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SPATIAL PERSONALITY FOR HUMAN SPACE INTERACTION

Space for change

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Abstract. Exploring the duality of pervasive computing and architecture in order to propose new models of interaction between people and their built environment. One of the unique "affordances" of digital media is interactivity. This word has come to stand for all manners of engagements between people and things but as McCollough (2004) reminds us the word implies deliberation over the exchange of messages. "Objects" or architecture would be exempt from this mode of communication since, in a likewise manner, we don't interact with a door, we simply open it. However, computing provides a reflexive twist for it is not only the means through which we indirectly communicate with others but also a subject with which we can directly interact. They solicit information and based on the deliberation we ask them for return responses. This quality of computing, especially as it becomes pervasive, has profound implications for architecture and urbanism. When computation becomes embedded into the very materials we build, they along with their nature as inanimate objects become questionable. Our environment itself becomes the interactive subject through which we can inquire about our condition, perform diagnostic tasks or most significantly converse to discover more about our surrounding and ourselves.

Keywords. Interaction; communication; responsive; environment; performative.

1. Introduction

The word interaction has evolved its meaning with time. From an ideology of mere response to a stimuli and sharing experience, and onwards to a technol-

ogy based activity. This transition has intensely influenced the change in the socio-cultural fabric. In architecture, interaction between people was defined by zoning and movement patterns. Now in the digital age, it is aided with technology which is rapidly influencing interaction patterns. It is seen that with just a touch of the fingertip on the surface, messages are conveyed and responses are given back instantly. However it lacks expression, feeling, and gesture that add to human interaction. Is modern day technology limiting our human abilities by arresting human potential? Can we design spaces that bridge the gap of generic surface bound interaction to tangible three dimensional interactions? This investigation seeks to address the need to allow natural order of human interaction with spaces by defining "interaction" between humans and space, facilitated by digital processes and tools allowing optimum use of human capabilities to inquire about ourselves, perform diagnostic and projective tasks or more significantly converse to discover about our surrounding and ourselves.

2. Background study

2.1. DIMENSION OF HUMAN INTERACTION

To develop a new system of interaction, it is essential to explore the dynamics of human exchange and tap into mans' potential, their needs and natural order of using, manipulating and learning from objects and spaces. This process repeats back and forth between dyad and a group in varying degrees of conversation (refer Figure 1).

The various aspects that shape the interaction are:

Nature of human interaction: Includes creating, receiving, manipulating and sharing information.

Choice of interaction: Whether to accept, reject, invite, share, withdraw, observe interaction or even parallel interaction with another while working on a task.

Subject of interaction: Varying from task oriented conversation i.e. task talk to small talk involving building a relation-model with the user.

Varying scales: User interacting at various levels i.e. one to one interaction (I degree), between two (II degree) and one too many interaction (III degree).

Type of response: Verbal (accent, tonal variations) and non verbal interaction (gestures, expressions, manipulation and action) depends on individual personality, habits and traits.

Contextual influences: culture, language, ethnicity, identity, weather and politic climate that influence interaction.

2.1.1. Vision of human-space interaction

Spatial interaction is developed by observing human behavioural patterns to identify new models where in spaces aid and participate in dialogue exchange. "The vision of HCI is to consider ethnicity, age, culture, race and gender of the user, using a varied range of devices that enables human nature of sensing, moralising, relating, feeling and not just thinking to solve task that on improve the cognitive mind of the individual but to shift focus to varied human needs like story telling, learning to read, finding a friend and extending this to dyads, groups and even macro level of society" (Cassell 2007). This vision can be extended to Human Space interaction where the interplay of surrounding settings and embodied space, along with these varied human parameters, lead to newer levels of interaction.

2.1.2. Technology utilisation

Defining and providing natural interaction with such digitally enabled spaces becomes crucial to the success of the mutualist environment. "Interactive technology has physicality of objects – tangible, multiple, minimal-infrastructure that needs to be balanced with generalisability – graphic, dynamic, generic information media" (Merrill 2008). Today's technology relies on vision and limited touch, lacking physicality, restricting wide range of experiences like feeling texture, hearing natural sounds, and gestures like flipping, turning, pouring, waving and expressions. To provide true interaction experience at spatial level, need to understand the natural way of usage, manipulation of objects and spaces by humans. The nature of mutualist embodied space needs to be a transparent invisible medium, relying on less built infrastructure that enables interactive, mobile, flexible, adaptive and changing environment.

