general model that states user aspirations with respect to device features which will be explained further in the next section.

3. EXPECTATION QUADRANT AND ASPIRATION MODEL

During our user survey and study we found that while there were certain features which were stated by the users directly and contributed to the sale of the product whereas there were other salient features which were not stated but were perceived to be present in the product. Therefore we developed a model of relationships which tries to correlate various device features with user's expectations taken from the user studies and market and user preferences taken from the Lifestyle Modeling table (http://sites.google.com/site/musicinspirationproject/Home/lifestyle-modeling).

This aspiration model spans across along the x-axis with the experience that a user has varying from internal (experience gained as a part of using the product) to external (experience gained as a part of owning the product) and along the y-axis with the user expectations varying from stated (which the user can declare) to perceived (which a user desires but cannot state).

It is the quadrant between stated expectation and external experience which requires prediction and needs to be incorporated in a product to embed a feeling of "arousal" in it. This plot between expectation and experience helps us to gain significant insight in terms of customer's desire and need.

The distribution gives us an idea of which features require further experimentation and innovation and which need to be fixed and made to follow the continuing trend, hence giving a vital input for new product development. This is the motive of developing a general aspiration model.

4. RESEARCH SUMMARIZATION

In the view of observations from our LifeStyle modeling, mixing and matching the results of user studies/surveys, and pattern of Aspiration modeling, we get to know the features that should essentially be present in the Next Generation music device to meet user expectations and the ones which can be further experimented with and need innovation. The essential features includes good connectivity (wifi, bluetooth) and platform portability (MP3 and WAV files can be played) with very large storage size, sleek and appealing form, small device size and proportionately bigger screen size. The features which can be experimented with include social aspect of the device and the ones which need further innovation include novelty and surprise element of a device along with exciting interaction pattern.

As digital entertainment applications evolve, there is a need for new kinds of platforms that can support sociable media interactions for everyday consumers suiting the Indian scenario. Taking into

account the collectivist nature of Indian society and with personal devices having largest share in the market we perceive the necessity of a product which will help in establishing better social interactions. In the following part of the paper we will be discussing the development of a new interactive table top device for playing music. The features for this device have been extracted from the studies, surveys and modeling done as has been discussed in the previous part of the paper. So we have incorporated all the essential features as desired for a next generation music device. Along with this we have used table top interaction unlike the traditional button or wheel interface used in music devices. We had to compromise with the small size desirability to accommodate social aspect of the product. Further we will discuss product development process in details.

5. PRODUCT DEVELOPMENT

Extracting the customers' stated and perceived expectations from Lifestyle and Aspiration model we move forward to incorporate these into a new design configuration of the product.

5.1. Features of the new Interactive Product

Taking into consideration the results of Lifestyle and Aspiration model along with user studies/surveys and also the collectivist nature of the Indian society we decide upon the following features of our product—

Social device	(Collectivism)
Multi user interaction	(Collectivism and excitement in interaction)
Tangible/Haptic interactions	(to instill excitement)
Single layered information organization	(for ease of use)

5.2. Table top interaction using blocks as a medium

As "arousal" and not "pleasure" is what a product must aim for; making the interaction interesting and involving is very important. And a user can get totally involved in an interaction if both his mind and body are involved in the task actively. So we defined an exciting interaction where a user moves blocks on a table surface to play music unlike the usual interaction of pressing buttons. The motion of blocks serves as a parameter to control the features of the product. A user can play music by using different combinations of blocks and moving them to different positions on the table surface; each permutation giving a harmonious set of music.

5.3. Music

To encourage a user to play with a device it is very important to take care that the mistakes he commits earlier should not instill fear of using the device. So each interaction must result in some constructive result to push him forward to further explore the product.

Taking this into consideration the interaction of the device has been designed such that any interaction happening between the block(s) and the table produces a harmonious music. To accomplish this task it becomes important to select the exact instruments which can play independent of each other so that every combination of block(s) and its position on the table surface is a success. So three independent musical instruments have been chosen—

- Guitar which deals in cord progression,
- Drums which deals in beats and
- Piano which deals in loops

Taking this into consideration we developed different sets of music for all the different combination of blocks possible. The pattern of change in music being — the beats/chord rate of the instrument increases when moved towards the center of the table and vice-versa. So we developed 63 different music tracks suiting each combination of block(s) and its position on the interactive surface.

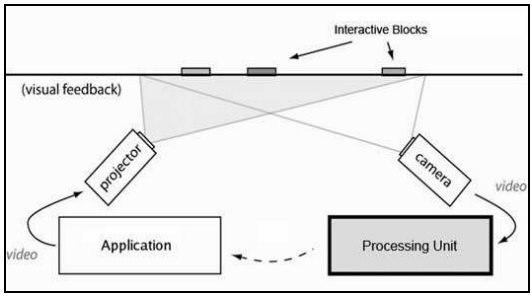

Figure 7. Technology used to create the setup *(taken from http://reactable.iua.upf.edu/).*

5.4. Technology

Resources used: Web cam, LEDs, computer for processing data and a projector. The technology used in the product is of image recognition and processing. The image of blocks is captured using a webcam located inside the interactive table and is further processed to decide upon the action. Translational motion is detected by capturing and feeding the initial and final positions of the block(s) and accordingly music gets changed. One projector is also fitted inside the table for video output [display purpose].

5.5. Form Design and Generation

Product experience is influenced by experiences from all the senses. Experiments provide insight into how sounds contribute to the overall experience of a product's expression.[3] So the mapping between the sound a product produces, its form and its function should be in congruence with each other. This aspect was taken care of while designing the table and the blocks. Also as it is a device being designed for the youth dynamic forms were considered.

6. COST EFFECTIVENESS OF THE DEVICE

A major plus point of the device is its cost effectiveness in our price sensitive Indian social environment. Both the technology and material used in construction of the device are cost effective making it a low cost but highly interactive and socially collaborative product.

6.1. Technology Cost

A simple process of image recognition and processing has been used which requires a webcam, a processor and a projector to project the output on the surface. LEDs have been fixed at the base of the blocks in different patterns to recognize their motion and position on the surface.

7. CONCLUSIONS

The insatiable demand of the avidly growing market presently desires not just innovation and creativity but also aspiration prediction. The need to stimulate users by devising products floating in their imagination is what can capture the present as well as future markets. To support this it becomes essential to develop models which can help deriving future expectations of customers. As discussed through the course of this paper it is of high importance to differentiate between essential, desired and expected features of a product and then accordingly move on to infusing creativity and innovation into it. This makes the product come very close to user's lifestyle, hence increasing its adaptability and acceptance manifold. We have tried to substantiate this through our Aspiration and Lifestyle model and have further put it to test by developing an interactive music device on the same guidelines. Market statistics and wider user surveys can substantiate these models further.

In the suggested Life Style and Aspiration modeling both market survey and user feedback have been considered to bolster the authentication of the process which is the main focus of this paper. The product developed after incorporating the results of the research was found to meet user expectations and desires during testing. A larger user sampling base can help in deriving more precise mathematical models to extract user aspirations.

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