Chapter 4
Wearables Operating Systems: A Comparison Based on Relevant Constraints

Vicente J. Peixoto Amorim
Federal University of Ouro Preto, Brazil

Saul Delabrida
Federal University of Ouro Preto, Brazil

Ricardo A. R. Oliveira
Federal University of Ouro Preto, Brazil

ABSTRACT
Wearable devices have increasingly become popular in recent years. Devices attached to users body remotely monitor his daily activities/health. Although some of these devices are pretty simple, others make use of an operating system to manage memory, resources, tasks, and any user interaction. Some of them were not initially designed and developed for this purpose, having a poor performance requiring the use of more resources or better hardware. This chapter presents a characterization of wearable devices considering the operating systems area. Some constraints of this context were designed to analyze the operating system’s execution when inserted into a wearable device. Data presented at the end shows that there is a lack of performance in specific areas, letting to conclude that improvements should be made.

DOI: 10.4018/978-1-5225-3290-3.ch004
INTRODUCTION

Nowadays, wearable computing has become one of the most trending topics on market and research areas. The possibility to have a computer attached to the body gives the user a superior level of context information inside an interactive environment. Although wearable computing is not a new concept (Sutherland, 1968; Mann, 1996; Mann, 1997), a recent advance in electronic components miniaturization has supported this type of device evolution. Watches (smartwatches), fitness trackers, glasses, augmented reality (AR) / virtual reality (VR) equipment and others have been increasingly gaining space on industry and user daily activities.

Regarding the hardware scope, the wearable devices can vary from simple ones to powerful machines fully integrated to the users’ needs, or even connected to other local equipment/services, such as smartphones and tablets. Some of them are just vital signals monitors while others may have a visual interactive display where a real-time processing is made and feedback is provided, letting the user be immersed in a virtual environment.

Despite the number of different wearable devices on the market today, until now, there is no operating system (OS) used as a reference for this environment. Most of the existent proposals start from a desktop or mobile OS distribution adapting it to deploy on a final wearable product. Current solutions that can be applied to wearables vary from real-time approaches (L. Foundation Zephyr, 2016; Pebble, 2016) to mobile devices operating systems adaptations (Google Brillo, 2016; Google Android, 2016). There are also specific proposals aiming this environment (Apple, 2016; Samsung, 2016) although they were not strictly developed for this purpose.

This chapter presents a characterization between different types of wearable devices, separating them according to its main functionalities and applicability. The characterization provided here helps to understand the difference between wearable devices and Internet of Things (IoT) devices. In addition to that, a comparison between operating systems applied on wearable devices is also made. The main contributions depicted here are a better comprehension of wearables environment organization and operating systems needs, besides the evaluation of current solutions on the market. Operating systems selected and listed here were specifically designed to wearable computing or have a close relationship with this context. In the end, tests results figured out, considering peculiar environment constraints, which is the operating system that closes reach the wearables environment requirements. Furthermore, the authors expect that this discussion raises the understanding about this environment essential characteristics as a whole, once hardware and software aspects were covered.
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