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An Overview of Mobile Technology:

Focusing on Mobile Phones

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Introduction

We live in a digital world where we are surrounded by technologies that have been designed to augment our lives and experiences. These technologies help us communicate, share media, learn, create, research and interact with each other. Mobile devices, such as laptops, Netbooks, mobile phones, and tablet computers, have changed the way people use technology and live their lives by enabling access to services, such as email, text messaging, multimedia messaging, internet access, video chat, video calling, Wi-Fi connectivity, gaming, instant messaging, Bluetooth and infrared communication, online social networks, GPS navigation, streaming media, audio and video playback, media capture (audio, image, video), information retrieval (i.e. online searches), content retrieval, location based services, data storage, tethering (serving as a wireless modem), and more, anywhere at anytime. This paper will provide a concise overview of mobile technology; specifically focusing on the mobile phones and its: technological origins and current ubiquity, services and applications in society, sensor technology and limitations, and sociological implications of this technology

Origins

Prior to the 1990s, and the wide spread use of mobile phones, a pager¹ was the dominate device that provided convenient, economical, personal and mobile communication. Other wireless communication technologies that existed prior to the invention of the mobile phone included radiophones, which were used to communicate

¹ Pager is a small mobile device used for communication before the wide spread use of mobile phones. Pagers allows for either a one-way or two-way communication of numbers and text messages

from land to sea vessels, and car phones, which were significant in weight and provided limited reliability. Mobile phones evolved out of these devices and society's need to communicate and, in particular, the convenience of that communication medium, (i.e. using vocal communication in a mobile context). This critical need coupled with advances in cellular networks and transistor technology, chip miniaturization and battery technology led to what we know today as a cellphone or mobile phone.

Generations

Cell phones have gone through cycles of technological advancement know as generations. The term "generation" refers to the type of network that the cellphone communicates over, and is linked with advances in cell phone technology. The first generation, or 1G, network introduced advances that surpassed the zero generation, 0G, such as multiple cellular tower sites, and the capability of a network to automatically transfer, or handover, the call to different sites based on the callers location in the network.

Every new generation yields new technological advancements, which have been vital in the development of mobile phone technology and communication. Briefly, the second generation (2G) introduced the use of digital transmission and the number of cellular sites drastically increased, which lead to smaller and less bulky phones due to advancements in battery technology and more energy-efficient electronics. This generation also introduced SMS (short message service) text messaging and the ability to access and download media, such as ring tones. Further, the third generation network saw innovations in networking and data transfer that allowed for faster network connection times, faster data

transfer rates and connection speeds, and better quality of service over the network.

These innovations allowed for Internet browsing and the real-time streaming of multimedia content, such as audio and video. Currently, a fourth generation network has been introduced, however it is still very early in its conception and is not in widespread use. The 4G network is emerging because the widely used 3G network is reaching its capacity for networking due to the large number of users on the network and streaming applications that are bandwidth-intensive. The fourth generation network eliminates circuit switching and utilizes a “multi-spectrum/multi-antennae” arrangement and an “all-IP” packet switched network to increase network performance, quality and bandwidth. [6] 3G, and the promising 4G, networking innovations and advances have caused mobile phones to gain popularity and ubiquity. The wide spread use and promise of these networks have motivated mobile phone manufacturers to develop better hardware, software, and user interfaces for this platform.

Ubiquity

Mobile phones have become extremely ubiquitous and are “deeply entrenched in the lifestyles of people around the world, they transcend nearly every cultural and economic barrier. The mobile phones of today offer speed and storage capabilities comparable to desktop computers from less than ten years ago.” [4] With more than 4.6 billion mobile phones in use in the world today, the growth of mobile phones is rapidly increasing in computational power and storage. The concept of the “Smartphone” is evolving, what was considered a smart phone a five of years ago is now a standard mobile phone today.

Technologies

Smartphones are pocket computers in disguise packed with sensors and mechanisms that can communicate with the outside world. Current modern day Smartphones have dedicated chips for logic processing (CPU), graphics processing (GPU) and communication, this makes them faster and much more capable than phones of the past, which typically had one chip for all its processing (logic, communication, etc). In addition, Smartphones are embedded with a wide variety of sensors and transducers. For example a Smartphone, such as the Apple iPhone, has an accelerometer, gyroscope, multi-touch screen, LED flash, camera or cameras, proximity sensor, light sensor, a microphone or two, speaker, high resolution display, and headphone jack. Last but not least, are the technologies embedded in these devices that are used to communicate with the outside world, such as GPS, SIM card reader/writer, memory card reader/writer, Bluetooth, WiFi, infrared, and mini USB or dock connector.

Applications

Cutting edge mobile applications are in the areas of computer vision, augmented reality, virtual reality, multimedia, gaming, multimodal sensing, gesture recognition, medical monitoring and feedback, real-time musical performance, reality mining and social diffusion are pushing the boundaries of what is possible with a Smartphone. [1] One of the biggest limitations of this platform is its battery technology. If better, longer lasting batteries were available these devices would be able to use more powerful, consequently more power hungry, processors. These powerful processors would allow for

better performance in applications, such as gaming, augmented reality, audio processing, and multimedia, which push the phone's processing power.

Sociological Perspective

From a techno-sociological point of view mobile phones are interesting because, apart from being hyper-ubiquitous and omnipresent worldwide, society holds them as familiar personal and private devices that are carried with them everywhere they go. Because of their small size mobile phones allow users to act freely and discretely from others' judgments and influences, thus interesting social behavior can be observed from the interactions that occur with these devices. Mobile technology and, technology in general, goes through a process of "domestication", which encompasses how a technology is absorbed into society. First society becomes aware of the technology's existence and imagines what it does. Then society appropriates the technology by seeing its uses and how we can use it as individuals. Then society objectifies the technology and personalizes it to individual's preferences. [2] At this point the technology has been successfully incorporated into society. Lastly, mobile technology is affected and advanced by societies' needs and vice versa; society is affected, as seen by their behaviors and actions, by the technologies and services that these devices can provide.

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