

Multi Patient Wireless Monitoring for Pandemic With Continuous Reading Analysis and Alert Generation For Affected Patient

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Abstract: *The public healthcare system of a country needs to deal with newer ailments and challenges arising due to change in lifestyle, food habits, etc. In addition, the novel requirements of the consumer healthcare market, facing among other issues, the strong demographic changes associated with the aging population put researchers in front of new and exciting challenges. The country's healthcare infrastructure may not be enough in the face of an epidemic, especially COVID-19. To overcome these problems, in this project we use an oxidation sensor and a temperature sensor to record the readings of the blood oxidation levels and body temperature of the patient. The readings are then pushed to the cloud using a Wi-Fi module, the values are then fetched on the frontend web application. A web application using React is developed to give a live analysis to monitor and check the condition of multiple patients with a graphical representation of their oxidation and body temperature levels. The bio data of each patient specifically can be viewed by the doctor. When the condition of a patient is at an abnormal level the doctor is immediately alerted through a pop up in the web application. Thus, this project prevents the doctor from coming in direct contact with multiple patients preventing further spread of the virus.*

I. INTRODUCTION

In recent ageing population is significantly rising in recent years than ever before. According to report, the number of individuals age 50 or above will surge to 2 billion by 2050, another report published by World Health Organization (WHO) revealed that in 2013 there was 7.2 million healthcare worker shortage and predicted to cross 12.9 million by 2035. These elderly population suffer from chronic diseases among the most that are commonly monitored and treated are blood pressure, diabetes and cardiac arrhythmia. These typical diseases combined with the naturally occurring diseases, continuously decline in cognitive and physical abilities of elderly people, which reduces the chances of many aged people from living independently, in their own homes. For many years' traditional exams were the standard way to measure blood oxidation level, heart beat and temperature in a specialized healthcare center. Conventional health monitoring models are inconvenient and time-consuming for all involved. These models will be inadequate to overcome challenges of healthcare services in increasing ageing society.

The public healthcare system of a country needs to deal with newer ailments and challenges arising due to change in lifestyle, food habits, etc. In addition, the novel requirements of the consumer healthcare market, facing among other issues, the strong demographic changes associated with the aging population put researchers in front of new and exciting challenges. A survey conducted by the World Health Organization (WHO) shows that by the year 2030, 1.56 billion adults will be living with high Blood Pressure (BP) - hypertension, which accounts for about 32% of the total death count. The costs of treatment seem to raise everyday which makes it unaffordable for a large chunk of the population. Health systems are grappling with the effects of existing communicable and non communicable diseases and also with the increasing burden of emerging and re-emerging diseases inadequate financial resources for the causes of health inequalities lie down in the social, economic and political mechanisms that lead to social stratification according to income, education, occupation, gender. Lack of adequate progress on these underlying social determinants

of health has been acknowledged as a glaring failure of public health.

II. SYSTEM OVERVIEW

India’s healthcare workers and public officials were vigilant in their fight against the virus. Despite that, the country’s healthcare infrastructure may not be enough in the face of an epidemic. Data from 2017 showed India had less than 0.5 hospital beds per 1,000 people. Moreover, the country’s population density was one of the highest in the world, making it harder to contain local transmissions if strict precaution measures are not followed. A lacking healthcare infrastructure also remains a major cause for concern. To overcome these problems, an oxidation sensor and a temperature sensor is used to record the readings of the blood oxidation levels and body temperature of the patient. The readings are the pushed to the cloud using a Wi-Fi module, the values are then fetched on the front end web application. A web application is developed to give a live analysis to monitor and the condition of multiple patients with a graphical representation of their oxidation and body temperature levels. The bio data of each patient specifically can be viewed by the doctor. When the condition of a patient is at an abnormal level the doctor is immediately alerted through a pop up in the web application. Thus, it prevents the doctor from coming in direct contact with multiple patients preventing further spread of the virus.

