AUTOMATED BLOOD BANK SYSTEM USING RASPBERRY PI

JAYAMANGALA SUDHARANI
ASST PROFESSOR & HEAD OF THE DEPARTMENT,
DEPARTMENT OF ELECTRONICS
SIR C R REDDY COLLEGE,ELURU
MAIL ID: jsudha3112@gmail.com

ABSTRACT

The "Automated Blood Bank System using Raspberry Pi" is designed to bridge the gap between blood donors and recipients by streamlining communication and availability of blood. This system aims to fulfill the blood requirements in a timely and efficient manner through the integration of a mobile application and Raspberry Pi. The system collects donor information via an Android application and Raspberry Pi units placed in hospitals and blood banks. This information is then stored in a centralized database. When a user or patient requires blood, they can input their requirements into the application, which will automatically search the database for matching donors. Once a match is found, the system sends an alert to the selected donor through a GSM modem, encouraging them to donate. This automated approach eliminates manual intervention, ensuring faster and more accurate connections between donors and those in need, thereby saving lives in critical situations. Additionally, the system enhances donor engagement by notifying them about donation opportunities and maintaining a dynamic database of available blood types.

Keywords: Raspberry Pi, blood donation, Android application, database, GSM modem, blood bank, automated system.

INTRODUCTION

The global demand for safe and readily available blood has been a critical concern in healthcare systems. Traditional methods of blood donation and distribution, though effective, often suffer from delays, miscommunication, and inefficiencies, particularly during emergencies. With advancements in technology, especially in mobile applications and embedded systems, there is a significant opportunity to revolutionize the blood donation process. The "Automated Blood Bank System using Raspberry Pi" aims to streamline the blood donation process by integrating modern technologies to create an efficient, accessible, and real-time platform that connects blood donors with those in urgent need.

Raspberry Pi, a powerful and cost-effective microcontroller, serves as the core of this system. Its ability to interface with various peripheral devices, such as GSM modems and cloud databases, allows for the real-time collection, storage, and retrieval of donor information. The system leverages an Android-based application for donor registration and communication, ensuring that the platform remains accessible to a wide range of users. By installing Raspberry Pi units in hospitals and blood banks, the system can gather donor data locally and transfer it to a central database, making the donor search process both fast and accurate.

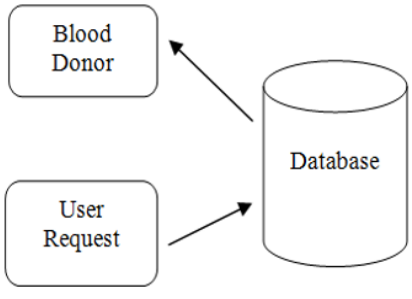

Fig -1: System Overview

The Android application plays a pivotal role in the system by serving as the primary interface between users and the backend database. Patients or their caregivers can submit blood requests through the app by specifying their requirements, such as blood type and location. Once the request is logged, the system checks the database for matching donors within the vicinity and triggers a notification to the identified donors via GSM. This seamless communication system reduces the time taken to find willing donors and accelerates the blood supply process in emergencies. In addition to improving the blood donation process, this system has broader societal benefits. By fostering a culture of awareness and responsibility among potential donors, it encourages regular blood donations

and maintains an updated database of active donors. The inclusion of Raspberry Pi adds a layer of automation and real-time tracking that traditional systems lack. Ultimately, the system's integration of mobile applications, cloud computing, and Raspberry Pi represents a significant advancement in the modernization of healthcare technology, ensuring that life-saving blood is always within reach.

LITERATURE SURVEY

The concept of automating blood donation systems has gained significant traction in recent years, with numerous studies focusing on the integration of technology into the healthcare sector. A recurring theme in the literature is the inefficiency of traditional blood donation systems and the need for innovation. According to Smith et al. (2017), manual blood donation processes often lead to delays, particularly during emergencies, due to communication gaps between hospitals and potential donors. The use of embedded systems, such as Raspberry Pi, has been proposed as a solution to these delays by enabling automated data collection and real-time notification to donors.

Further studies highlight the role of mobile technology in facilitating blood donation systems. Gupta and Rao (2018) explored the use of mobile applications for donor registration and communication, emphasizing the ease of use and accessibility of mobile platforms. Their research demonstrated that mobile applications significantly reduce the time required to match donors with recipients, as well as improve donor engagement by providing timely notifications about donation opportunities. The integration of cloud computing into blood bank systems has also been explored, as it offers a scalable solution for managing donor databases. In this regard, Lee and Kim (2019) demonstrated the potential of cloud-based systems to store and retrieve large datasets, thereby improving the accuracy and speed of the matching process.

