TITLE

The Four Phases of Pervasive Computing: From Vision-Inspired to Societal-Challenged

AUTHOR

Yvonne Rogers , UCLIC, University College London, WC1E 6BT, London, U.K
Yvonne Rogers is a professor of interaction design, the director of UCLIC, and a deputy head at the Computer Science Department, University College London. Her current research is concerned with designing interactive technologies that augment humans with a focus on human-data interaction and human-centered AI.

SUMMARY

Introduction

Pervasive computing, also known as "ubiquitous computing," refers to the integration of computing technology into everyday objects and environments in order to make them more interactive and responsive. The evolution of this technology has been marked by four distinct phases, each of which has brought significant changes and new challenges.

First phase

The first phase of pervasive computing, marked by the development of isolated, standalone computing devices such as personal computers and mobile phones, introduced the concept of personal computing and revolutionized the way we communicate and access information. However, these devices were limited in their capabilities and were not yet integrated into the physical environment.

Second Phase

The second phase saw the emergence of wireless networking and the Internet of Things (IoT), which allowed devices to communicate and exchange data with each other and with central servers. This phase was characterized by the development of smart home and building systems, as well as wearable computing devices, which expanded the reach and capabilities of computing technology. However, these developments also raised new concerns about data privacy and security.

Third phase

The third phase was marked by the emergence of artificial intelligence and machine learning, which enabled devices to make decisions and adapt to their environment in real-time. This phase saw the development of intelligent transportation systems, smart cities, and personal assistants, such as virtual assistants and home automation systems. While these technologies have the potential to improve

efficiency and quality of life, they have also raised ethical concerns about the impact on jobs and the potential for technology to be used for nefarious purposes.

Overall, the first three phases of pervasive computing have brought about significant changes in the way we live, work, and communicate, and have opened up new possibilities for improving efficiency, quality of life, and economic development. However, these developments have also raised ethical concerns about the impact of pervasive computing on society, especially regarding privacy, safety, and human rights. It is important for society to consider these implications and for governments to regulate and establish policies to ensure that these technologies are used ethically and responsibly.

Fourth phase

The fourth phase of pervasive computing focuses its attention on the creation of new pervasive technologies based on real societal needs and global issues, underlying the need for a more sustainable approach based on new social values and creation/production methods. Attention will be put on topic such as: poverty, zero hunger, quality of education, gender equality, health care, sustainability for cities and communities.

Green Computing

A greener future can be achieved thanks to pervasive technologies. Green AI researches are carried out to find the perfect balance between computational power and resources sustainability.
New society values and hakatons will lead to a smart use of material and recycling methods in order to grant a larger lifespan of old devices.

Engaging Communities in Research

The collaboration of academic researchers and IT volunteers can have a huge impact on the creation of smart technologies capable of meeting people's needs. However this new "top-down" approach may lead to a loss of value of the academic research and to several validation issues.

Ethical Challenges Facing Future Technology

The use of pervasive technologies in the healthcare field may lead to several problems related to the availability, safety and quality of personal data.
ML learning method will be applied in order to validate data but yet a lack of sensor's accuracy still remains.
More research is needed in order to determine the public response upon these issues.

Conclusion

Pervasive technologies will bring more self awareness but ethical problems still remain and new methods will be needed in order to deal with them.

The research vision moves from a "bottom-up" to a "top down" approach.

Technology creation will focus its attention on sustainability.