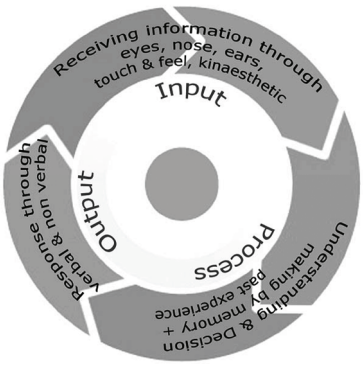


Figure 1. Interaction cycle of a Human.

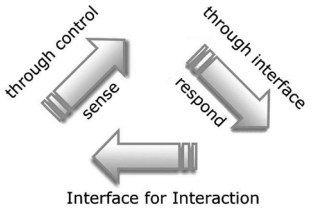


Figure 2. Designing an interface.

2.1.3. Spatial personality

The need of the interactive space, to adapt to human personality and habits as well as to allow for customisation (Rao 2011) is often neglected as the focus has always been on "efficiency" and not "variability" with allowance for creating "adapting techno-spatial personality", for in human to human interaction this forms the basis of varied communication.

2.2. PREVIOUS MODELS OF HUMAN-SPACE INTERACTION

Previous models of human-space interaction have been modeled around being mainly "visually responsive" to a few human capabilities – movement and touch. The response to every individual is the same leading to repetition thus lacking ap propriate and varied response to the unique individual, dyads or group.

Every decade what is perceived as "contemporary" is cast aside for the new. Change has been a constant factor that challenges design where process and ideas are constantly evolving with people's needs, perceptions and technology. From the primitive models of equating space as flexible mobile machines, like the 'walking city', 'blow out village' and 'enviropill' that controls environments at user's whim (Archigram 1960) to allow users to assemble their environments for learning and entertainment in the 'fun palace' (Price 1960). All these hint at the need for spaces to anticipate change and evolve with time, to respond to needs and changing environments, to allow freedom of customisation and control by the user. From being a passive and static space, the shift was towards appropriate, reactive, evolving environments. This led to a virtual reality which failed as we don't just orient ourselves with our mind but with our bodies as well. Artificial intelligence failed, as intelligence lies in interaction and not in a highly developed cognitive machine (Pask 1976). The strong need for a mutualist environment to allow cohesive interaction forms the basis of Human space interaction. Learning becomes crucial for conversing with spaces, so machine and users must learn and adapt from each other. A series of responsive installations created auto-poetic systems that reacted

to cultural, political events and climate of the city (Haacke 1970) while other installations senses everyday noises and responds through the varying lines on screen (Paik 1965). The Internet emerged to be a global social fabric allowing varied cognitive styles, learning patterns, expressive behaviour and flexible for customisation (Negroponte 1995). Digital networks are generic in nature with development in HCI; interface became responsive but lacked interaction. Interaction is deliberative and variable in a series of exchanges. The nature of such interactive spaces is to be a transparent medium of interaction where suitability surpasses performance as the key to technological success (Douglas 2004). As interaction models have been evolving with time and context, a study of context-based interaction is explored.

3. Contextual study

Architecture and public behaviour demand different interaction paradigms. The contextual factors are studied and mapped for various range of people against interaction at varying degree. This leads us to rethink the relation of space with user for interaction. By understanding how people interact within a space we can define how people interact with a space by considering the various aspects of interaction like subject, choice of interaction, mode of response and contextual influence will help to create new perspectives.

3.1. SCENARIO 1 – BUILT ENVIRONMENT

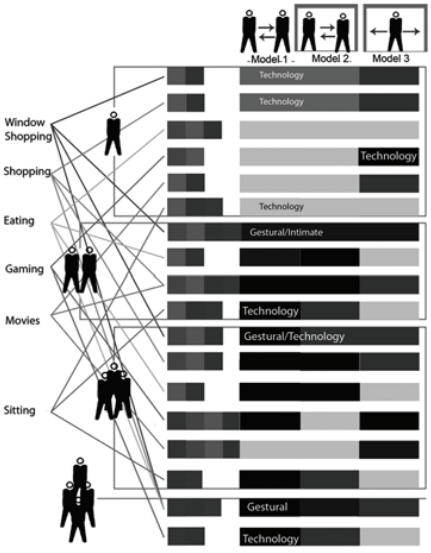


Figure 3. EA mall – built environment.

