

Chapter 9

Monitoring the Physical Activity of Patients Suffering From Peripheral Arterial Disease

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ABSTRACT

The peripheral arterial disease (PAD) is characterized by leg pain during walking, and a recommended treatment for this disease is to perform supervised physical activity. In this chapter, a system that monitors the physical activity containing one application for smartwatch, one application for smartphone, and a back-end webservice is presented. The applications collect heart rate, GPS locations, step count, and altitude data. The methodology used for the development of the system was based on the agile method with the production of prototypes. In this chapter, four development cycles, which cover the users' and researchers' needs, are presented. In this work, the main objective is to evaluate the current mobile technologies on the physical activity data collection and the development of a system that assists the users to maintain an active life.

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INTRODUCTION

The main symptom of peripheral arterial disease (PAD) is intermittent claudication, that is characterized by a leg pain throughout walking, which compels the people suffering PAD to stop walking temporarily. These individuals progressively show a diminution on physical aptitude. In Portugal, it is estimated that 3% at 10% of people suffer from PAD (Menezes et al., 2009). The individuals with PAD shows a change in the blood flow at the arterials of the inferior members, which is caused by blockages in the arteries. In extreme situations, this disease can cause wounds and the necessity of amputations. A recommended treatment for PAD is to perform supervised physical activity (Gornik & Beckman, 2005). The research conducted by Garg et al. (2006) concluded that people with PAD which perform physical activity regularly had lower mortality rate comparing to people with PAD whom were less active. The control of the beginning of pain, the magnitude, the number of times that the patient needs to stop and how much time the pain takes to disappear, are very important factors for the control of the progression on the intensity of recommended exercise. The exercise program for patients with PAD is applied in a Portuguese hospital, located in Vila Real, Portugal. Some of these patients must get transport from longer distances three times a week.

With the appearance of mobile devices, it is possible through the sensors that come built-in, collect a panoply of data from users like their health status and physical parameters during the performing of exercise. This information is useful for the patients, because they can have a better perception of their fitness status. If this information is also available to the health professionals, it can be used to be part of a support tool to keep tracking of the evolution of their patients. This approach in the application of health information systems, has introduced benefits and rationalities in these processes (Reis et al., 2016b).

This chapter is divided in the following sections: “Related works”, presents some studies related to PAD treatment and ambulatory monitorization systems; “Background”, supplies a contextual frame of the work and it is presented a comparison on the smartwatches and fitness applications currently available; “Design of proposed system”, describes the developed system; “Methodology”, describes the method used in the elaboration of user tests and collection of results; “Results”, describes the results obtained; “Analysis”, analysis made upon the results obtained; “Conclusion”, it is summarized the work elaborated; “Future work”, it is presented perspectives about the future.

For this work, the objectives are: the construction of a system for the monitorization of physical activity and health data to users that suffer PAD and support the health professionals in keep tracking of the current user’s health and physical status.

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