Journal of Current Research in Engineering and Science
Bi-Annual Online Journal (ISSN : 2581 - 611X)
Volume 4- Issue 1,Paper 6, January

ONLINE MEDICAL CONSULTATION USING ANDROID MOBILE APPLICATION

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Abstract— Healthcare is the basic right of every individual in the society. It is the maintenance or improvement of health via the prevention, diagnosis, treatment, recovery, or cure of disease, illness, injury, and other physical and mental impairments in people. With the recent advancements in technology, mobile health apps have revolutionized the way in which healthcare is provided, by connecting medical devices to mobile apps. The apps connect to allow doctors to remotely monitor patients and patients to self-manage their diseases. Most mHealth applications are designed for the general public, related with self-care, such as applications to monitor diabetes or weight. Few of them are developed for clinical use. Hence our aim is to develop a mHealth (mobile health) application that facilitates immediate online doctor consultation especially for the elderly and disabled.

Keywords — Microcontroller, Body temperature, Pulse rate, SPO2, Medicine Reminder, Wireless Communication, mHealth, android, mobile application, , online consultation, emergency assistance, healthcare, efficiency, user-friendly, symptoms, temporary relief, minor illness

I. INTRODUCTION

. Life is becoming too busy to get medical appointments in person and to maintain proper health care. The main idea of this work is to provide ease and comfort to patients while taking an appointment from doctors and it also resolves the problems that the patients have to face while making an appointment along with that this android application also remind the timings for when to take a tablet. This android application also monitors the patient's vital parameters such as Pulse rate, SPO2, Body Temperature. These parameters are also shared with their physician via SMS. The android application acts as a client whereas the database containing the doctor's details, that will helps the patient or their caretaker to reach their doctor quickly. The vital parameters are all transmitted from the microcontroller to the android application via Bluetooth communication.

The rapid development of mobile health technology (m-Health) provides unprecedented opportunities for improving health services. As the bridge between doctors and patients, mobile health applications enable patients to communicate with doctors through their smartphones, which are becoming more and more popular among people.

II. MOTIVATION

The future of healthcare is shaping up in front of our very eyes with advances in digital healthcare technologies, such as artificial intelligence, VR/AR, 3D-printing, robotics or nanotechnology. People have to familiarize with working hand-in-hand with technology and healthcare workers have to embrace emerging healthcare technologies in order to stay relevant in the coming years. While searching the Google Play Store for "health apps in India", 250 applications (apps) appeared. Out of 250 apps, finally, 22 apps were found to be providing online doctor consultation and/or doctor appointment booking-related services.

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III. RELATED WORK

Roy Abi Zeid Daou, Elias AAD, Farid Nakhl, Ali Hayek and Josef BÖRCSÖK presented a system that is able to monitor the patient vital signs (Heart Rate, SPO2, NIBP, ECG, temperature and respiration rate) and send them continuously to the doctor's android phone device. The system enables multiple patients to be connected to the same doctor. Within the system, the health care professional may activate/deactivate any of the vital signs sensors. He can also set a prescription for the patient, schedule a meeting,… When bad activities are received, a message is directly sent to the doctor and to the patient relatives in order to alert them. Note that the Bluetooth connection is used to send/receive data between the patient platform and its android system. The tested results showed an almost error free system with an accuracy above 95% and a few milliseconds delay between the vital signs reading and their upload over the server.

K. Prahlad Rao, Mohammed Ahmed Hanash and Gaafar Ahmed AL- Aidaros developed an innovative mobile app that can contribute in clinical consultation complementing face-to-face interaction in the healthcare at lower risk to the public. It was developed for smartphone on Android platform to facilitate interaction between the patient and doctor where the patient seeks advice, diagnosis and treatment from the doctor from remote places. The Graphic User Interface (GUI) display screens of the smartphones are incorpotated the medical data needed by the clinician to interpret and respond to information.

