

Intelligent spaces: Effects of pervasive environments on the role of interior designer

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Abstract

Intelligent spaces are rooms or areas that are embedded with sensors and actuators which enable the spaces to perceive and understand what is happening in them. Through an increasing number of computers and wireless communication technologies networked them, these spaces have the ability of receiving the parameters of physical world which users exist in their relevant context, analysing and processing the data with the interfaces between the physical and digital world, and react or change their mode and augment the human functionality, on time. Integration of computer and physical space results a space which have the computer's thinking ability. Due to the space having intelligence, sensors and the capability to communicate, definitions are not the same as in usual space. Pervasive computing is transforming interior spaces by allowing utilities, goods and information to appear dynamically where and when they are needed. Also, we are face with the space that can understand what is happening inside and outside it and which is not passive to the changing environmental situations. Intelligent interiors can become immersive sensory environments that combine the advantages of automation and modern technology with sensory feedback and materiality. The advances in hardware, system design, and software made enable to achieve this vision. In this world, physical objects and spaces are linked to the digital world and information about the physical world can be used to support human functionality and experience. In this paper, the vision of intelligent space will be explained and the innovations that helped to realize these spaces will be introduced. The social and psychological impacts of the future technologies while designing interior space will be discussed. The changing way we work and live and interfering boundaries of the space titles were asked by the way of a short questionnaire to the Interior Design Students who have the seminar about Intelligent and Interactive Spaces this semester, so their knowledge about these spaces and computer technologies are enough to comment the questions. This will give us the idea of future's interior designers' new

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role in these environments. These finding will give us a supporting knowledge about intelligent or thinking spaces and their impacts on the roles of interior designers.

Keywords: Intelligent spaces, pervasive environments, interior design education, future vision.

1. Introduction

The idea of pervasive environments and intelligent spaces is no longer a dream and has long become a serious area of research and soon these technologies will start entering our everyday lives. Pervasive technology is a vision of computational properties permeating everyday life. Intelligent spaces are rooms or areas that are equipped with pervasive computing technologies kind of sensors and actuators which give the spaces ability to perceive and understand what is happening in them and react to the parameters on time. The frame of intelligent spaces (or iSpaces) is the world where information and communication technology (ICT) disappears as it becomes embedded into physical objects and the spaces in which we live and work. Challenges of information and communication technology (ICT) carried the PC on the desktop out into the physical world and transform it as pervasive environments which have intelligence embedded in it to support our human activities. In this world of pervasive ICT, physical objects and spaces are linked to the digital world, and information about the physical world can be used to augment human functionality and experience (Gajos, Weisman & Shrobe, 2003).

Intelligent space vision is bringing ICT into the physical world through the following capabilities: embed digital links into physical spaces, communicate physical state everywhere, process and mine data. Embedded sensor systems and radio frequency identification tags (RFID) gather parameters, label to identify objects, control things/appliances in the physical world and in this way convert the dynamic parameters or events of physical world into digital information. By the help of these sensors the physical worlds' ability of sensing improves. Through the embedded wireless communications the physical space can also be communicated locally and globally. Figure 1 represents a system of an iSpace consists essentially of three components: the physical world in which users exist, the interface between the digital world and the physical world and the digital world in which digital knowledge and intelligent systems are available to influence and support actions in the physical world (Steventon & Wright, 2006). The aim of this embedded technology is to provide us with intelligent and contextually applicable support, augmenting our lives and our experience of the physical world in a beneficial way. Advances in hardware, system design, and software that are making it possible to embed intelligence and communications ability to transform our spaces as pervasive environments.

Interior design is ephemeral. Walls, floors, furniture, materials, are only the infrastructure of interior space. What we do in the space is insubstantial: we listen, we watch, we eat, we bathe. Light, sound, smell, taste are the senses that interior spaces' touch. The realizations of iSpace as application of pervasive ICT will radically transform the interior space. The ever-increasing number of intelligent, communicating objects in them also brings new kinds of functionality, user interfaces, and increased complexity, which is something we have to cope with (Yıldırım, 2014). The complex and dynamic nature of iSpaces will require awareness of system design knowledge and as a result of that new approach to interior design is inevitable (Kaila, 2009). Intelligent spaces can be more flexible and interactive than traditional spaces. These interiors can become pervasive sensory environments that combine the advantages of automation and modern technology with sensory feedback and materiality (Bonanni, 2003). Many of the surfaces of interior spaces can serve as display to provide information intuitively where and when it is needed.

