Integrated Health Monitoring Application

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Abstract

This scholarly work explores the design and potential applicability of an integrated healthcare surveillance platform grounded in the Arduino framework. The investigation delineates the significance of medical surveillance, underscores the advantages of employing Arduino for such purposes, and presents the identified issues and aims of the research endeavor. It delves into related scholarly efforts in the domain of healthcare surveillance and discusses the methodology employed in this scientific inquiry, offering a holistic perspective on the topic.

Keywords — Arduino, Bluetooth, Human Computer Interaction, IoT

I. INTRODUCTION

The motivation behind this research lies in addressing the limitations of existing health monitoring systems and exploring the potential of an integrated health monitoring application based on the Arduino platform. While several commercial health monitoring devices are available in the market, they often come with high costs, limited customization options, and restricted access to raw data [1]. Additionally, integration with existing healthcare systems can be challenging, hindering the seamless flow of information between patients, healthcare providers, and other stakeholders.

II. DESIGN/METHODOLOGY/IMPLEMENTATION

The overall design of the system incorporates several components, including the Arduino mainboard, buttons, LCD1602 liquid crystal display, Bluetooth module, photodetector sensor, temperature sensor, clock circuit, reset circuit, and audio-visual alarm circuit [2], as depicted in Figure 01. The system features three buttons that allow users to set upper and lower limits for pulse rate and temperature. During pulse rate measurement, the user lightly places their hand on the photodetector sensor, which indirectly captures the pulse signal by detecting variations in signal strength caused by the differences in blood's light transmittance during the heartbeat. For temperature measurement, a waterproof temperature sensor is placed in the armpit, and the collected temperature data is transmitted to the microcontroller for display on the LCD. The Bluetooth module enables the display of detected data on the mobile APP and website, while allows users to send control commands to adjust the threshold values for pulse rate and temperature alarms.

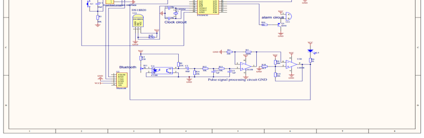

Figure 01 The Simulation of the Health Monitoring Application

III. EVALAUATION AND RESULTS

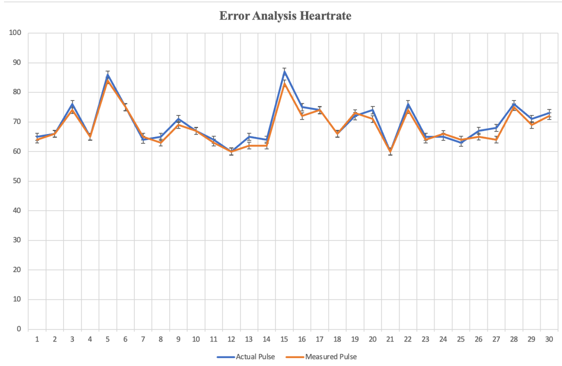

Figure 02 Error Analysis of Heartrate

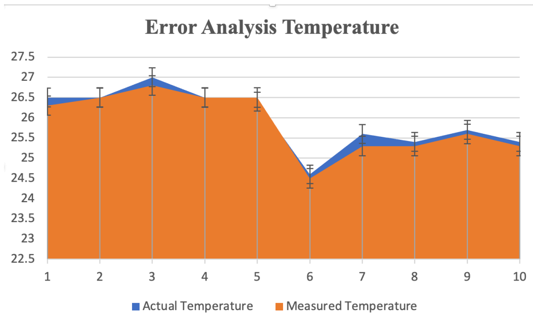

Figure 03 Error Analysis of Temperature

The two figures lists the measured values, which exhibit some degree of error. Due to the non-ideal linearity of the sensor and other components, linear compensation was applied to the measured data.Using the formula for mean squared error, the calculated error is 0.59 and 0.08, which is acceptable.

$$S = sqr\left[\frac{(X_n - \overline{X})^2}{n(n-1)}\right]$$

IV. CONCLUSION

The proposed integrated health monitoring application holds great promise in addressing the healthcare needs of elderly individuals [3]. By continuously collecting and analyzing vital health data, this system has the potential to improve the quality of life and extend the independence of elderly individuals while providing valuable insights to caregivers and healthcare providers.

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