



---

## Mobile Computing

MNO Sadiku<sup>1</sup>, SM Musa<sup>1</sup>, Sudarshan R Nelatury<sup>2</sup>

<sup>1</sup>College of Engineering, Prairie View A&M University, Prairie View, TX 77446

<sup>2</sup>School of Engineering, Pennsylvania State University, Erie, PA 16563-1701

---

**Abstract** The use of mobile devices has increased greatly over the last few years. Mobile computing allows people to send and receive data and information over a network from wherever they are. This wireless connectivity is profoundly changing the way we compute, communicate, and socialize. This paper presents a brief introduction to mobile computing.

**Keywords** mobile computing, nomadic computing, ubiquitous computing

---

### Introduction

Advancement in technology has led to several mobile devices. They have become the most natural devices for multimedia consumption, production, computation, and human-computer interaction. Mobile computing has evolved from the popularity of these devices. Mobile computing is using a computing device while being mobile [1]. It enables us to access information networks anytime, anywhere, thereby bringing an end to the tyranny of geography. It involves mobile communication, mobile hardware, and mobile software.

### Mobile Communication

Mobile computing implies wireless communication since communication takes place without being connected to a fixed physical link. It allows mobile devices to operate from anywhere. The ability to communicate wirelessly is vital in order to use time efficiently. The signals are carried to their intended destinations through the air. This requires the construction of infrastructure for communication networks. Existing networks include cellular networks, satellites, and Wi-Fi. Currently, some networking infrastructures (such as Internet of Things and wireless sensor network) are being developed [2].

### Mobile Hardware

Mobile devices include portable computers or laptops, handheld computers, personal digital assistants (PDAs), mobile phones, and tablets. These devices operate in full-duplex and can send and receive signals simultaneously. A PDA is usually a pocket-sized computer. Mobile phones or smart phones today are loaded with capabilities such as keyboards, cameras, and Internet access. With advancement in technology, mobile devices will keep getting smaller, faster, and more sophisticated.

### Mobile Software

Since hardware capabilities are limited, companies invest in mobile application software (mobile app), which is designed to run on mobile devices. This is the operating system of the mobile devices. The operating system provides several features such as touch screen, cellular connectivity, Wi-Fi, Bluetooth, GPS mobile navigation, camera, speech recognition, and voice recorder.



## Applications

The benefits of mobile computing include connectivity, social interaction, and portability. Areas of applications include mobile Internet, education, policing, health, sports, gaming, agriculture, transportation, emergency services, business, interaction with things, and social interactions with people [3-5].

*Mobile Internet:* This technology allows us to share information and services anytime, anywhere. It does that through mobile devices, mobile users, and mobile applications [6].

*Education:* The portability offered by mobile computers is helpful to teachers. Nowadays, students use mobile devices more than PCs to access the Internet. Programming will appeal to them if they can build useful applications for their devices. App Inventor is a tool developed at MIT to program Android devices. With App Inventor, students can perform some applications without writing a single line of code [7]. This allows the students to focus on how to be creative and reason analytically rather than be bogged down with the details of programming languages.

*Policing:* Mobile computing technology has much potential for improving police performance, management, and operations. It helps the police in collecting, managing, and analyzing data. It enables the officers to have real-time access to data on crimes and to precisely target people that contribute to crime and disorder in the community [5].

## Conclusion

Security is becoming a major concern in mobile computing. It relates to security of private, sensitive information stored in mobile computing devices such as the smartphones. In addition to security, mobile computing faces other inherent challenges: constant mobility, limited power, and restricted capability. Mobile devices are still limited by their battery power, storage, and bandwidth. In spite of these limitations, the future of computing is mobile.

With rapid technological advancements, the future of mobile computing is exciting.

More information about mobile computing can be found in two international journals devoted to it: IEEE Transactions on Mobile Computing and International Journal of Wireless and Mobile Computing.

## References

- [1]. C. Cuddy, "Mobile computing," *Journal of Electronic Resources in Medical Libraries*, vol. 6, no. 1, 2009, pp. 64-68.
- [2]. W. H. Weng and W. T. Lin, "A mobile computing technology foresight study with scenario planning approach," *International Journal of Electronic Commerce Studies*, vol. 6, no. 2, 2015, pp. 223-232.
- [3]. B. Bruegge and B. Bennington, "Applications of mobile computing and communication," *IEEE Personal Communications*, vol. 3, no. 1, Feb. 1996, pp. 64-71.
- [4]. M. Berry and M. Hamilton, "Mobile computing applications: Bluetooth for local voices," *Journal of Urban Technology*, vol. 17, no. 2, Aug. 2010, pp. 37-55.
- [5]. C. S. Koper, C. Lum, and J. Hibdon, "The uses and impacts of mobile computing technology in hot spots policing," *Evaluation Review*, vol. 39, no. 6, 2015, pp. 587-624.
- [6]. S. Deng et al., "Toward mobile service computing: opportunities and challenges," *IEEE Cloud Computing*, July/August 2016, pp. 32-41.
- [7]. X. Liu and H. Xu, "Reform on college fundamentals of computer course based on mobile computing," *Proceedings on the 11<sup>th</sup> International Conference on Computer Science & Education*, August 2016, pp. 890-893.

## About the Authors

Mathew N.O. Sadiku is a professor at Prairie View A&M University, Texas. He is the author of several books and papers. He is an IEEE fellow. His research interests include electromagnetic computation and computer networks.



Sarhan M. Musa is a professor in the Department of Engineering Technology at Prairie View A&M University, Texas. He has been the director of Prairie View Networking Academy, Texas, since 2004. He is an LTD Spring and Boeing Welliver Fellow.

Sudarshan R. Nelatury is an associate professor at Penn State University, The Behrend College, Erie, Pennsylvania. His teaching and research interests lie in electromagnetics and signal processing.

