Ubiquitous Computing- Invisible Computers anywhere and everywhere

From smart watches to self-driving vehicles healthcare and everything in between, Pervasive computing applications can cover energy, military, safety, consumer, production and logistics, so much of modern life is part of a ubiquitous computing-oriented way of thinking – but it’s the sort of phenomenon that often only the experts know about in detail. An example of pervasive computing is an Apple Watch informing a user of a phone call and allowing him to complete the call through the watch. Or, when a registered user for Amazon’s streaming music service asks her Echo device to play a song, and the song is played without any other user intervention. The various common everyday devices and objects are assumed to be smart computing devices connected to Internet and capable of communication with users and the other similar devices. Services like Apple’s iCloud, which allow users to seamlessly access their data from a range of devices no matter where they are, are obvious parts of the ubiquitous computing paradigm. Most important, ubiquitous computers will help overcome the problem of information overload. Ubiquitous computing can occur using any device, in any location, and in any format. A user interacts with the computer, which can exist in many different forms, including laptop computers, tablets and terminals in everyday objects such as a fridge, stoves, cars or a TV. You are living in a smart world of connected networks with hidden objects and wearable sensors which are context aware. Instead of you providing the commands, objects around you know what you like, what you need and act accordingly without explicit instructions.

Digital technologies such as mobile, social media, smartphones, big data, predictive analytics, and cloud, among others are fundamentally different than the preceding IT-based technologies. Newer technologies touch the customers directly and in that interaction create a source of digital difference that matters to value and revenue. We call that source a digital edge. The Internet and digital technologies connect people and establish connections- the Internet has also disrupted the stable hierarchies of the old information age. It understands your health, travel plans, vacation suggestions, work schedule, your favorite food, cloths etc.. This smart living environment is programmed to make your life easier and smarter. It understands your personal preferences and intended course of action. The ubiquity of network connectivity and the proliferation of smart devices (such as sensors, signs, phones, tablets, lights, and drones) have created platforms upon which every enterprise can innovate. We're seeing a rebirth of artificial intelligence driven by the cloud, huge amounts of data and the learning algorithms of software. Some predict that we are headed much further.

Ubiquitous Computing

Mark Weiser, a Chief Scientist at Xerox, PARC (Palo Alto Research Center) coined the term Ubiquitous Computing in 1988. It’s also called Ubicomp in short. Ubiquitous means everywhere and anywhere. It is the concept of proper imbedding of computers into the everyday world. Ubicomp can be considered as a subset of Internet of Things (IoT). It’s also called Pervasive Computing.

He defined ubiquitous computing as “the method of enhancing computer use by making many computers available throughout the physical environment but making them effectively invisible to the user.” This definition highlights the following main properties:

• Pervasive computers: The technology that makes computation capabilities available throughout our physical environment.

• Invisible computers: Ubiquitous computing enables many computation capabilities throughout the physical environment, but makes them invisible to the user.
Enhanced computers: The objective of ubiquitous computing is to enhance computer usage with the following characteristics:

- Expand human consciousness: Many physical things can be embedded with computation features that expand users’ consciousness. For example, smart homes automatically control electricity. Refrigerators inform you if an item is out of stock.
- Make context-aware and responsive environments: Ubiquitous computing enhances physical things with a new dimension of features without affecting the context of the actual usage. It enables other interconnected things to know the user’s current context so that the devices respond in a way that improves the overall activities of the user.

Altogether, ubiquitous computing improves the performance of human activities by moving technology into the background, which allows users to focus only on their natural activities towards the world. The technology drives users’ tasks in an optimized manner in the background.

**Some challenges of Ubiquitous Computing**

First, the numerous micro-chips and sensors with the associated software poses several challenges. There may be several dead spots where the inability to connect may not be available and maybe a drop in wireless signal at your home and thereby can cause the system to de-function. Also depending on Satellite network is often an expensive proposition to make. Lack of the presence of system administrators often causes problems in the smooth operations of the smart networks. Not to mention the presence of numerous interconnected computers which pose a growing challenge to cybercriminals and hacker community which can further lead to invasion of privacy and other related issues and losses which may not ensure a safe environment. Moreover, in the pervasive era, the operation and the manipulation of ubiquitous environment causes the system to behave differently and can be controlled from an external device (for ex. counterfeit chip). This poses a larger threat to the community. A case in point is “I Robot”?

**Applications**

It goes without saying that, in order for the successful implementation of ubiquitous computing environment a lot depends on advancement of technology. It has to ensure that the environment has to be adequate with memory, energy and computation power. And it should be configurable and manageable. Personal computers and a world where smartphones and tablets were so pervasive that they were in everyone’s bag packets and belongings. Ubiquitous computers, in contrast, reside in the human world and pose no barrier to personal interactions. With the implementation of robust computer networks become more energy efficient and achieves better
energy consumption and distribution. With the using of Ethernet technologies and security gateways, the network can be fast and reliable.

The importance of Ubiquitous computing has a huge potential and yields a promise and does have a significant impact on many areas of life. Introduction of smart cars can help to avoid accidents, ensure safety measures and provide easy routes. Smart energy meters give better energy performance, memory, and computation power. Telecom enables wider reach with new communications.

The potential of Ubiquitous computing is huge and have an impact on many areas of the field. Introduction of smart cars can help to avoid accidents and provide better, faster and easy routes. Smart energy meters give better energy performance. The broadband divide could prove to be a real hampering force to the Internet of Things movement that is gaining speed today. Cloud, mobility, big data are all converging and making a seamless network, but the success of this convergence de-pends heavily on the ability to actually move and access the data. And considering that millions of additional devices (some of which are just sensors) will enter the equation means its time for further investment and quick.

