Efficient Blood Bank System Automation with Raspberry Pi

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Abstract - —*"A blood bank system based on Raspberry Pi was suggested to centralise blood donations. This system's goal is to use a Raspberry Pi and an Android application to complete each blood request. The suggested solution would use a Raspberry Pi and an Android application to gather donor data by setting up devices at locations like blood banks and hospitals. The database will house these records. The user or patient must visit the program, submit his blood requirements, and have the database match those criteria. A message will then be sent to that specific blood donor using a GSM modem.*
Key Words: **Raspberry Pi; Embedded Blood Bank; Blood donor; GSM; Android;**

1. INTRODUCTION

The demand for blood is sharply rising. We need five million blood units annually, yet there are only five million units available. This is the main disadvantage when emergency blood is needed. Some patients, such those with cancer, require blood on a daily basis. Despite the advancement of technology, we are still unable to connect blood donors and receivers on a single platform. Accidents are unpredictable. Since blood needs might arise at any time, proper contact between the donor and the recipient is essential to preventing extended wait times for blood [1].

Figure 1 displays an overview of the proposed system.In essence, the patient or user must submit a request with the necessary blood details; database data will be retrieved, and the appropriate blood donor will be notified. Section II of this work includes the software design, system flow, and object tracking system diagram. Section III provides an explanation of the Kalman filter algorithm and its mathematical formulas. Section IV presents the system's results. In part V, the task is finally completed.

Fig -1: System Overview
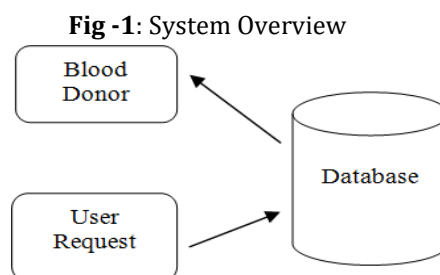
2. RELATED WORK

Blood bank is responsible for the storage, processing and collection of blood. Blood plays important role in blood bank as it is the necessity of everyone. Many researchers worked on the development of blood bank management system. Some of them are given below [2]:

1. Virtual Blood Bank Project

This system implemented by using java and web applications. This allows us to find donors from their respective address which are collected from hospital database.

2. Location based blood bank system based on cloud storage

This type of system is based on mobile app which is linked to cloud server. Donor registration details and other details will be stored in the cloud. In case of an emergency anybody can use this app to locate the donor.

3. Emergency Blood Bank directories using **www.bloodbanker.com**:

In this type of system, **www.bloodbanker.com** website holds the details of hospitals and blood banks in USA. Website can be used to find the nearest blood donor.

3. PROPOSED SYSTEM

3.1 Block Diagram of the system:

The proposed work explores to find blood donors by using GSM 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 and about 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 is requirement 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].
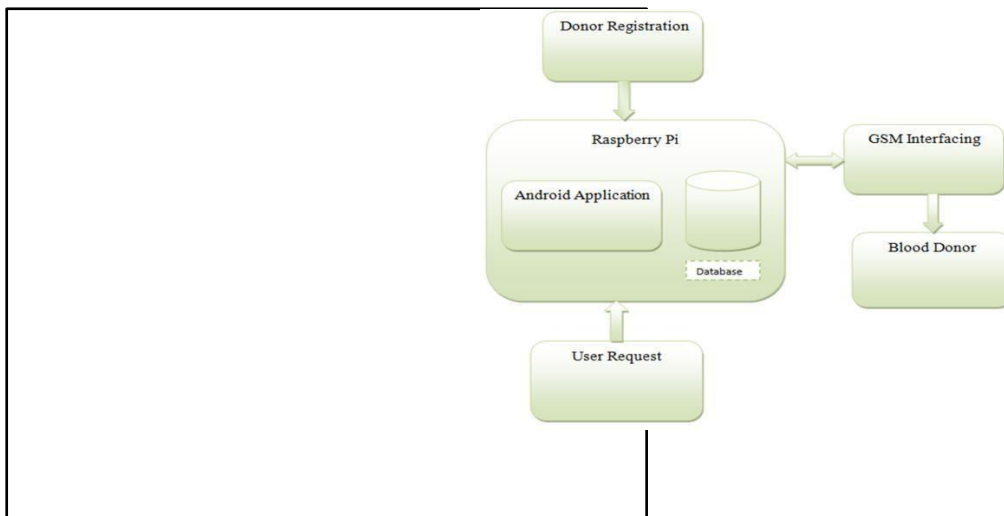

