

Automated Blood Bank with Embedded System

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Abstract - Automated blood bank is an associate work that brings all donors and receivers on common platform. The main aim of this project is to provide blood to the receiver with minimal time. The System consists of android application for users, Arduino for collecting medical information (such as temperature and heart beat rate) of donors and Cloud server is used for communication link between user and blood bank administrator. The system is divided into three segments— First segment is to collect heart beat rate and body temperature using sensors i.e. Temperature sensor (lm35) and Pulse sensor. Second segment consists of android application and Wi-Fi module for data transfer to the server and third segment is to display the availability of blood.

Key Words: Android application, Arduino, LM35, Pulse sensor, Wi-Fi module.

1. INTRODUCTION

Blood is a very important entity in the medical field. There is need of blood for different types of illnesses [2]; the blood is collected from the voluntary donors. Blood or the components of blood are used to treat patients with medical conditions such as anaemia, cancer, blood disorders, and those having surgery. Hence, the blood cannot be evaluated in terms of the cost.

Every year the nation requires about 4 Crore units of blood, out of which only a miserable 40 Lakh units of blood are available. There are multiple blood banks around the world, however none of them offer the capability for a direct [3] contact between the donor and recipient. This is often a serious disadvantage notably in cases wherever there is associate degree pressing would like of blood. This project aims to beat this communication barrier by providing an immediate link between the donor and receiver by developing an android application through which user can register the app and search the blood that is in need. Here the user can act both as donor and receiver, and also user can view his/her body temperature and heart beat rate which are measured by sensors (Temperature sensor i.e. LM35 and Pluse sensor). As Donor, he can donate the blood through the blood camp/bank and also by individual. As receiver, he can search the blood through blood camp and also by individually. By requesting the blood, the current location of receiver will be sent to the donor.

2. HARDWARE REQUIREMENTS

2.1 Arduino Uno:

Arduino Uno is a microcontroller board based on the ATmega328 ([datasheet](#)). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

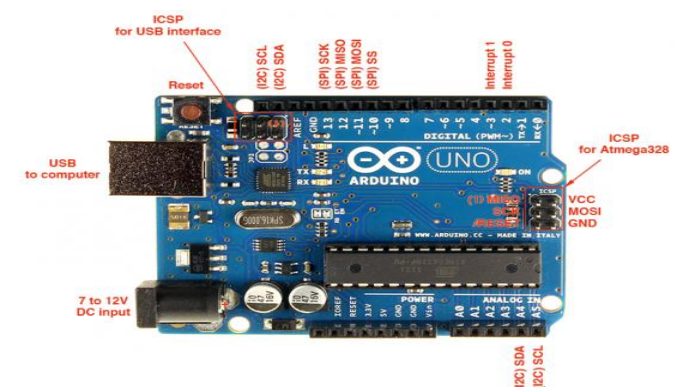


Figure 2.1 Arduino

2.2 Wi-Fi Module:

ESP8266 is a cost-effective Wi-Fi module that supports both TCP/IP and microcontrollers. It runs at 3V with maximum voltage range around 3.6V. More often than not, it also comes under name ESP8266 Wireless Transceiver. This module stays ahead of its predecessor in terms of processing speed and storage capability. It can be interfaced with the sensors and other devices and requires very little modification and development to make it compatible with other devices.



Figure 2.2 ESP8266 Wi-Fi Module

2.3 Pulse Sensor:

Heart beat sensor so called Pulse Sensor is designed to give digital output of heart beat when a finger is placed on it. When the heart beat detector is working, the beat LED flashes in unison with each heartbeat. This digital output can be connected to microcontroller directly to measure the Beats per Minute (BPM) rate. It works on the principle of light modulation by blood flow through finger at each pulse.

The Heart Beat Sensor provides a simple way to study the heart's function. This sensor monitors the flow of blood through Finger. As the heart forces blood through the blood vessels in the Finger, the amount of blood in the Finger changes with time. The sensor shines a light lobe (small High Bright LED) through the ear and measures the light that is transmitted to LDR. The signal is amplified, inverted and filtered, in the Circuit .By graphing this signal, the heart rate can be determined, and some details of the pumping action of the heart can be seen on a graph.