The subject of interaction is highly task oriented while the mode of response is predominantly gestural and verbal. When the activity is not goal oriented usage of technology as a basis for interaction scales up. The third degree scale of conversation is more compared to the second degree. The market space is the contextual influence.

3.2. SCENARIO 2 – COMMUNITY LEVEL

The subject of interaction revolves around task talk for people of similar age groups. Small talk occurs before and after a task while general talk occurs in certain task oriented activities like walking. The nature of interaction is through appreciating, encouraging, explaining, correcting, observing, and imitating information. Technology based conversation is mostly seen in dyads. Type of response is highly verbal. The contextual influence stimulates interaction in people by its multifunctional nature and points of interest.

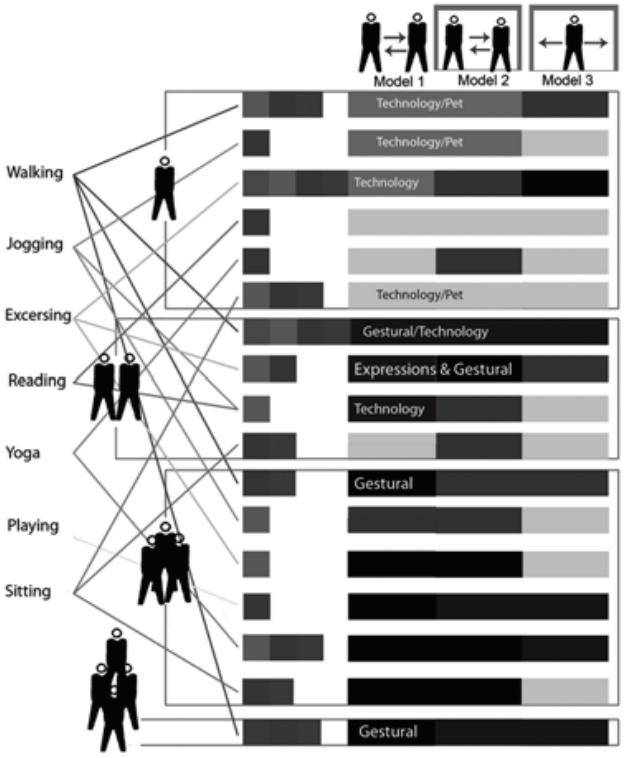


Figure 4. Nageshwara Park – community level.

3.3. SCENARIO 3 – URBAN LEVEL

The subject of interaction revolves mostly around general talk while small talk occurs when taking a break from the activity. The contextual influence is inviting human interaction through movement towards area's of high visual activity. Non-verbal interaction is the highest type of response, while verbal is high among the same age group and technology for the first-degree users respectively.

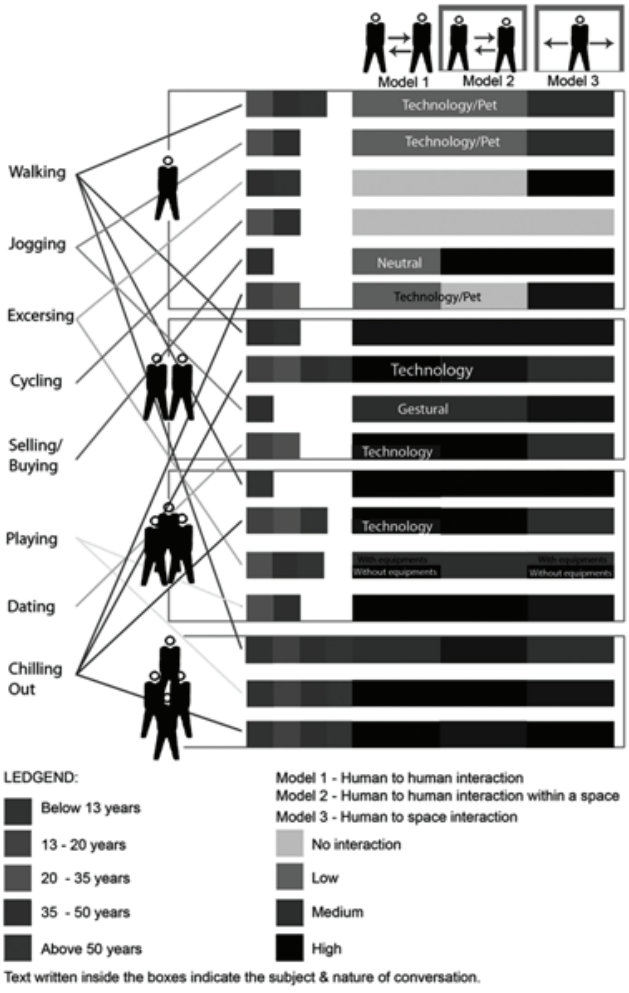
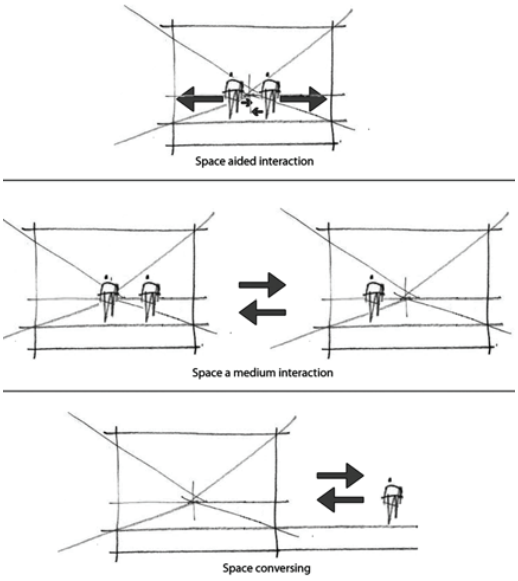