CONNECT ANY THING OVER ANY NETWORK

The Internet of Things (IoT) is a computing concept that describes a future where everyday physical objects will be connected to the Internet and be able to identify themselves to other devices. It is significant because an object that can represent itself digitally becomes something greater than the object by itself. No longer does the object relate just to you, but is now connected to surrounding objects and database data. When many objects act in unison, they are known as having "ambient intelligence." Advances in connected automation, navigation, communication, robotics, and smart cities—coupled with a surge in transportation-related data—will dramatically change how we travel and deliver goods and services. Automation in the field of transportation is everywhere. Have we as humans become an afterthought? We order service on our smartphones, we maneuver around in increasingly automated vehicles, we ride in driverless transport, and we will increasingly find ourselves sharing our highways and byways with drones and other unmanned craft.

All the more the Internet is becoming more and more important for nearly everybody as it is one of the newest and most forward-looking media and surely "the" medium of the future. These advances—in fields such as robotics, A.I., computing, synthetic biology, 3D printing, medicine, and nanomaterials—are making it possible for small teams to do what was once possible only for governments and large corporations: solve the grand challenges in education, water, food, shelter, health, and security. Technology is, today, moving faster than ever. Advances that took decades, sometime centuries, such as the development of telephones, airplanes, and the first computers, now happen in years. The ubiquity of network connectivity and the proliferation of smart devices (such as sensors, signs, phones,
tablets, lights, and drones) have created platforms upon which every enterprise can innovate. Since the past few years we have also seen countless innovations that improve our daily lives. From Internet technology to finance to genetics and beyond - we have seen technologies such as mobile, social media, smartphones, big data, predictive analytics, and cloud, among others are fundamentally different than the preceding IT-based technologies. Easy maintenance of household equipment is possible as the sensor tag attached to the equipment lets you know when the maintenance is due or when the warranty expires to avoid any costly repairs.

In the area of healthcare, embedded smart chips will automate and regulate processes and improve the patient’s environment. Google enabled products like smart glass, a smart bracelet, an apple iWatch or even a smart body analyzer are seen more and more. The many devices and services we manage are anything but “[woven] into the fabric of everyday life”. Artificial intelligences are now ubiquitous, from GPS navigation systems and Google algorithms to automated customer service and Apple’s Siri, to say nothing of Deep Blue and Watson — but no machine has met Turing’s standard. The quest to do so, however, and the lines of research inspired by the general challenge of modeling human thought, have profoundly influenced both computer and cognitive science. Similar to the way traditional phones were evolved as smartphones, there will be more consumer objects which will soon be evolved as smart objects like smart appliances, smart glasses, smart watches, smart cloths, smart cars, smart conferencing, smart homes, smart environment and a smart world. A healthy eating smart environment can reduce the obesity levels. It can also provide a comparative study of fast food vs. home food which promotes health awareness and quality of life. The cameras at your door could identify the family and friends and also strangers. We see a tremendous change in the manner in which traditional phones were evolved as smartphones, Or, going a step further, the machine could determine your location, recognize you haven't posted a picture of yourself smiling in some time, and recommend you buy tickets to the funny movie playing around the corner. Fintech apps are changing the way financial institutions interact with their customers. The proliferation of Fintech apps has a great impact on the society, like — reducing the price paid by the customer, increased competition, easy access to financial services etc.

SaaS & Bring Your Own Device

Global movements such as BYOD and SaaS, where consumerization of IT and mobility are drastically changing the capabilities of employees and their expectations of a workspace. Building your own apps is the ideal way to mitigate the risk of BYOD and SaaS. An organization can provide those that only allow the user to access what they need. The enter-prise’s concern is the data; the employee’s concern is the device. In the IT security world, we care about both. Now that most of the organizations started adopting BYOD in some form, it is not just their personal iPads and laptops that users are bringing into the office, they are also using the consumer apps available in their personal device for work purpose which leads to the next wave in mobility. In the very near future BYOD won’t be a ‘trend’ but a norm no one would think twice about. Blockchain contains applications with far-reaching impacts that defy the basic elements of big data by surpassing basic activities such as transfers of money and electronic currencies. In the era of big data and the Internet of Things, blockchain has applications that go beyond the tangible, intangible and monetary things like digital currencies and money transfers. From electronic voting, financial services, health care, supply chain, oil and gas, smart contracts and
digitally recorded property assets to patient health records management advertising, publishing, media, energy, government and proof of ownership for digital content – among many others.

Blockchain will profoundly disrupt hundreds of industries that rely on intermediaries – think banking, finance, trading stocks, bonds and commodities, academia, real estate, insurance, legal, health care and the public sector.

Some companies integrate Fintech into their existing products/services, while others invest Fintech solutions in their own incubators and IBM’s Watson for example has developed a financial services assistant that can provide better advice on financial products based on market conditions, life events, client’s past decisions and available offerings. In the past, some of these devices were wired together into more complex systems. But it wasn’t until they were provided with some intelligence, connected to the Internet, and empowered by a new wave of technological accessibility—through cloud computing, smartphones, and the prototyping capabilities of digital fabrication.

Nothing gives a day a greater chance than a good wallop of passion. Look for ways to support, encourage, build up, and stimulate the technology breakthroughs that come your way, everywhere and anywhere.