The ultimate vision is challenging, and there are many obstacles to its realization. There are several technical and also social and economic barriers. Socio economic impacts of pervasive environments will affect some of the disciplines. Some of them should revise them. Interior design is one of the fields that will be expected to support by computational areas. How will the integration new intelligent

technologies surround our spaces impact the role of interior designers? Intelligent communication technologies, especially developments on wireless technologies and sensors changed the way we work and live and interfering boundaries of the space titles. The purpose of this study is to determine interior design students' views about the iSpace vision and its effects on their future roles while designing these spaces. It is aimed to see if university students' opinions toward pervasive environments differed in terms of gender, internet usage frequency or class level variables. These finding will also give us a supporting knowledge of priority while programming the future education areas for interior design discipline. The quality of interior design education is closely associated with a well-designed curriculum which is supporting students' vision to design for future spaces that satisfied user needs.

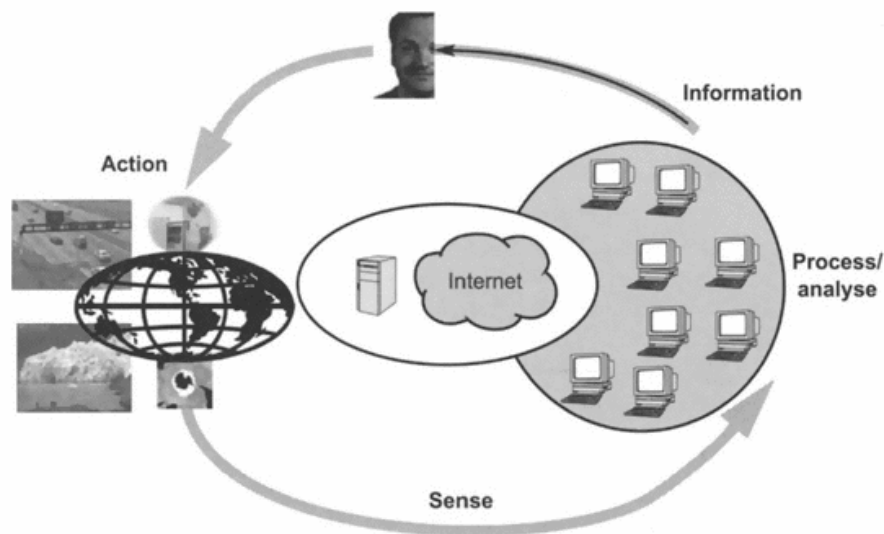


Figure1. Schematic of generic intelligent space vision

2. Method

The sample consisted of students at İzmir University Faculty of Architecture Department of Interior Design selected randomly (N=102). The gender proportions of respondents were 41, 2 % male and 58, 8 % female. 50 of the students are second year and 52 of the students are third year. The hourly seminar was given by the instructor about the iSpaces vision and pervasive environments. The iSpace in which the opinions of the students' will be questioned in the study is Microsoft Home of Future part 3 movie which reflects the daily life of a human in an intelligent home in 11.34 minutes (Figure 2).



Figure 2. Microsoft home of future part 3

Data for the study were collected by a descriptive survey, through a 17-item, five-point Likert scale, ranging from never (1) to completely (5), developed by the researcher herself, from students (N=102). In accordance with this approach, the opinions of students towards the ispaces and computer technologies were analysed. Kaiser-Meyer-Olkin (KMO) and Barlett's test of sphericity were conducted. KMO and Barlett's tests show whether the sample size was sufficiently large. In this study, KMO value of the scale was measured to be .577 and Barlett's test result was found statistically significant ($p=0.000$). The researcher herself administered the scales among the students in their classrooms and collected data in the same way. Data obtained from survey of students were analysed by using Window Excel program for accounting data; by using Windows SPSS program for statistical data. Data obtained from student statements and survey applications were analysed and interpreted by using techniques such as Pearson, Chi-square and one-way variance analysis (ANOVA).

3. Findings

Findings indicate that 88.2 % of the students think that the role of interior designer for ispaces will change ($P= 0.000$). Independent groups t test results indicate that there is no significant differences for gender on students' opinions towards changing role of interior designer for future ($p>0.05$). In order to measure, in which way the future's interior designers' role changed, the relation between the changing role and the parameters of this direction were analysed. The results of ANOVA show that there is a significant relation between internet usage frequency and changing role of interior designer ($F= 4.228$; $df= 2$; $p= 0.039$). Descriptive Statistics show that the sample group was using internet 3.47 hour in a day (Mean: 3.47; median: 4; SD: 1.340). Also there is a significant difference between the students' internet usage frequency and opinion changing interiors in a socializing way ($p<0.05$).

