

I. Introduction

The specialized medical equipment required to diagnose, treat and monitor specific types of diseases is very expensive and somewhat unreachable for poor communities with limited resources that have no access to technology. New approaches have to be implemented in order to ensure health-care delivery and medical assistance to rural communities that lack access to proper instrumentation[1,2], particularly when specialized medical teams travel through those communities performing medical campaigns.



Fig.1. Medical assistance affluence on Guatemalan rural communities.

II. System Architecture

The topology of the system is shown below on Fig. 2.

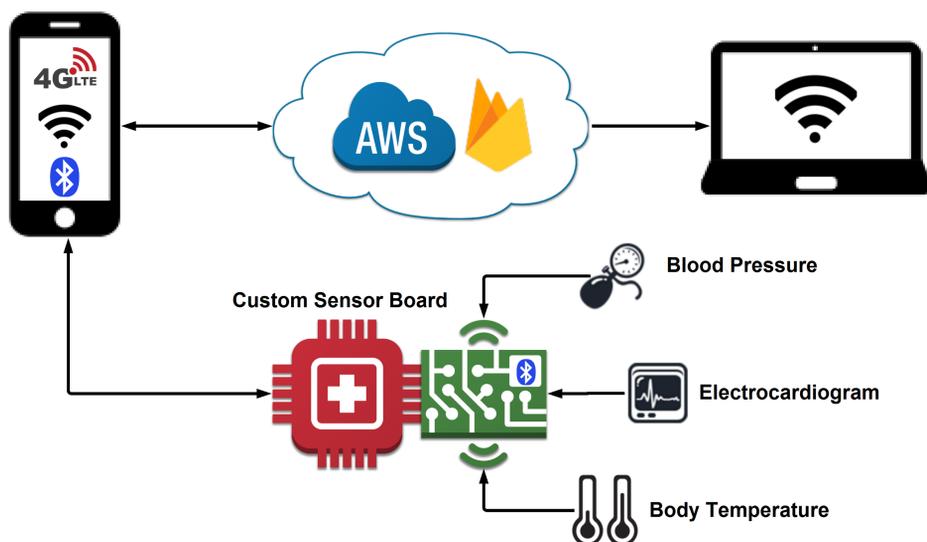


Fig.2. System Architecture of Smartphone Based Healthcare Monitor System.

III. Custom Sensor Board

A mobile based medical instrumentation kit implemented on Cypress's PSoC Analog Coprocessor is proposed in order to perform signal conditioning and to integrate specific medical instrumentation.

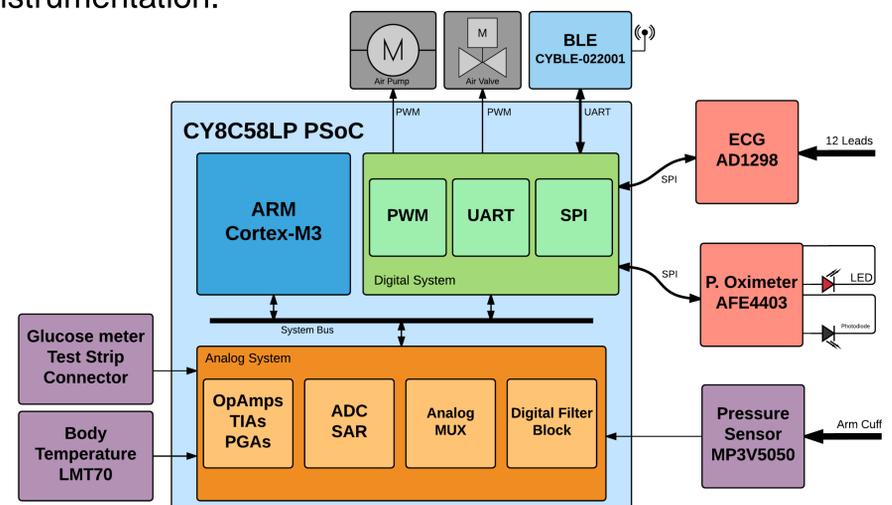


Fig.3. Custom Sensor Board Block Diagram.

IV. User Interface, Storage and Monitoring

- User-friendly interface implemented on an Android application.
- Cloud based data storage capabilities implemented with Google Firebase.
- Access medical information through a custom Web-based app, hosted on Amazon Web Services (AWS).
- Low Cost and Low Energy portable medical instrumentation kit based on FreeRTOS.
- Bluetooth Low Energy (BLE) communication protocol.

V. Discussion

The User Interface, implemented on an Android application for smartphones, enables the doctor and the patient to cost effectively monitor and analyze different measurements from a group of predefined biological parameters according to the necessities of the patient, e.g. a diabetic patient could benefit from a glucometer, a blood pressure monitor or a ECG (in case of previous history of cardiovascular disease or arrhythmias) but a patient with Chronic Obstructive Pulmonary Disease could benefit more from a pulse oximeter and temperature control for exacerbations.

VI. References

- [1] M. Maksimovic, V. Vujovic, and B. Perisic, "A custom internet of things healthcare system," in 2015 10th Iberian Conference on Information Systems and Technologies (CISTI). IEEE, 2015, pp. 1–6.
- [2] X. Xu, A. Akay, H. Wei, S. Wang, B. Pingguan-Murphy, B.-E. Erlandsson, X. Li, W. Lee, J. Hu, L. Wang et al., "Advances in smartphone-based point-of-care diagnostics," Proceedings of the IEEE, vol. 103, no. 2, pp. 236–247, 2015.