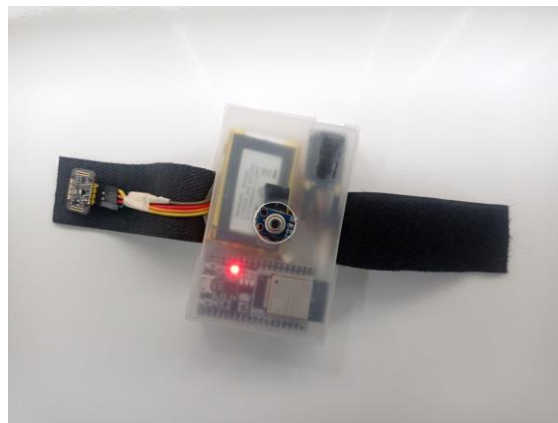


ISPO SCIENTIFIC PAPER
(INDONESIAN SCIENCE PROJECT OLYMPIAD)
“PREMAN”
(PORTABLE REAL-TIME HEALTH MONITORING BAND
USING ARDUINO)



Category : Technology and Robotics Engineering

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ABSTRACT

Maintaining a high level of health is important in the post-pandemic era. Heart rate and body temperature are two vital signs that reflect a person's level of health. If there are abnormalities in these two vital parameters, almost all physiological aspects of the body can be affected. Heart rate can be measured manually using a stethoscope, but this method has a high degree of human error. Some other methods like Phonocardiogram (PCG) and Electrocardiogram (ECG) are clinical and tend to be expensive. As for body temperature, it can be measured using a mercury clinical thermometer by placing it in several body parts such as the mouth, armpit, ear, and rectum. The disadvantage of this measurement method is that it tends to disturb comfort and takes quite a long time to get measurement results. Mercury thermometers are made of glass, making them easily breakable, and mercury itself is a hazardous substance, which is a weakness of this measurement method. Based on the existing problems, the researcher's desire arises to create a device that can measure both heart rate and body temperature simultaneously, succinctly, can be taken anywhere, is economical, and its measurement results can be monitored directly through an application on a device. This device adopts the design concept of a health band, but with continuous measurement and a lower cost of production. The prototype of this device uses an Arduino ESP32 microprocessor, a MAX 30102 sensor, and a GY906, as well as a TP4056 battery module and an MT3608 as a power source and storage for the device. The MAX30102 sensor can measure heart rate using the photoplethysmogram (PPG) principle, while the GY906 is used to measure body temperature using the infrared radiation reflection principle. An application that displays the results of the sensor measurement in real-time was created with the help of Blynk software. This device is called PREMAN, an acronym for Portable Real-Time Health Monitoring Band. The device is worn on the wrist with the help of a fastener to get a stable pressure to the body surface, maximizing the sensor's ability to measure accurately. The result of this research is the creation of a device that measures body temperature and heart rate integrated with a device application to check measurement results directly. A trial of using PREMAN was conducted on 10 students of CT Arsa Foundation Sukoharjo High School. Data was also collected from each respondent using PREMAN and manual tools such as a thermometer and ECG, then comparing the results of the PREMAN measurement with those of the two manual tools using the relative error test. PREMAN has a high level of accuracy in measuring heart rate and body temperature, with relative error rates of 0.217% and 1.56% respectively. This shows that PREMAN has a body temperature accuracy of 99.783% and a heart rate accuracy of 98.44%.

Keywords: PREMAN, Arduino ESP32, heart rate, and body temperature.