

Exaggerated Realism Interacting With Computers In Future

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Abstract- A revolution in computer interface design is changing the way we think about computers. Rather than typing on a keyboard and watching a television monitor, Augmented Reality lets people use familiar, everyday objects in ordinary ways. The difference is that these objects also provide a link into a computer network.

HCI 2020 produced many ideas, both thrilling and troubling. This report is not a conventional publication of an academic conference but seeks to convey the passion of those ideas, both for the general reader and the HCI practitioner. For the general reader, this is important because knowledge of what the future might be may empower, while ignorance harm. For the HCI practitioner, its purpose is to map out the terrain and suggest new approaches while keeping an eye on the main prize: the embodiment of human values at the heart of computing.

Keywords: Augmented Reality, Interactive Paper, Design Space Exploration, Participatory Design

INTRODUCTION

Computers are everywhere: in the past several decades they have transformed our work and our lives. But the conversion from traditional work with physical objects to the use of computers has not been easy. Software designers may omit small, but essential, details from the original system that result in catastrophic failures. Even the act of typing is not benign: repetitive strain injuries (RSI) due to overuse of the keyboard has become the major source of workmen's compensation claims in the United States and causes over 250,000 surgeries per year.

HOW TO "AUGMENT REALITY"

One of the first presentations of augmented reality appears in a special issue of *Communications of the ACM*, in July, 1993. We presented a collection of articles that "merge electronic systems into the physical world instead of attempting to replace them." This special issue helped to launch augmented reality research, illustrating a variety of approaches that use one or more of three basic strategies:

1. Augment the user

The user wears or carries a device, usually on the head or hands, to obtain information about physical objects.

2. Augment the physical object

The physical object is changed by embedding input, output or computational devices on or within it.

3. Augment the environment surrounding the user and the object

Neither the user nor the object is affected directly. Instead, independent devices provide and collect information from the surrounding environment, displaying information onto

objects and capturing information about the user's interactions with them.

Augment:	Approach	Technology	Applications
Users	Wear devices on the body	VR helmets Goggles Data gloves	Medicine Field service Presentations
Physical objects	Imbed devices within objects	Intelligent bricks Sensors, receptors GPS, electronic paper	Education Office facilities Positioning
Environment surrounding objects and users	Project images and record remotely	Video cameras, Scanners Graphics tablets Bar code readers Video Projectors	Office work Film-making Construction Architecture

Figure 1: Examples of augmented reality approaches, with relevant technologies and applications

Augment the user

Beginning with the earliest head-mounted display by Sutherland in 1968, researchers have developed a variety of devices for users to wear, letting them see, hear and touch artificially-created objects and become immersed in virtual computer environments that range from sophisticated flight simulators to highly imaginative games. Some augmented reality researchers have borrowed this "virtual reality" technology in order to augment the user's interactions with the real-world. Charade involves wearing a data glove to control the projection of slides and video for a formal presentation. Charade distinguishes between the natural gestures a user makes when just talking or describing something and a set of specialized gestures that can be recognized by the system, such as "show the next slide" or "start the video". Some applications are designed to let people get information by "seeing through" them. For example, an obstetrician can look simultaneously at a pregnant woman and the ultrasound image of her baby inside. A video image of the woman, taken from a camera

mounted on the helmet, is merged with a computer-generated ultrasound image that corresponds to the current position of the live image. A similar approach enables plastic surgeons to plan reconstructive surgery. The surgeon can simultaneously feel the soft tissue of a patient's face and examine a three-dimensional reconstruction of bone data from a CAT scan that is superimposed on the patient's head. KARMA, the Knowledge-Based Augmented Reality for Maintenance Assistance, lets a repair technician look through a half-silvered mirror and see the relevant repair diagrams superimposed onto a live video image the actual device being repaired. The system tracks the viewer and the components of the device being repaired in real-time and calculates how best to present the information. These applications require tight coupling between the electronic images and particular views of the physical world. The problem of "registering" real-world objects and precisely matching them to the corresponding electronic information is an active area of research in augmented reality.

Augment the object. Another approach involves augmenting physical objects directly. In the early 1970's, Paper created a "floorturtle", actually a small robot that could be controlled by a child with a computer language called Logo. LEGO/Log is a direct descendant, allowing children to use Logo to control constructions made with LEGO bricks, motors and gears. *Electronic bricks* contain simple electronic devices such as sensors (light, sound, touch, proximity), logic devices (and-gates, flip-flops, timers) and action bricks (motors, lights). A child can add a sound sensor to the motor drive of a toy car and use a flip-flop brick to make the car alternately start or stop at any loud noise. Children (and their teachers) have created a variety of whimsical and useful constructions, ranging from an "alarm clock bed" that detects the light in the morning and rattles a toy bed to a "smart" cage that tracks the behavior of the hamster inside. Another approach is "ubiquitous computing", in which specially-created objects are detected by sensors placed throughout the building. *PARCTabs* fit in the palm of your hand and are meant to act like post-it notes. The notebook-sized version acts like a scratch pad and the *Liveboard*, a wall-sized version, is designed for collaborative use by several people. A related project at Xerox EuroPARC uses Active Badges (from Olivetti Research laboratory, England) to support collaborative activities, such as sharing documents, and personal memory, such as triggering reminders of important or upcoming events or remembering people or meetings in the recent past.

