

# A Mobile Health Service for Hypertension Self-Management\*

Extended Abstract<sup>†</sup>

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## CCS CONCEPTS

• **Applied computing**~Life and medical sciences • **Applied computing**~Health care information systems • **Hardware**~Sensor devices and platforms • **Hardware**~Wireless integrated network sensors • **Networks**~Network protocols

## KEYWORDS

ACM proceedings; mHealth; hypertension; self-monitoring; personalized medicine

## ABSTRACT

Chronic diseases management is one of the greatest challenges of modern healthcare systems. Patient telemonitoring, based on timely data transfer and immediate feedback, provides a prognostic indicator of cardiovascular morbidity and mortality. This extended abstract presents a new project aiming at the effective control of patients suffering from hypertension, highlighting the importance of adhering to monitoring schedules and prescribed treatment. Given the fact that hypertension, as a chronic condition, affects more than one third of the population worldwide and that raised blood pressure constitutes the major risk factor for coronary heart disease and ischemic and hemorrhagic stroke [1], the need for constant monitoring of a patient's health condition and disease management has become vital. Within this framework, we implemented an online service that provides the potential of self-managing hypertension.

More specifically, the service enables the recording and processing of vital signs of patients suffering from high blood pressure. All the data are stored wirelessly and automatically in a cloud infrastructure, as their personal electronic health record (EHR), to provide appropriate personalized medical follow-up and treatment. The cloud platform is based on the popular framework Node.js and stores the personal EHR in a NoSQL database, MongoDB. The service exploits three Bluetooth wireless technology devices (a blood pressure monitor, a scale and a wearable activity tracker), in combination with an android smartphone (Fig. 1). Additionally, monitoring of patients' medical adherence, patients' compliance to a long-term or short-term measurement program according to the doctor's instructions, automatic detection of biosignals' values exceeding the permissible limits and timely and immediate notification of the doctor are achieved. At the same time, the attending physician receives a detailed weekly report, via email, containing the patients' timetable with all the measurements along with their average values and the respective graphic representation,

based on the report model of the Hypertension Center of the University of Athens, consistent with the "2013 European Society of Hypertension (ESH) and European Society of Cardiology (ESC) Guidelines".



Figure 1: System Architecture

Aiming at improving, enhancing and personalizing the medical monitoring of hypertension patients, the proposed approach can circumvent the challenges of electronic health systems and provide benefits for the involved users, such as monitoring of their physical and emotional status, enhancement of their prosperity, early detection and management of potentially dangerous situations, motivation to follow treatment and to engage in physical and self-caring activities and, last, modeling of their behavior to improve self-care.

Our future perspective is to use all the information gathered from the medical reports for data analytics purposes. For this objective, data mining and pattern recognition methodologies are being applied to data, concerning the patients' sex and age, their blood pressure values, their weight, their nutrition habits and the data collected from the fitness bracelet, in order to create a new model useful in the prediction, evaluation and treatment of the hypertension disease.

## ACKNOWLEDGMENTS

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## REFERENCES

- [1] K. T. Mills et al. 2016. Global Disparities of Hypertension Prevalence and Control. *Circulation*. pp. 134:441-450. DOI: <http://doi.org/10.1161/CIRCULATIONAHA.115.018912>