Erokan Canbazoglu, Yucel Batu Salman, Mustafa Eren Yildirim, Burak Merdenyan and Ibrahim Furkan Ince proposed to develop a mobile application with an effective user interface design to support the dentist–patient interaction by providing the patient with illustrative descriptions of the procedures and the end result. Sketching, paper prototyping, and wire framing were carried out with the actual user's participation. Hard and soft dental tissues were modeled using three dimensional (3D) modeling programs and real cases. The application enhances the presentation to the patients of potential implants and implant supported prosthetic treatments with rich 3D illustrative content. The application was evaluated in terms of perceived ease of use and perceived usefulness through an online survey. The application helps improve the information sharing behavior of dentists to enhance the patients' right to make informed decisions.

IV. SYSTEM OVERVIEW

A. Objective

To develop an application that allows a doctor to monitor their patient's vital parameters anytime via a communication protocol. The patient's vital parameters considered in this application are pulse rate, SpO_2 and body temperature. The parameter values when in abnormal range automatically sends a text message as an alert to the doctor along with the location of the patient. The sensor values are transmitted to phone via Bluetooth connection.

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B. Block Diagram

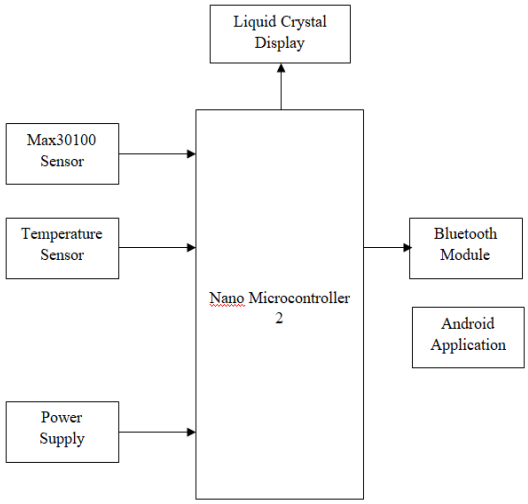

Fig 1

C. Flow Diagram

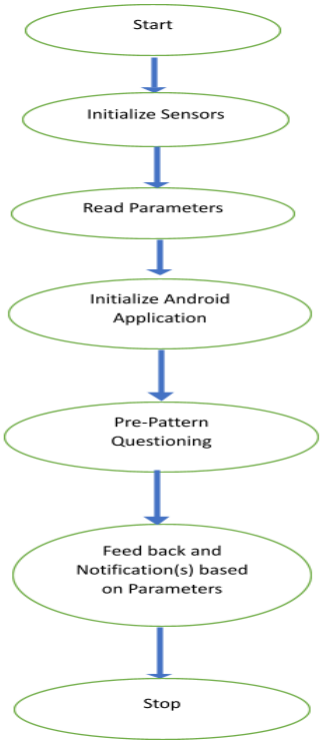

Fig 2 Workflow of the app

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D. Components

a)Arduino Nano: A small, complete, and breadboard-friendly microcontroller board based on the ATmega328P. It offers the same connectivity and specs of the Arduino Uno board in a smaller form factor. The Arduino Nano is equipped with 30 male I/O headers, in a dip-30 like configuration, which can be programmed using the Arduino Software integrated development environment, which is common to all Arduino boards and running both online and offline. The board can be powered through a type-b micro-USB cable, or through a 9V battery.

b)Power supply: The Arduino Nano can be powered via the Mini-B USB connection, 6-20V unregulated external power supply (pin 30), or 5V regulated external power supply (pin 27). The power source is automatically selected to the highest voltage source.

c) HC-05 Bluetooth Module : HC-05 Bluetooth Module is an easy to use Bluetooth SPP (Serial Port Protocol) module, designed for transparent wireless serial connection setup. ... HC-05 Bluetooth module provides switching mode between master and slave mode which means it able to use neither receiving nor transmitting data. This module works on 3.3 V

d) LM35 Temperature Sensor: Temperature measuring device that produces an analog output voltage proportional to the temperature in Centigrade(Celsius). Sensitivity is 10mV/degree Celsius. It has low self heating capability.

e) MAX30100: Integrated pulse oximetry and heart rate monitor sensor consisting of two LEDs, a photodetector, optimized optics and a low-noise analog signal processing unit. It operates from 1.8V to 3.3V.

f) LCD Display: Electronic display module that uses liquid crystal sandwiched between two glass plates coated with transparent electodes that define the characters to be displayed which makes the liquid crystal molecules to maintain a defined orientation angle and produce a visible image.

g) Android Application: MIT App Inventor is a web application integrated development environment that allows newcomers to computer programming to create application software (apps) for two operating systems (OS): Android, and iOS. It is free and open-source software that uses a graphical user interface (GUI) very similar to the programming languages Scratch (programming language) and the StarLogo, which allows users to drag and drop visual objects to create an application that can run on android devices.