Augment the environment

The third type of augmented reality enhances physical environments to support various human activities.

In Krueger's *Video Place*, a computer-controlled animated character moved around a wall-sized screen in response to a person's movements in front of the screen. Another early example was Bolt's "Put That There", in which a person sits in a chair, points at objects that appear on a wall-sized screen and speaks commands that move computer-generated objects to specified locations. Elrod and his colleagues use embedded sensors to monitor light, heat and power in the building, both to make the environment more comfortable for the occupants when they are there and to save energy when they are not.

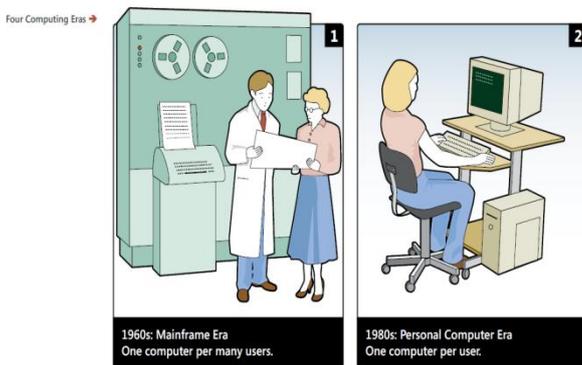
The world we live in has become suffused with computer technologies. They have created change and continue to create change. It is not only on our desktops and in our hands that this is manifest; it is in virtually all aspects of our lives, in our communities, and in the wider society of which we are a part. What will our world be like in 2020? Digital technologies will continue to proliferate, enabling ever more ways of changing how we live. But will such developments improve the quality of life, empower us, and make us feel safer, happier and more connected? Or will living with technology make it more tiresome, frustrating, angst ridden, and security-driven? What will it mean to be human when everything we do is supported or augmented by technology? What role can researchers, designers and computer scientists have in helping to shape the future?

The aim of this report is to reflect upon the changes afoot and outline a new paradigm for understanding our relationship with technology. A more extensive set of lenses, tools and methods is needed that puts human values centre stage. And here, both positive and negative aspects need to be considered: on the one hand, people use technology to pursue healthier and more enjoyable lifestyles, expand their creative skills with digital tools, and instantly gain access to information never before available. On the other, governments become more reliant on computers to control society, criminals become more cunning via digital means, and people worry more about what information is stored about them.

1.1 Changing Computers

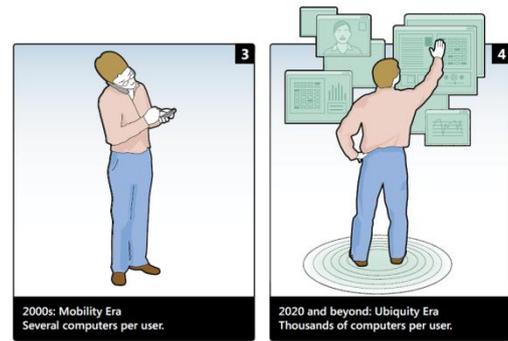
There have been various computer-driven revolutions in the past: the widespread introduction of the personal computer (PC) was one, the invention of the graphical browser was another, and the Internet yet another. There have also been computer eras where one type of computer has dominated, having straightforward implications for whether the computers were shared or personal, and for whether they were specialized commodities or not (*see diagram below*). But the ways

computers have altered our lives, all aspects of our lives, is more comprehensive than, at first blush, recollection of these technological revolutions or eras might suggest. Computers affect how we undertake the most prosaic of activities – from buying food to paying our bills – and they do so in ways we might not have imagined when the first personal computers arrived on our desks. They have also created wholly new experiences, for example, allowing us to inhabit virtual worlds with people from many different parts of the globe. In between these extremes, from the prosaic to the wholly new, computers have taken over from older technologies in ways that looked merely like substitution at first but which have ended up creating radical change.



Photography, for example, has retained its familiarity despite moving from being chemically-based to being digital. At the point of creation, people still ‘point and shoot’ in much the same way as they used to. However, what one can do with images when they are digital is quite different. Whereas, before, we may have only printed one or two rolls of film, displaying the photos on the mantelpiece or in an album, digital images are now reproduced many times over, and are often broadcast around the world on websites.

