

# Optical-Based Non-invasive Wearable Sensor for Continuous Monitoring of the Blood Pressure

Advance sensor technology has progressed significantly during the last decade for personal healthcare monitoring (PHM), for outpatients at home and patients whilst admitted to hospital. It is highly important for any developed PHM sensor technology to be comfortable, accurate and low cost. Such developed sensor technology should be able to monitor patients and non-patients health key vitals at the home on a day to day basis, which will allow the medical personnel to use this technology remotely at a very low cost to monitor health status.

In this project we have developed a Non-Invasive Wearable Sensor for Real-Time Monitoring of the Blood Pressure. Our developed robust sensors device The proposed blood pressure ring sensor device was tested and benchmarked (against Nonin 2120 benchmark blood pressure device) four participants for a continuous period of 4 h, where the average mean arterial pressure (MAP) (using Nonin 2120) for 4 h was at 98.92 mmHg and the average predicted MAP was at 92.8 mmHg, which demonstrates an accuracy of 93.8%. The average real systolic pressure (using Nonin 2120) was at 144.25 mmHg and the predicted average systolic pressure was at 132.77 mmHg which shows an accuracy of 92%. The average real diastolic pressure (using Nonin 2120) was at 76.25 mmHg and the predicted diastolic pressure was 72.7 mmHg, showing an accuracy of 95.5%.

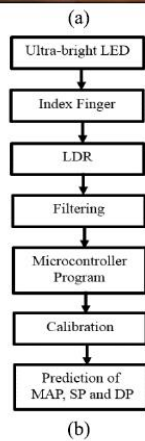
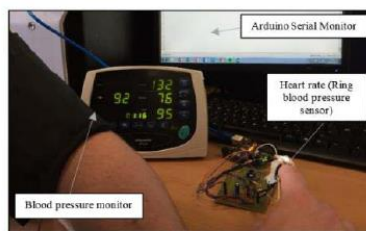


TABLE SHOWING FOUR PARTICIPANTS' REAL MEAN ARTERIAL PRESSURE (MAP) VALUES WITH THE AVERAGE VOLTAGE (Vin) FOR FOUR PARTICIPANTS MEASURED FROM 10:00am TO 14:00pm

Time	MAP1	Vin1	MAP2	Vin2	MAP3	Vin3	MAP4	Vin4
10:00	94	2.7	91.333	2.73	88.333	2.48	90.6667	2.22
11:00	92	2.4	93.333	3.26	87	2.5	91.333	2.49
12:00	92	2.33	85	2.42	88.333	2.46	98.333	2.75
13:00	91.6667	2.13	91.3333	2.72	91.333	2.56	85	1.83
14:00	91.6667	2.39	99.333	3.42	90.33	2.58	90.6667	2.55

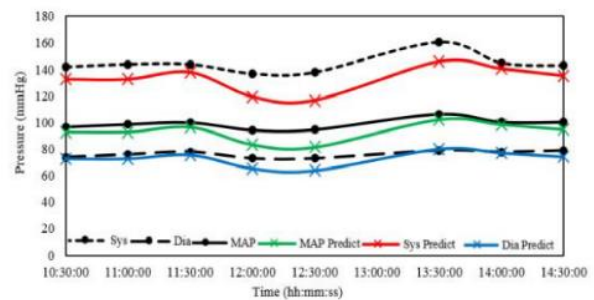


Fig. a) Experiment set up of the measurement blood and the ring sensor measuring the blood pressure. b) Schematic diagram of the system from the LED input to the prediction of the MAP, SP and DP.

Graph of real MAP (black line), systolic (black short dash) and diastolic (black long dash) pressures with the predicted; MAP (green line), systolic (red line) and diastolic (blue line) against time from 10:30am to 14:30pm.