A Proposal for Mobile Diabetes Self-control: Towards a Patient Monitoring Framework

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Abstract. In this paper, we present a proposal for Patients' Mobile Monitoring. This framework enables the definition and generation of profiles, modules and communication structures between each of the measuring devices and the mobile phone depending on the kind of condition and the measuring values of the patient. We use patterns to allow the generation of self-control modules and patient profiles. These patterns establish relations between each module. With patient's measured data, patient profile and modules, the framework generates an application for the doctor and the patient in a mobile phone. These applications allow the monitoring, patient self-control and the communication between the patient and the doctor. Moreover, as an important study case, we present a mobile monitoring system which allows patients with diabetes to have a constant control of their glucose tendency as well as direct communication with their doctor.

Keywords: Healthcare, Diabetes, Mobile Monitoring, Framework, Mobile Phone.

1 Introduction

According to the World Health Organization (WHO), "diabetes is a chronic disease that occurs when the pancreas does not produce enough insulin, or alternatively, when the body cannot effectively use the insulin it produces. Insulin is a hormone that regulates blood sugar. Hyperglycaemia, or raised blood sugar, is a common effect of uncontrolled diabetes and over time leads to serious damage to many of the body's systems, especially the nerves and blood vessels. This is why it is important to keep a good glucose levels" [1]. Furthermore, the WHO estimates that more than 180 million people worldwide are diabetics. This number is likely to be more than doubled by 2030. In 2005, an estimated 1.1 million people died from diabetes. Diabetes-related deaths will increase by more than 50% in the next 10 years.

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In order to facilitate people lives, we are working on a mobile monitoring system which allows patients with diabetes to have a constant control of their glucose tendency as well as direct communication with their doctor. Furthermore, we aim to educate these in people in their disease; so that, we are elaborating an education component meant to allow them to know more about the disease and how to make their daily routine more comfortable. As part of our proposal we have included a diet and a prevention unit; these aim to ensure a healthy lifestyle without annoying surprises for the patients.

2 Related Works

Mei [3] propounded the development of a framework for the representation of patients' vital signs. This framework, facilitates the representation of the different existing notations to represent vital signs (FDA [4], CEN [5], HL7 [6], DICOM [7]). For this, it proposes an XML scheme to design the representation of vital signs framework, specifying the existing standards of representation. It is proposed only a representation of the vital signs obtained by the mobile devices creating data sheets with the representations of vital signs that ensue from the mobility of the (patient) users in heterogeneous environments. Our proposal is not based on representation of vital but on the control and interpretation of these. Tadj [9] with LATIS Pervasive Framework (LAPERF) provides a framework with base and automatic tools for the development and implementation of applications of pervasive computing. His principal usefulness (utility) has been demonstrated in the use of healthcare applications. It tries to obtain a better integrity in the pervasive systems. It is designed by means of a system based on rules, which filters rules not contemplated in the system. Roy [10] offers the idea of a framework supporting the merger of efficient context-aware information for healthcare applications assumed as an ambiguous context. It provides a systematic approximation to derive fragments of the context and to handle the probability of ambiguity existing in this context. This framework has been evaluated in the monitoring of elderly people in small home environments. This design has been developed and labelled using Bayesians Dynamics Networks (DBNs) and a rules-based model. In our case, we do not have ambiguity in the data, to achieve this, we define an individual profile for each patient; the functionality of architecture lies on this profile. Broens [11] propounds the development of a framework which incorporates the use of context information. Orientated to patients who suffer from epilepsy, the system sends messages to the different dependences associated with the framework. In case a patient has symptoms of a possible epileptic seizure, by means of a Epilepsy Safety System (ESS) that includes mobile patient monitoring, Body Area Network (BAN), twenty four hours a day; the system reports to the patient who has variations of symptoms that can lead to an epileptic seizure. Our architecture propounds the patient mobile monitoring with doctor, patient, and mobile phone communication. Such mobile phone belongs to the patient and is the key element in the communication and self-control.

Preuveneers [12] has investigated how the mobile phone platform can contribute with individuals diagnosed of diabetes to handle their glucose in blood levels without resorting to no additional systems (beyond the equipment they use nowadays) or