Figure 5. Besant nagar beach – urban level.

4. Proposed interaction model



1. Interaction between *people to people with space as an aid* for conversation people in same space.

2. Interaction between *people to people with space as a medium* for connecting people in different spaces.

3. Interaction between *people and space* to enquire about tasks.

Figure 6. Interaction model

5. Methodology

Previous models of interaction by Gordon Pask, Cedric Price and Malcom Douglas have investigated human computer interaction and its various parameters. This research is to explore the third interaction model i.e. spatial interaction with user. The contextual study has opened up paradigms and parameters of interaction, which is analysed and experimented by the following process.

5.1. INPUT

Information is retrieved by the space through sensing modules. These modules function based on the interplay of the following three characteristics

5.1.1. Visual

The interactive space observes and understands the surrounding spaces in the macro level. The space tracks the user's parameter in terms of number of users, their orientation and activity intensity at system level. The identity, body language, age and gender of each user is mapped at micro level

5.1.2. Sensory

The temperature and climatic variations of the surrounding space is sensed to provide physical comfort. It also allows the users to touch the tangible surface in order to converse with the space.

5.1.3. Sounds

Every day noise and verbal conversations conveys the emotion and mood of surrounding space and user.

5.2. PROCESS

For successful space and user interaction, the former must have a personality as this is required for an exchange of a series of deliberative message exchange and building varied relationship with the latter. This spatial personality can be programmed to be customised and personalised to allow the user to instruct the space. Further more, the decision of type of response needs to be appropriate for an apt response which is worked out with memory mapping of the user and context. The memory mapping is a database of interaction paradigms, which generates a unique digital memory pocket that stores previous interaction patterns by the user. The module senses the user's degree and creates a memory pocket. The type of response and subject of interaction is simultaneously taken as the input. This is analysed and the nature of interaction is decided upon giving out the response. This process repeats back and forth creating new memory pockets and thus new interaction levels.

5.3. OUTPUT

The scope of physicality and generalisability is investigated for the newer model of interaction. The physicality of the user interface is brought out allowing for spatial expansion and contraction in order to aid in learning, completion of task and conversation. These qualities investigates, through various computational studies, the basic "building blocks" of a space taking into aspect its materialism, structuralism, assembling and ease of usage. The individual module is of a smaller scale allowing physical manipulation that can be operated as a unit on its own and as well as a part of spatial system.

6. Conclusion and further work

The experiment further seeks to investigate into the working of "invisible medium" built into the spatial personality that retrieves input information. The memory mapping of the space is developed by scripting self generating algo-

rithms that create multiple digital memory pockets that develops the spatial personality. Exploring the basic building modules, adaptive mass, flexible surfaces and digital points are woven together to respond with varying degree of physicality. These are iterated and tested with parameters of material, structural and assembling techniques for its physical manifestation. This interaction model allows the user to physically interact with space using the help of computation as a tool. Furthermore our long term goal is to integrate the first two interaction models derived as an extended function of the interactive space.

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