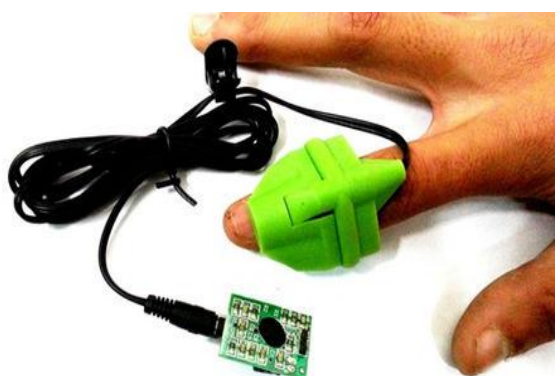


Figure 2.3 Pulse Sensor

2.4 Temperature Sensor (Lm35):

LM35 is a temperature measuring device having an analog output voltage proportional to the temperature. It provides output voltage in Centigrade (Celsius). It does not require any external calibration circuitry. The sensitivity of

LM35 is 10 mV/degree Celsius. As temperature increases, output voltage also increases. It is a 3-terminal sensor used to measure surrounding temperature ranging from -55 °C to 150 °C. LM35 gives temperature output which is more precise than thermistor output.

The LM35 thus has an advantage over linear temperature sensors calibrated in ° Kelvin, as the user is not required to subtract a large constant voltage from its output to obtain convenient Centigrade scaling. The LM35 does not require any external calibration or trimming to provide typical accuracies of $\pm 1/4^{\circ}\text{C}$ at room temperature and $\pm 3/4^{\circ}\text{C}$ over a full -55 to +150°C temperature range.

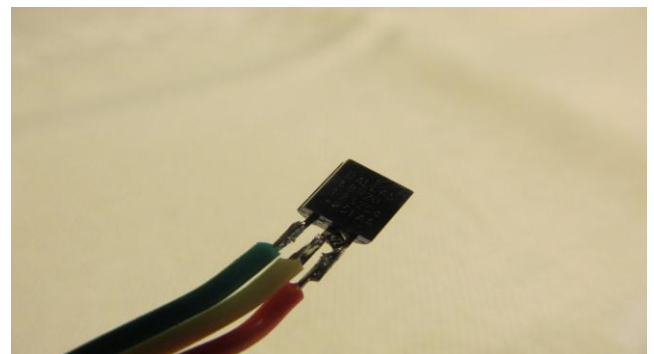


Figure 2.4 Temperature Sensor (LM35)

2.5 LCD Display:

The LCD panel used in this block interfaced with micro-controller through output port. This is a 16 character × 2Line LCD module, capable of display numbers, characters, and graphics. The display contains two internal byte-wide registers, one for commands (RS=0) and the second for character to be displayed (RS=1). It also contains a user programmed Ram area (the character RAM) character that can be formed using dot matrix that can be programmed to generate any desired. Two distinguished between these areas, the hex command byte will signify that the display RAM address 00h is chosen.

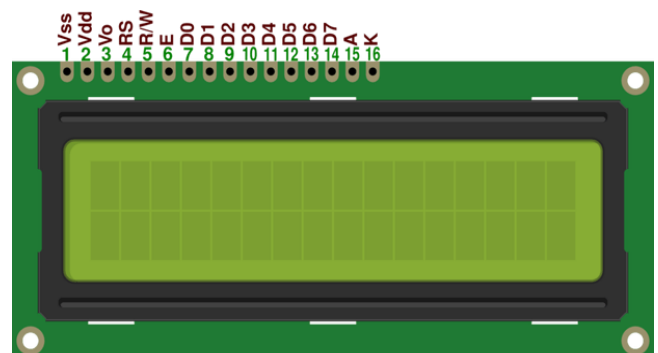


Figure 2.5 LCD Display

3. SOFTWARE REQUIREMENTS

3.1 Android Studio:

Android application is designed using Android Studio. Android Studio is the official integrated development environment (IDE) for Google's Android operating system, built on Jet Brains' IntelliJ IDEA software and designed specifically for Android development. It is available for download on Windows, macOS and Linux based operating systems. A rich layout editor that allows users to drag-and-drop UI components, option to preview layouts on multiple screen configurations. The Android SDK includes an Android device emulator - a virtual device that runs on computer. The Android Emulator lets develop and test Android apps without using a physical device.



Figure 3.1 Android Studio

4. LITERATURE SURVEY

In "Android blood bank" by prof. Snigdha et.al [1] proposed an application for blood donor. In that application the donor can find the exact path by using GPS (Global Positioning System). The detail of blood donors will be saved .private data and confidential data are only viewed by the administrator. They have methodologies like PHP, MySQL and Android.

In "Smart Blood Bank Based On IoT" by Radha R. Mahalle¹, S. S. Thorat² [2] says that, It will reduce the manpower required at the blood bank to update the online data also reduces the efforts of blood seeker of searching bloodstock at each blood bank. When bloodstock reaches to zero system helps to send a request message to the donor and nearest blood bank. By using IoT the real-time available bloodstock is displaying on the website it minimizes the efforts of blood seeker.