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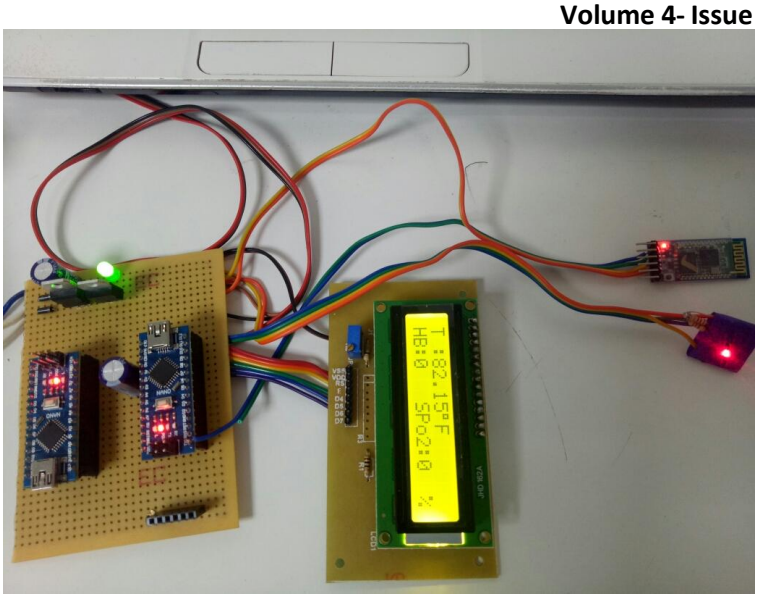

Fig 3 System Setup

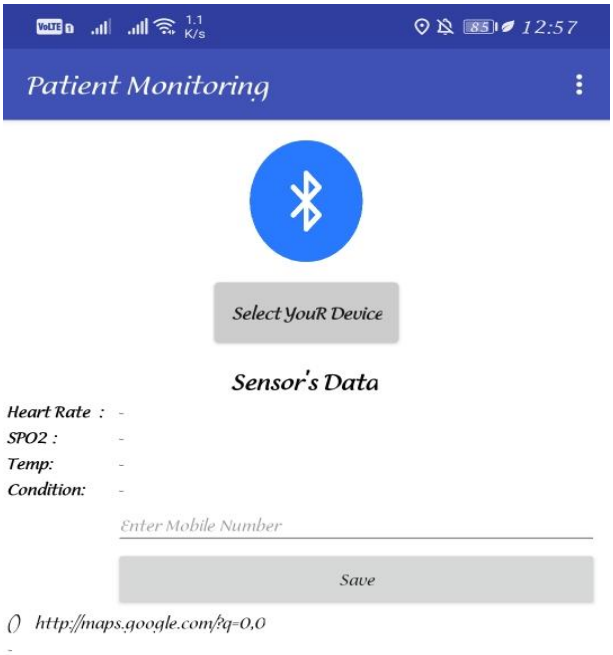

Fig 4: App homescreen

V. RESULTS

1. The biosensors (LM35 and MAX 30100) are interfaced with Arduino Nano along with a LCD display
2. The setup is paired with the user's mobile phone via Bluetooth connection between HC-05 and mobile phone's Bluetooth..
3. An emergency contact no is entered in the app screen.

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4. Every time the user comes in contact with the sensor, the parameter values are recorded and displayed on both LCD as well as phone.
5. When the values go beyond optimal range, an alert is shown and a text message containing the parameter values is immediately sent to the contact number entered.
6. Along with the parameter values, the location of the user is also shared to easily locate and cater to them.

