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Design and Development of a Cardiovascular Monitoring System

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Abstract: *Cardiovascular diseases are the most common causes of deaths globally. Continuous and regular monitoring of vital signs is necessary for patients suffering from cardiovascular diseases especially in low and middle income countries (LMIC), with limited facilities for diagnosis and monitoring of the cardiovascular system. In this paper, a low cost, non-invasive cardiovascular monitoring system was developed. The system was powered by a 12V battery and consists of a pulse rate sensor for recording pulse rate, heart monitor sensor for recording electrocardiogram, Arduino board (ATMega 2560), potentiometer, jumper connecting wires, 16×2 liquid crystal display monitor. The design includes modulation and demodulation sections that record signals from the measurand and transmit them to the doctor. The device was initially tested on ten subjects. Periodic heart beat was observed with mean ± standard deviation pulse rates obtained as 75.82 ± 1.09 BPM (beats per minute). Further comparison between the device and a standard blood pressure monitor on forty-five volunteers revealed a mean pulse rate of 76.44 ± 10.04 BPM and 77.84 ± 10.65 BPM for the proposed and standard device, respectively. The Wilcoxon-signed rank test results performed in SPSS gave a p-value of 0.118, showing that there was no statistically significant difference between the pulse rates observed in both devices. Standard Electrocardiograph (ECG) waveform for healthy subjects was obtained when the device was tested on healthy patients. Based on the test results, the device was shown to be effective for real-time monitoring of the cardiovascular system.*

Keywords: *Cardiovascular monitoring system, electrocardiogram, pulse rate, vital signs*