In "Design and Implementation of Automated Blood Bank Using Embedded System" by Bala Senthil Murugan L, Anitha Julian Assistant Professor [3], has propose that servicing the persons who seek donors who are willing to donate blood and also provide it in the time frame required. The work

explores to find blood donors by using GSM based Smart Card CPU - Raspberry Pi B+ Kit.

In "Android Blood Donor Life Saving Application in Cloud Computing" by T.Hilda Jenipha and R. Backiyalakshmi [4] has proposed an application for blood donation. In this application during emergency it will list of donors in the city. In this cloud based services is provided in which it will prove important in emergency blood delivery. They can enable immediate access to donor's information and location. It will ensure the instant location tracking and communication. Only the register person can access this service.

In "Blood Donation and Life Saver-Blood Donation App" by Anish Hamlin M R1, Albert Mayan J [5], has proposed a reliable information system based on GIS and OTP in android mobile. The main concept of this proposed system is too valuable to health care. By using this application, the existing problem such as miss use of details and wrong information provided to third party is replaced.

In "Automated Blood Bank using Embedded System on Cloud Platform" by Abhijeet Moharkar¹, Akanksha Somani² [6], has proposed that the work is to find matched blood group with its blood component (RBC, Platelet, Plasma) and provide it to the patient/ user in required time frame. It also provides transparency between users and blood bank administration. The system consist of android application for users/patient and Raspberry pi B+ as a computer for blood bank administrator. The cloud server is used for communication link between users and blood bank administration. Both are to be connected through internet connectivity also SMS facility is provided for user to know status of their requested blood group.

5. EXISTING SYSTEM

In existing there is no proper care about the people who donate blood to patients. In case if the donor has or had any medical problem and comes toward to donate blood to the patient then it may lead to threat. Hence medical history of donor should be updated.

Medical histories would be like:

- *A person who has Anaemia should not donate blood.
- *Donor who having diseases that are transmissible through blood is not request to donate blood.
- *People who are un-weight for height from their height should not donate blood.
- *Pregnant women or recent child birth women should not donate blood.

Thus the above following reasons are not updated in existing system. These types of information are not provided in existing system this may lead to dead in person. The donor and patient's body condition will not match at all the time .here it contain two aspects (1) volunteer's location (2) the distance between the user location and volunteers.

6. PROPOSED SYSTEM

The proposed method is to create an android application in which the blood donor are available easily at required time. The donors who are all register in this application are show while searching for blood donation by individually and blood camps. The donors who are all nearby location are tracked by the GIS by requesting the blood from receiver. The purpose of this application is donating blood while in case of emergency. The application also provide various information about donating blood, other medical information of users such as body temperature, heart beat rate and notification of blood camps where newly added to app. Who are all willing to donate blood can register through this application. User can act both as Donor and Receiver from this app.

System Functionalities:

* Blood donation application update information about the blood donation camp and sends the notification to the users.

*The system provides authorized features so that the private and confidential data are only view by the authorized user.

*The system will keep record of every donor into cloud platform, in order to keep track of blood stock.

By this the communication of various devices has improved, hence people can communicate anytime from anywhere through mobile. The purpose of this application is to develop blood donation services/camp and keep record of blood donor which is easy to distribute blood throughout country. Blood donation application mainly contains admin, donor, patient, database and application.

Proposed System Architecture:

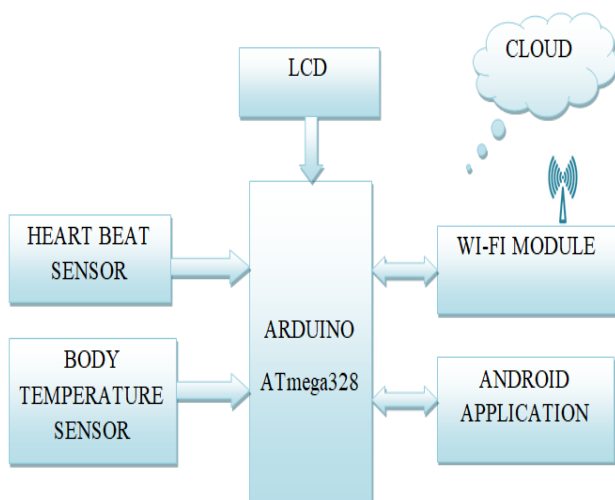


Figure 6.1 Proposed System

Modules:

Admin:

The admin provide each member a user id and a password in which he/she can identify uniquely. Changing password to maintain donor private details, updating are given to the administrator. The update operation is done by admin in which it will regularly check the expiry date of blood and request the donors who donate the blood to replace it.