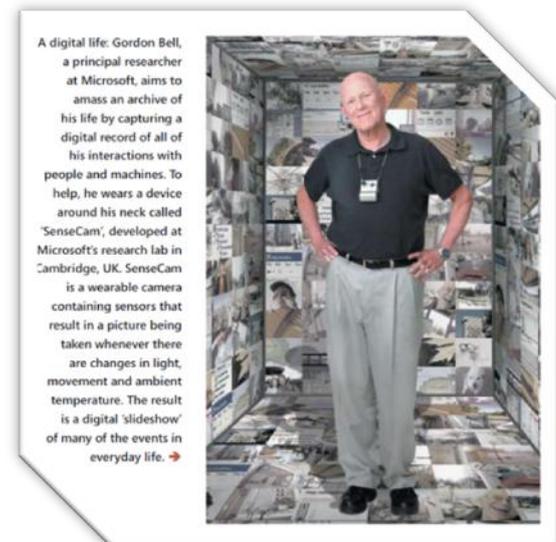
The activities we undertake and the goals we have in mind when we take photos and share them, then, are not at all the same now as they were even five years ago. It is not just in terms of user experiences, such as shopping, games, and picture-taking that the world has changed. Computers have altered our sense of the world at large, letting us see images of far-away places, instantaneously and ubiquitously. The world, now, seems so much smaller than it was even a decade ago. In this section we begin to look at many different aspects of how computing technologies have changed and their impact on our lives.



2.2 Hard Disks to Digital Footprints

A powerful metaphor that came into prominence in 2007 was the carbon footprint. Suddenly everyone started talking about reducing carbon emissions, from schoolchildren to world leaders, concerned with how we are destroying our planet and what actions can be taken to reduce these footprints. In a similar vein, people are beginning to talk about their evergrowing digital footprints. Part of the reason for this is that the limits of digital storage are no longer a pressing issue. It is all around us, costing next to nothing, from ten-a-penny memory sticks and cards to vast digital Internet data banks that are freely available for individuals to store their photos, videos, emails and documents. Furthermore, huge amounts of information are being recorded and stored daily about people’s behaviour, as they walk through the streets, drive their cars and use the Web. While much of this may be erased after a period of time, some is stored more permanently, about which people may be naively unaware.

In 2020, it is likely that our digital footprints will be gigantic, distributed everywhere, and in all manner of places and forms. Data are also being collected on our behalf or about us for no apparent reason other than because the technology enables it – our digital shadows, if you like. Personal video recorders (PVRs) record TV programmes chosen by the viewer but also automatically store them based on the viewer’s viewing profile or other criteria. Similarly, new devices are beginning to appear, such as SenseCam (see ‘A Digital Life’, below), that can automatically capture all kinds of traces of everyday life, in the form of images, video, conversations and sounds. The same is true for GPS devices which now appear in cars, in mobile phones and even embedded into clothing. All of these are capable of producing and storing large volumes of location data about our comings and goings without any conscious effort on behalf of their owners.



.3 The Growth of Creative Engagement

he new generation of technologies, including ubiquitous computing and Web 2.0, is enabling more creative uses of computing than ever before. Many of these are advancing our knowledge as a society. For example, various mixed-reality and sensor-rich physical environments have been developed to enable people to engage with both the physical and digital world in new ways. The most playful example of this is the Nintendo Wii. This is impacting on many aspects of learning, from science and medicine, to the way we teach our children through collaborative learning and experimental games. More extensive inquiries and decisions have been enabled, through the 'mash-up' of Web 2.0 tools, allowing for more discoveries and far-reaching analyses, such as determining the effects of deforestation in different continents.

Augmenting human reasoning

Computers are increasingly being used to visualise and reason about complex problems and information in new ways, leading to new forms of research. Computer scientists are working with biologists, chemists, physicists and earth scientists to develop computational tools that can help tackle some of the most important scientific questions facing the world today, such as climate change and global pandemics.

In its support of the doing of science, a challenge for the development of computational tools and technologies is to ensure that they are able to augment human reasoning and problem-solving skills in a way that empowers scientists' and others' ability to understand, model and solve problems.

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The ability to provide increasingly sophisticated tools to augment our human capabilities speaks strongly to the human values associated with our desire for productivity and industriousness in our lives, and our aspirations for greater knowledge. We will need to fathom out how best to represent and present information. This involves working out how to make data from all kinds of different sources intelligible, usable and useful. These may come from research labs, but equally may come from an ever-growing stream of data from the increasing array of sensors placed throughout the world. It also entails figuring out how to integrate and replay, in meaningful and powerful ways, the masses of digital recordings that are being gathered and archived, such that professionals and researchers can perform new forms of computation and problem-solving, leading to novel insights.

CONCLUSION

In this paper we have shown that how virtual reality concept can be implemented in the real world by the means of augmented reality. Augmented reality helps us to visualize the real world virtually for that HCI plays main role in it.

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