

# TISSUE VIABILITY MONITORING - A MULTI-SENSOR WEARABLE PLATFORM APPROACH

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Health services worldwide are seeking ways to improve patient care for amputees suffering from diabetes, and at the same time reduce costs. The monitoring of residual limb temperature, interface pressure and gait can be a useful indicator of tissue viability in lower limb amputees especially to predict the occurrence of pressure ulcers. This is further exacerbated by elevated temperatures and a humid micro environment within the prosthesis which encourages the growth of bacteria and skin breakdown [1].

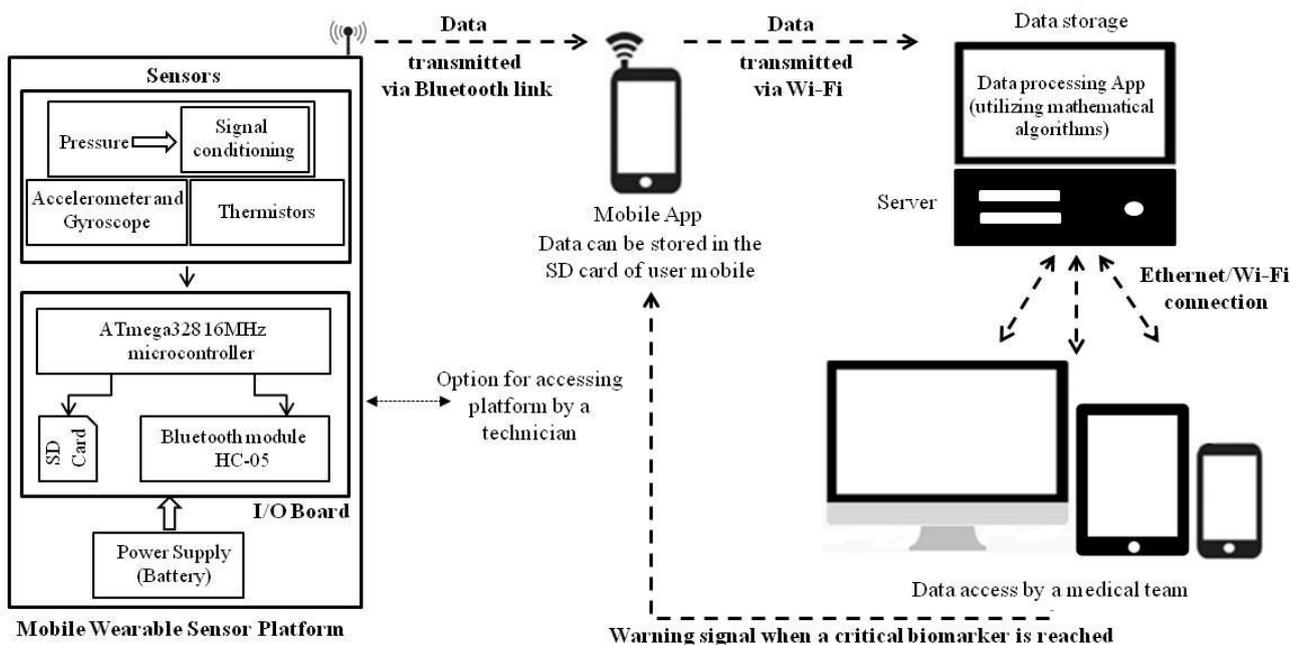


Figure 1. Architecture of the data flow in the multi-sensor wearable platform.

Wearable systems for prosthetic users have to be designed such that the sensors are minimally obtrusive and reliable enough to faithfully record movement and physiological signals. A mobile sensor platform has been developed for use with lower limb prosthetic users as seen in Fig. 1. This system uses an Arduino board that includes sensors for temperature, gait, orientation and pressure measurements [2]. The platform transmits sensor data to a central health authority database server infrastructure through the Bluetooth protocol at a suitable sampling rate. The data-sets recorded using these systems are then processed using machine learning algorithms to extract clinically relevant information from the data. Where a sensor threshold is reached a warning signal can be sent wirelessly together with the relevant data to the patient and appropriate medical personnel. This knowledge is also useful in establishing biomarkers related to a possible deterioration in a patient's health or for assessing the impact of clinical interventions.

## REFERENCES

- [1] Mathur, N., Glesk, I and Buis, A., " Skin Temperature Prediction in Lower Limb Prostheses," IEEE Journal of Biomedical and Health informatics, vol. 20(1), pp 158-165 (2016).
- [2] Mathur, N., Glesk, I. and Buis, A., "Issues in Wearable Mobile Sensor Platform for Lower Limb Prosthetic users," Proc. International Conference on Transparent Optical Networks (ICTON), pp 1-4 (2015).