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| **Title:** | Designing, Implementing, and Testing of a Microcontroller and IoT-based Pulse Oximeter Device | | |
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| **Abstract:** |  |
| Abstract— In this research paper, design, implementation, and testing of an Arduino microcontroller and IoT-based low-cost pulse oxygen saturation detection device using an integrated circuit sensor as the central part of the system. The measured physiological parameters are the pulse rate and blood oxygen saturation state (SpO2) from the peripheral capillary. The Arduino Uno R3 microcontroller is the heart of this system to process the detected electrical signals and convert them ultimately into the SpO2 value with the appropriate unit. A wireless platform for this system was developed to send the measured data to a mobile device through the Internet of Things (IoT) and mobile apps. The microcontroller unit and its IoT module were used to transfer the data from the measuring device to the smartphone and an Android program was made to link the IoT module and collect and then store the measured data. The system was designed using the EasyEDA software to review its applicability. Then the hardware implementation is done on a printed circuit board. The optical type sensor senses the arterial oxygen saturation status from the bloodstream of the fingertips of a patient and transforms it into the appropriate digital format to be read by the microcontroller’s ports according to its instruction sets. Finally, the system was assessed by measuring the SpO2 level of 54 persons of diverse ages ranging from 12 to 57 years. The data were validated against a standard oximeter available commercially in the market. Then the designed measuring meter was evaluated by computing the percentage of errors for each data at the same instant. The computational results revealed that the designed system is capable of measuring the pulse rate and pulse oxygen saturation level with an average percentage of error within ±1.1% and ±0.6% respectively. | |