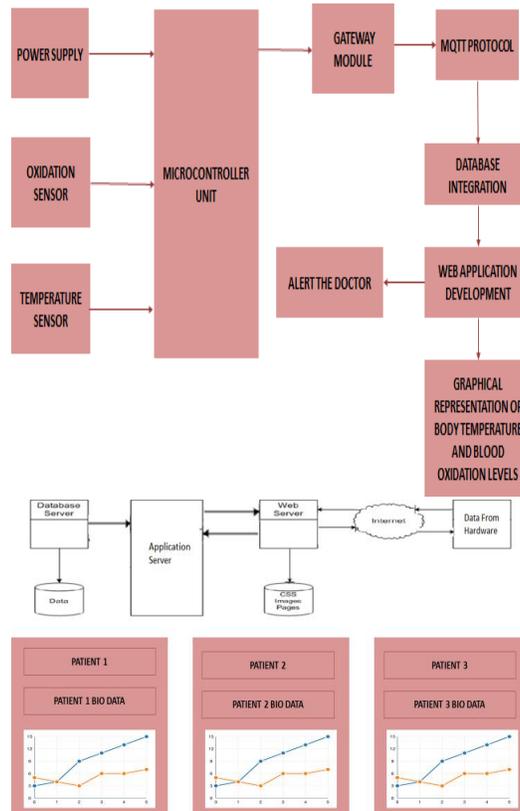


Figure 1: Block Diagram of Proposed System

2.1 Hardware Implementation

The ATMEGA 328 microcontroller which supports the data up to eight (8) bits. It has 32KB internal built-in memory is the main component which is connected with the variable sensors, power supply and web application. The sensors include temperature sensor, oxidation sensor and a respiratory sensor to record the readings of the blood oxidation

levels, body temperature, heart rate, respiratory rate of the patient. When a power supply is given to the sensors, it sends readings to the controller unit. The Wi-Fi module used is ESP8266. The extracted readings are then pushed to the cloud server using a Wi-Fi. the values are then fetched on the front end web application with the help of Message Queuing Telemetry Transport (MQTT) protocol, it works without an error.

The camera is also used to monitor patient eye blink detection. if the eye blinking of the patient is detected it will capture and send the snapshot to the doctor’s mail Id using the IOT technology. The bio data of each patient specifically can be viewed by the doctor. The doctor can diagnose the patient according to continuously recorded data, a sensor electronics module permits the acquisition of different physiological parameters and their online transmission to the handheld portable device connected to the processor.

III. PROCESS FLOW OF PROPOSED SYSTEM

In this session the process flow of the proposed system is explained. The flow diagram of the proposed system is shown in Fig.3.

- Initializing the system consisting of sensor controller and Wi-Fi gateway.
- Initiating the web application.etching values from sensors.
- Sending data wirelessly using Wi-Fi gateway with the help of MQTT protocol.
- Showcasing values in web page.
- Plotting the graph to the respective values obtained.
- Generating pop up when patient goes critical.
- An email is sent via SMTP server as alert if the patient regains consciousness, it is detected by their eye blinks and an image is captured and sent to the doctors.

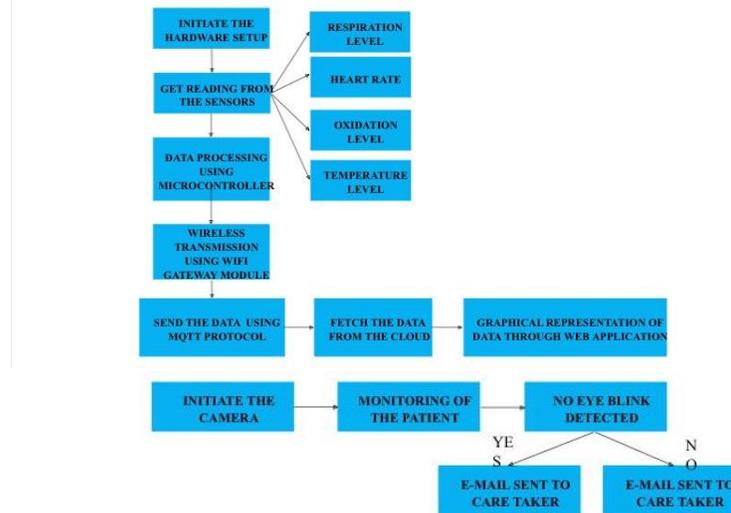


Figure 3: Process Flow Chart of Proposed System

IV. RESULTS

The output displayed with the Raspberry pi window is showed in this results session.

4.1 Normal and Abnormal level Prediction

The parameters are monitored continuously and the readings are update to cloud using Wi-Fi module ESP8266, the values are then fetched on the front end web application. When the condition of a patient is at an abnormal level, the doctor will be alerted immediately through a pop up in the web application. This entire setup prevents the doctor from coming in contact with multiple patients preventing further spread of virus.