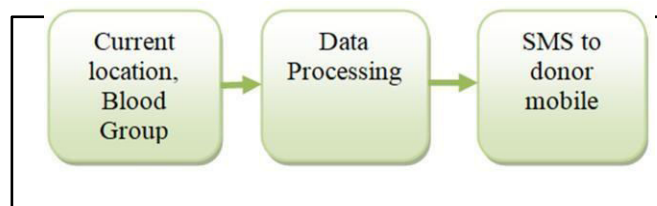**Fig -2**: Block Diagram of the proposed system

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.

3.2 Android Application:

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].
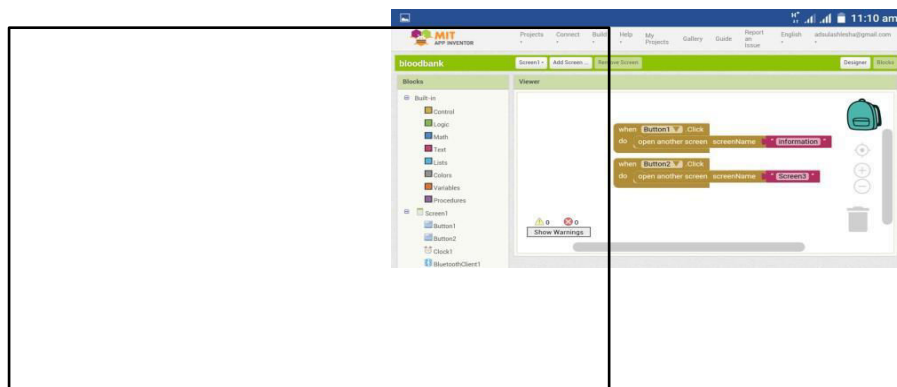
Fig -4: MIT app inventor environment

3.3 Proposed System Flow:

Input: Blood group and location

1. Person/donor who wants to donate blood needs to register his details
2. This details will be stored in raspberry pi system database
3. User in need of blood will have to select required blood group and current address
4. Corresponding blood donors information will be fetched and displayed on screen
5. Patient needs to select donor and send SMS option on the screen
6. SMS will be send to blood donor directly through GSM Modem

4. SYSTEM IMPLEMENTATION

4.1 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 ranges from 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 I^2C. Pi 3 and Pi Zero W have on board Bluetooth and Wi-Fi 802.11n The B- models have an 8P8C Ethernet port [5]

4.2 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 to the internet through GPRS. This is a wireless module with ultra compact size [6].
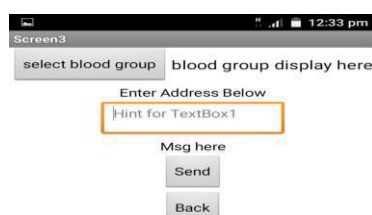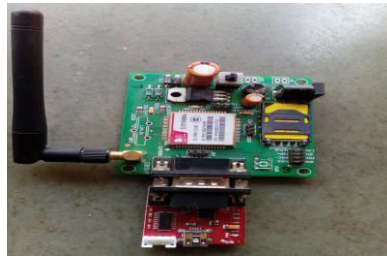
Fig -6: GSM Modem