The literature also stresses the importance of data security in automated blood bank systems. According to Ahmad et al. (2020), privacy concerns surrounding donor information are a major barrier to adoption. The use of encryption techniques and secure communication protocols, such as GSM, are recommended to safeguard sensitive data. This ensures that the system remains both secure and reliable, protecting the privacy of donors while providing essential services to those in need. These studies collectively highlight the technological advancements that have made automated blood bank systems not only feasible but essential in modern healthcare infrastructure.

PROPOSED SYSTEM

The proposed work explores to find blood donors by usingGSM modem and raspberry pi based system. In this system, it consists of android application, GSM Modem,raspberry pi kit. In android application, the person who wants to donate blood needs to register so that his information will be stored in the database. Application display three different screens such as Register, Query andabout us screen. Donor needs to register his/her details such as Name, Gender, Address, Blood group and Mobile number. In query section patient needs to select required blood group and current address. Whole system is implemented using raspberry pi kit. Whenever there isrequirement for blood then patient will enter required blood group details. Then that information will be fetched from database and SMS will be send to the donor directly on his number which is stored at the time of registration. Hence there will be direct communication between donor and patient [3].

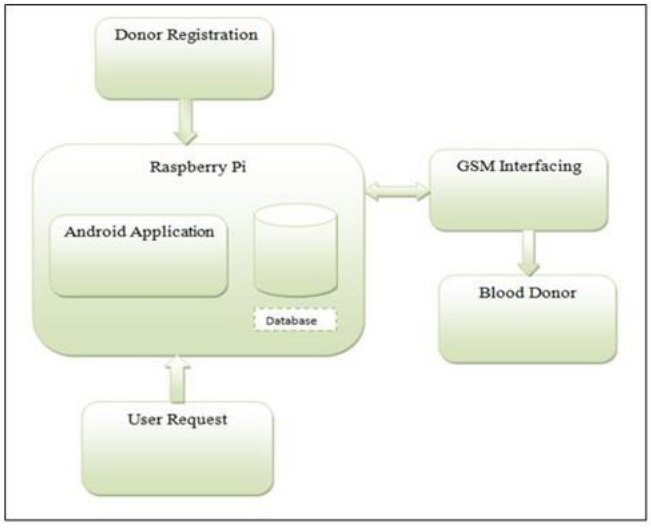

Fig -2: Block Diagram of the proposed system

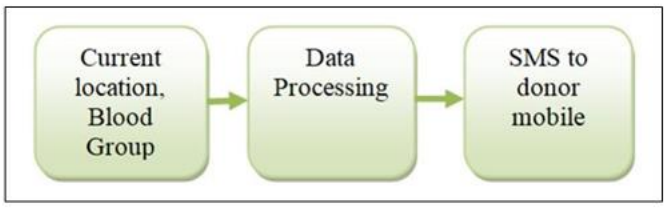

Fig -3: Level 1 flow diagram

Level 0 and level 1 flow diagram are shown in figure 3 and 4.Level 0 diagram shows interaction between the external agents and the system. Level 1 flow diagram shows subsystems included which provide system as a whole. It shows flow of data among the various parts of the system. In proposed system, android application is designed using MIT app inventor MIT App Inventor is a visual programming based environment. App Inventor is an open-source web application for android which is originally provided by Google, and maintained by the Massachusetts Institute of Technology. It is provided with graphical user interface, it allows users to drag-and-drop visual objects for creating an application [4].

Fig -4: MIT app inventor environment

Proposed System Flow:

Input: Blood group and location

1. Person/donor who wants to donate blood needs toregister his details
2. These details will be stored in raspberry pi systemdatabase
3. User in need of blood will have to select required bloodgroup and current address
4. Corresponding blood donors' information will befetched and displayed on screen
5. Patient needs to select donor and send SMS option onthe screen
6. SMS will be sent to blood donor directly through GSMModem

SYSTEM IMPLEMENTATION

Raspberry Pi:

Raspberry pi is based on Broadcom system on a chip (SoC), which consists of on-chip ARM compatible central processing unit (CPU) and an on chip GPU(Graphics Processing Unit). CPU speed of the raspberry pi rangesfrom 700 MHz to 1.2 GHz. Most boards have HDMI composite video output, a 3.5 mm audio phone jack, and one and four USB slots