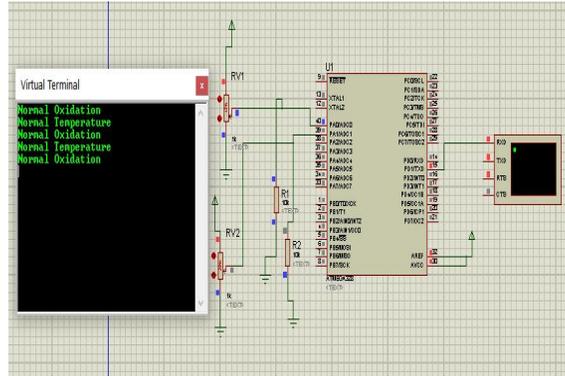


Figure 5: Normal level prediction

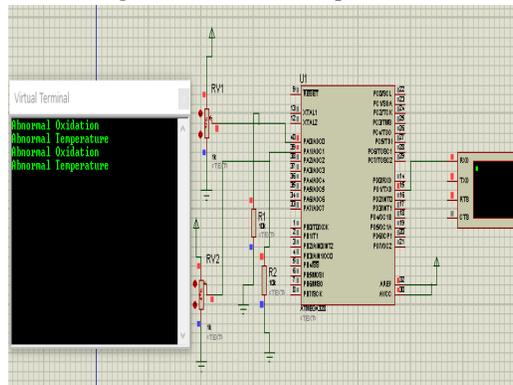


Figure 6: Abnormal level prediction

4.2 Multi Patient Monitor Webpage

A web application is developed for effectively monitoring the patients. The main page of the web application. It has two parts: login and sign up. New user can get access to the page by signing up.



Figure 7: Multi patient Monitor

Figure 8: Login page

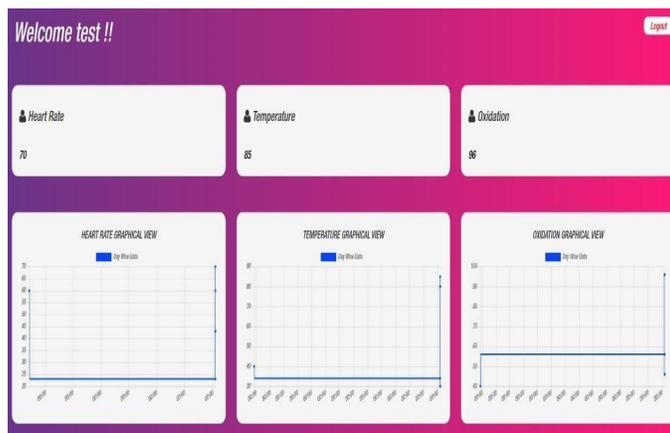


Figure 9: Home page

On successful login the user is routed to the home page of the web application. The home page of web application is given in figure 3.19. The normal and abnormal levels of the patient condition for body temperature, blood oxidation and heart rate is monitored continuously and is displayed as graph. When the patient is at an abnormal level, the doctor is alerted immediately through a pop up. By using graphical representation, the user (doctor) can view patient's previous conditions and progress.

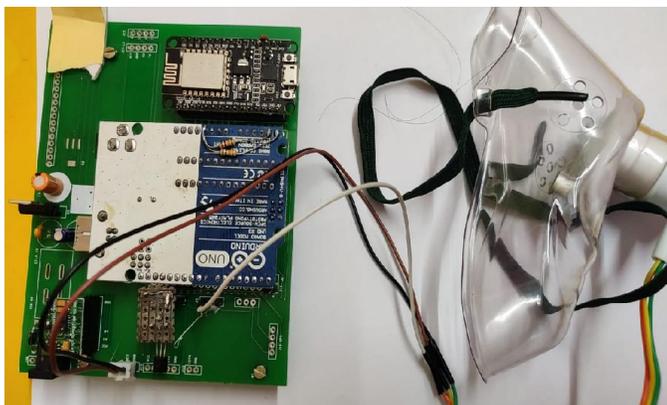


Figure 10: Hardware of proposed system

4.3 Email Notification

The camera is also used to monitor patient eye blink detection. If the eye blinking of the patient is detected it will capture and send the snapshot to the doctor's mail ID using the IOT technology.

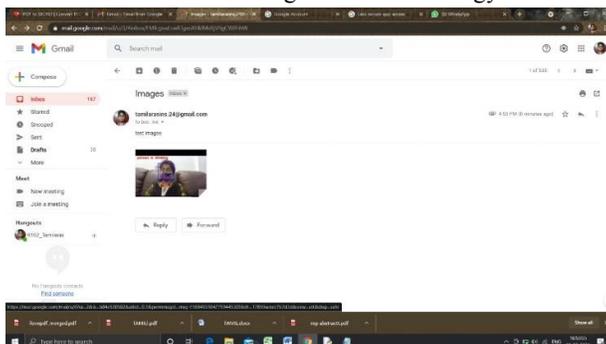


Figure 11: Email Notification

V. CONCLUSION

A web application for multi-patient monitoring system to develop a consumer electronics product with low computational cost and high accuracy outcomes for automatically monitoring and recognizing the critical parameters of patients living alone. Moreover, this system can be utilized for all patients monitoring and is also very promising for real-time applications because of the fast processing time. It is useful for diseased patients.

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