In the scope of study many analyses were done in which changing role of interior designer is dependent variable. It was determined that students' give similar answers to the questions about in which way the role of interior designer will change. Sometimes these analyses indicate significant relations between specific variables. Findings shows that the opinions of students' about the future

role of interior designer is related significantly with having these qualifications as; creativity (Mean: 1.65; median: 1.00; SD: 0.854), technological knowledge (Mean: 1.80; median: 2.00; SD: 0.848), material knowledge (Mean: 2.20; median: 2.00; SD: 0.707). Chi-square test show that there is a significant relation between interdisciplinary and changing role of interior designer ($p < 0.05$). These disciplines are determined as industrial designer (Mean: 1.74; median: 2.00; SD: 0.777), psychologists (Mean: 1.92; median: 2.00; SD: 0.816), and computer engineer (Mean: 1.93; median: 2.00; SD: 0.904).

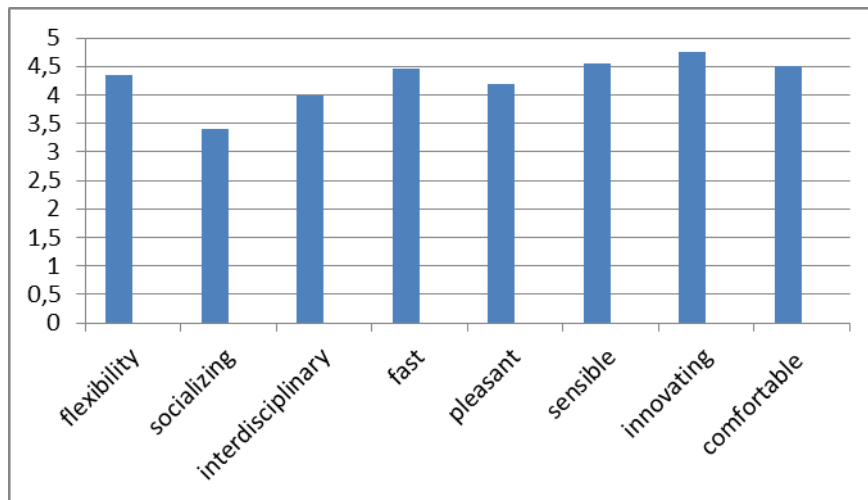


Figure 3. Evaluations of students to iSpace vision in context of adjectives.

As it is seen in Figure3, evaluation of the intelligent spaces and the future role of interior designer in the context of adjectives were made according to data collected from students under titles such as flexibility (Mean: 4.34; SD: 0.742), socializing (Mean: 3.41; SD: 1.266), interdisciplinary (Mean: 3.98; SD: 0.860), fast (Mean: 4.46; SD: 0.642), pleasant (Mean: 4.20; SD: 0.849), sensible (Mean: 4.56; SD: 0.607), innovating (Mean: 4.45; SD: 0.434), and comfortable (Mean: 4.50; SD: 0.628) .

4. Results and discussions

Intelligent spaces where they are expected to provide benefits and what many of the social and technical issues are that must be solved before widespread adoption. Before the future come the designers and educational facilities should be one step forward. Findings give us the idea from the future's interior designers' point of view about their role in pervasive environments. These finding will give us a supporting knowledge about intelligent or thinking spaces and their impacts on the roles of interior designers.

The present research evaluated and compared interior design students' perceptions of iSpaces and the effects of their role while designing these interiors. The results of the study indicate that most of the students' had positive opinions towards the intelligent spaces and their changing role of interior designer in the future. The students' results show that the creativity will be the first qualification of an interior designer, the second is technological knowledge and third one is material knowledge. These are the specifications of a future interior designer must have according to the students. The complex and dynamic nature of iSpaces will require awareness of system design knowledge and as a result of those new approaches to interior design is inevitable.

Students have the opinions about the interdisciplinary study will increase especially with industrial designers, psychologists, and computer engineers. Recent years the increasing number of studies about environmental psychology and future technology should find its place while designing educational facilities not only in a way of case studies with traditional environments but also in context of pervasive environments. Especially in pervasive environments which have design process consisting of several disciplines, it has been tried to create an inter language for people in the field of interior design, psychology, and computer engineering.

Students who use the internet frequently, found the iSpace and pervasive computing environments socializing and interactive. This is remarkable, because we are face to face of a new definition of socializing. Because of the pervasive environments seems more interactive and flexible than traditional environments, according to the students they are more socializing. According to students' opinions socializing find its meaning in digital world.

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