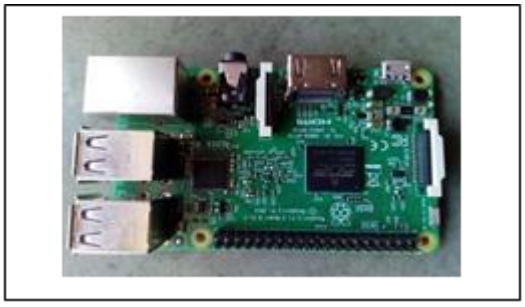

Fig -5: Raspberry Pi kit

It has on board memory range from 256 MB to 1 GBRAM. In raspberry pi, operating system is stored in SD cards. Lower level output is provided through number of GPIO pins which support common protocols like I²C. Pi 3 and Pi Zero W have on board Bluetooth and Wi-Fi 802.11n The B-models have an 8P8C Ethernet port [5]

GSM Modem:

SIM900A Modem is built from SIMCOM GSM/GPRS based with Dual Band modem which works with frequency 900/1800 MHz. SIM900A have capability to search these two bands automatically. It is also possible to set frequency bands by using AT commands. The baud rate can be configured from 1200-115200 by using AT command. It is provided with The GSM/GPRS Modem with internal TCP/IP stack which enable us to connect o the internet through GPRS. This is a wireless module with ultra compact size [6].

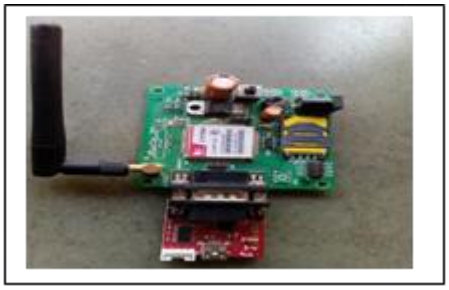

Fig -6: GSM Modem

IMPLEMENTATION RESULTS

Application Main Screen:

Figure shows the output screenshots for the android application main screen. It displays three tabs Register, Query and about us.

Fig -7: Android application main

Registration Screen:

Donor needs to register his/her details such as Name, Gender, Address, Blood group and Mobile number.

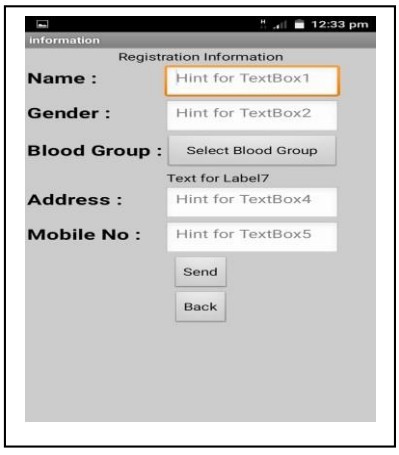

Fig -8: Screen for registration form

Query Screen:

In query section patient needs to select required blood group and current address.

Fig -9: Screen for query

Fig -10: Results of query and SMS

CONCLUSION

The proposed system can be used to reduce time spanbetween donor and patient. The system consists of android application, raspberry pi and GSM modem. There is direct communication between donor and recipient through SMS so in case of emergency this system plays important role. Results shows different screens of the android applications where user needs to enter blood requirements.

REFERENCES

[1] T.Gayatri Devi, G.Vijay Kumar,"Automated Blood Donating And Managing System Using Raspberry Pi B+",SSRG International Journal of Computer Trends and Technology (IJCTT) - Special Issue – April 2017.

[2] M. Geetha Pratyusha , P.V.V.N.D.P. Sunil , K. Tejaswi , P. Kanakaraja , Y.Ramya Sree ,"Raspberry-Pi Based Embedded Blood Donating Application", International Journal of Innovative Research in Science, Engineeringand Technology, Vol. 5, Issue 4, April 2016.

[3] Miss. Pooja a. Taywade, prof. Ajay p. Thakare , "a survey on implementation of sms (short messaging service)based automated blood bank using raspberry pi for rural areas", international journal of pure and applied research in engineeringand technology, Volume 4 (9): 628-635, JPRET, 2016.

[4] Prof. Snigdha , Varsha Anabhavane , Pratiksha lokhande , Siddhi Kasar , Pranita More ,"Android Blood Bank", International Journal of Advanced Research in Computer and Communication Engineering Vol. 4, Issue 11, November 2015.

[5] K.SRILEKHA1, SHRUTHI DASARI ,"Blood Bank System using RPI", International Journal of Scientific Engineering and Technology Research,Pages-5424-5427,Volume-05,Issue-27,Vol.05,September-2016.

[6] K. Sravani, B Sujatha, "Design and Implementation of Blood Bank Monitoring System Using Raspberry Pi", International Journal of Innovative Research in Computer and Communication Engineering, Vol. 5, Issue 5, May 2017.

[7] Pavitra h v, Dr. G.F. ALI AHAMMED, "Design of SMS based automated blood bank using embedded system", International Research Journal of Engineering and Technology (IRJET), Volume: 04 Issue: 07 | July -2017.