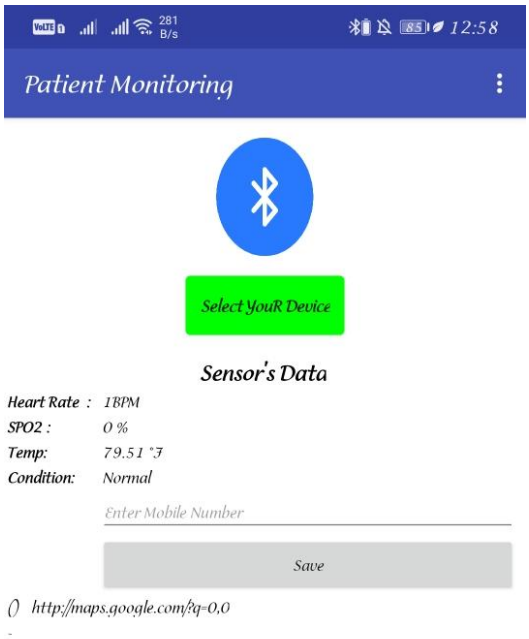

Fig 5: App showing parameter values

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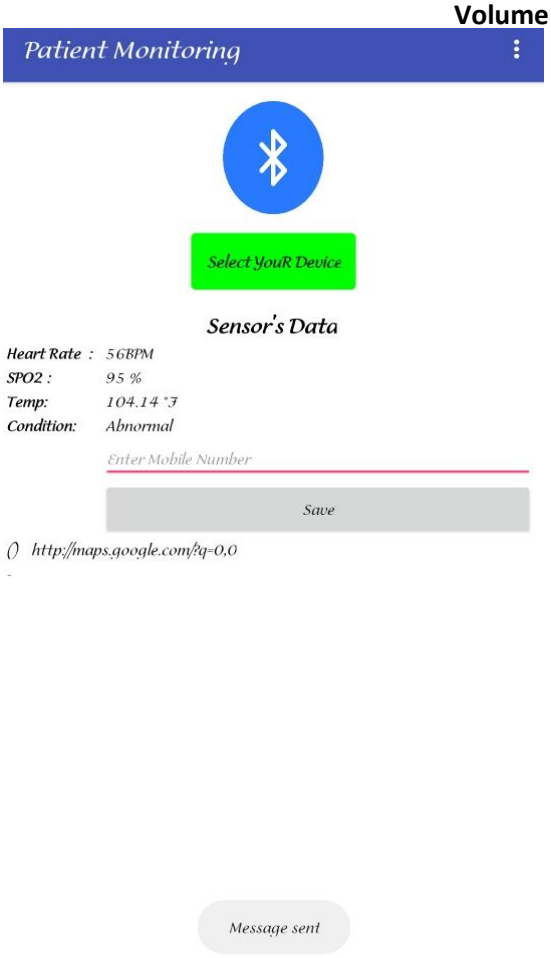

Fig 6: App sending text message when abnormal

The advantages of this system are,

i. Easy to use as it does not require any professional help.
ii. Reduces time from travelling to the hospital and booking an appointment.
iii. Simple and compact setup, hence less power consumption.
iv. Cost effective solution and user-friendly as it can be accessed by anybody.
v. Very vital in the current pandemic

VI. CONCLUSION

Vital signs are measurements of the body's most basic functions. The four main vital signs routinely monitored by medical professionals and health care providers include the following:

a. Body temperature
b. Pulse rate
c. Respiration rate (rate of breathing)
d. Blood pressure (Blood pressure is not considered a vital sign, but is often measured along with the vital signs.)

The number of subjects with positive test of the virus is increasing and so does the number of patients hospitalized. In parallel, most patients with positive test result or typical clinical symptoms are at home with no information of what to do if their clinical symptom status deteriorates. More health services must be moved closer to where the inhabitants live and simultaneously strengthening the community health system. New tools for monitoring the well-being of the patients must be developed in order to act early enough to avoid severe deterioration of health status and avoid new hospitalization. This goal has become even more important during the COVID 19 pandemic because the healthcare system is not prepared or built to take care of all these patients in hospitals. Patients and local health system may benefit from the feedback of a simple monitoring system, which detects changes in respiration and temperature variables in combination with the patient's subjective experiences of care. So a handy setup that can record and share these vital parameters from time to time is the need of the hour.

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