5. IMPLEMENTATION RESULTS

5.1 Application Main Screen:

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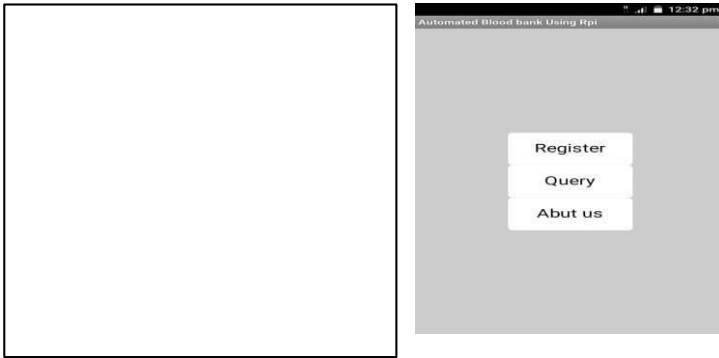

Fig -7: Android application main

5.2 Registration Screen:

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

5.3 Query Screen:

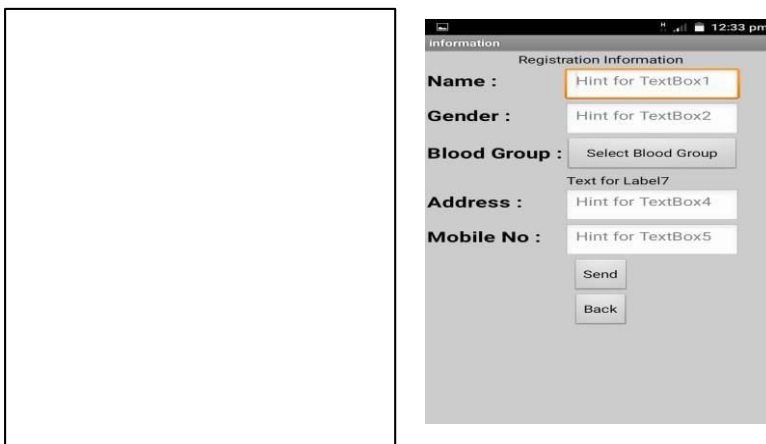In query section patient needs to select required blood group and current address.

Fig -8: Screen for registration form
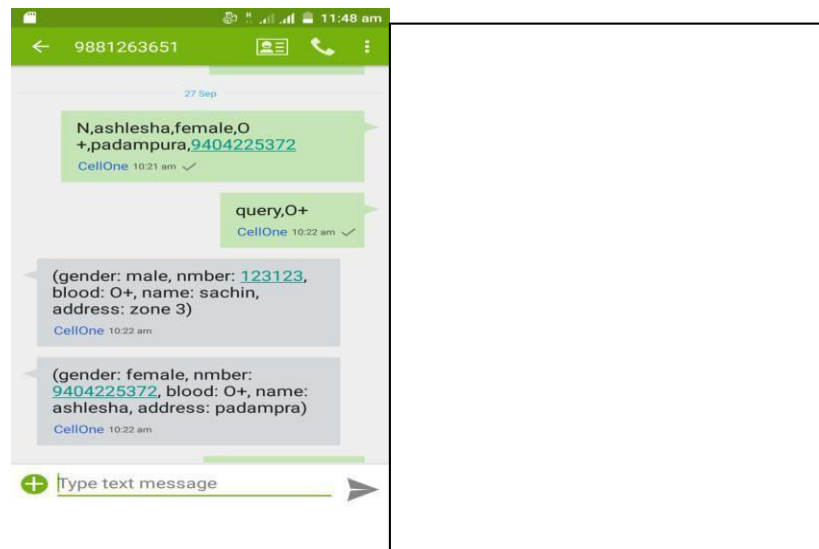
Fig -9: Screen for query

Fig -10: Results of query and SMS

6. CONCLUSION

The period between a donor and a patient can be shortened with the help of the suggested system. The Raspberry Pi, GSM modem, and Android app make up the system. Since SMS allows for immediate contact between the giver and the recipient, this method is crucial in an emergency. The results display several Android application windows where the user must input blood requirements.

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