Receiver:

In case of emergency they can request for blood in which it gives information. As per the health condition of the patient the blood is given. By requesting the blood the current location of requester will be sent to the donor through application where the information is fetched by wi-fi module from cloud server.

* Receiver can also receive the blood by blood camp and personally.

* He can also get the details of blood donation camp and checks the health condition.

Donor:

Each donor is given an id and password through which they can identify uniquely. There are various options given to donor such as blood donate, notification of blood donation camp, Help centre, My health kit and Feedback. The database is used to store the information about the blood donor, receiver information and so on.

* Donor can donate the blood in respective blood camp/bank and also donate personally as requested by the requester.

* Donor can check his Heart beat rate and body temperature through my health kit option.

* Donor can also view the details of blood donation camp by notification option.

Application:

This application is use to search blood donor during the time of emergency. The accepted donors are track by GPS. The GPS is used in mobile application where it is use to map the donor. The proposed system tells about the working of system where it start with opening the application in mobile .sign in or login option is given to the user. If the user already registers then admin provide the information of the user which is already stored in data base. If the user is not registered then he/she is ask to sign to entering the details about them. The admin of this application can view the details of all donors and receivers. The admin should regularly modify about the donor before and after the donating the blood. The details given by the donor are

regularly checks by the admin in which the correct information is present or not. The application maintains the record of user, blood camp.

RESULTS

Software:



Fig 1: App logo



Fig 2: Home Page

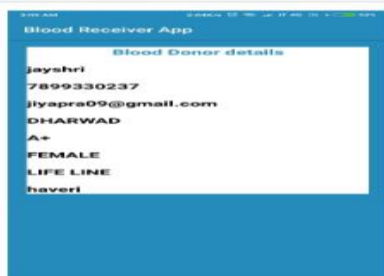


Fig 3: Details of the donor

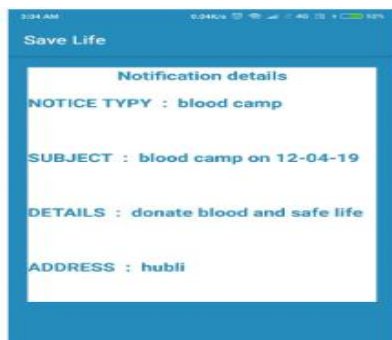


Fig 4: Notification Details About Conducting blood camp

Hardware:

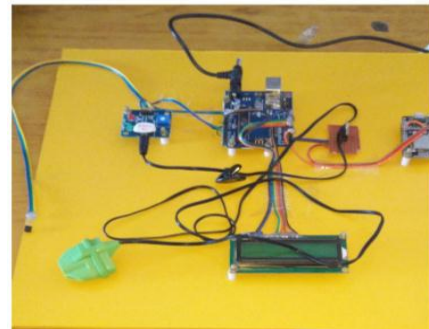


Fig 1: Hardware Component

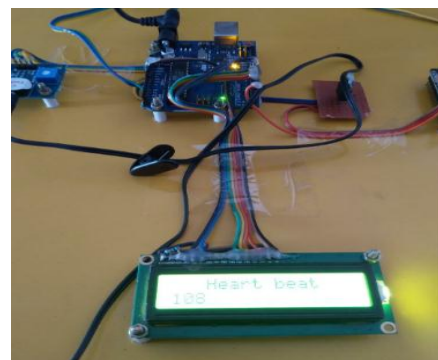


Fig 2: Heart Beat Measure

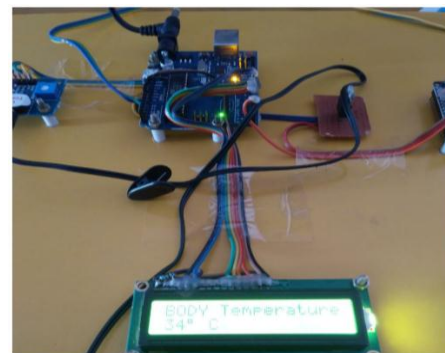


Fig 3: Measure of Body temperature

CONCLUSION

Growing population has increased the need for the blood supply for various diseases. In every two seconds, some person required blood and currently India facing problem of the blood shortage. To address the problem an effective system is designed using the android application on cloud platform. The system provides a methodology to fulfil the requirement of blood to the victims without rushing to the blood bank to know the availability of the blood. A Pulse Sensor and Temperature Sensor are connected to the Arduino board which continuously monitors the status of the Health information of users. The output data provided by the Arduino is displayed on the mobile application using the Wi-Fi module so anyone accesses the app and obtained the information of available blood. It will reduce the manpower

required at the blood bank to update the online data also reduces the efforts of blood seeker of searching blood at each blood bank.

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