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A NOVEL AUTOMATED BLOOD BANK SYSTEM USING ARDUINO

Vishal V.Rathi^{*1} & Roshan Karwa²

^{*1}Assistant Professor, EXTC Department, Sipna COET, Amravati, India

²Assistant Professor, CSE Department, PRMIT&R, Badnera, India

ABSTRACT

Blood is life and it has to be made available as and when required. Obviously, it is a duo involved .the donor and the recipient .When an earnest request from the recipient is made to reach the donor ,a project from all the useful Android may get involved , and this is how an automated blood bank comes into existence .A heart-to-heart tete-e-tete would be the best answer and their communication could be best initiated by providing a direct link between the two . It requires Micro USB of 5V and 2A power supply only. Entire communication takes place via SMS (Short Messaging Service) which is compatible among all mobile types. “Automated Blood Bank” is a dream come true project ,both for the giver and taker. The passionate sense of the wonder of existence ,which sets in a personal problem of having to ask for that life –fluid for self –nourishment crops up and the ready help is provided by this life saving project. The proposed work explores to find blood donors by using GSM based Arduino Kit. The vision is to be “The hope of every Indian in search of a voluntary blood donor.

Keywords: *Android, SMS, Micro USB, Communication.*

I. INTRODUCTION

Blood is the red fluid that circulates in our blood vessels, i.e. veins and arteries. As for justification. There may or can be no substitutes for wide ranging need for blood, no other possibility to get it so quickly through other alternatives . It cannot be made or manufactured. The more widely it is used ,the more society will become aware of the range of its utility and practices which make it valuable for a diversity of social purposes. Science has repeatedly insisted on the need to examine the concept of blood and its scope more articulately.

Blood is the human fluid carries out all the participatory function of the body –natural,factual,biological and all.It is red in colour but with different antigens namely A,B,AB and O and specific about who shall take what .Blood too is fashionable –it has its own matching system.AB is a universal receiver and O is the universal Donor. Group A blood has only the A antigen, group B has only the B antigen, group AB has both and group O has neither.

Blood can be stored for a limited period of time that is why the blood banks need a steady and constant collection.

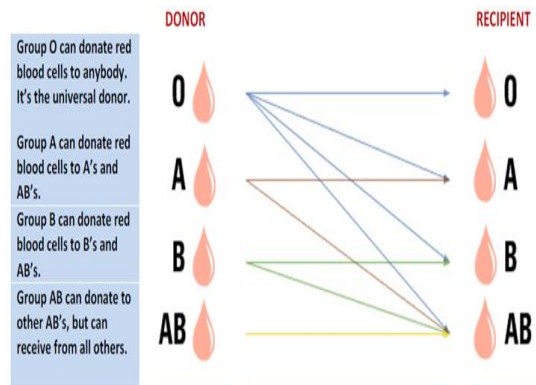


Figure 1.1. Donor- Recipient

There are multiple blood banks around the India; however none of them offer the capability for a direct 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. Following chart gives more information about these blood groups.

You Can Receive								
If Your Type Is	O-	O+	B-	B+	A-	A+	AB-	AB+
AB+	YES	YES	YES	YES	YES	YES	YES	YES
AB-	YES		YES		YES	YES		
A+	YES	YES			YES	YES		
A-	YES				YES			
B+	YES	YES	YES	YES				
B-	YES		YES					
O+	YES	YES						
O-	YES							

Figure 1.2. Blood Groups Details

Although people speak of rare blood groups such as AB negative being in high demand, more common groups such as B positive and O positive are needed the most. Almost all blood banks receive a large number of donors who donate B positive and O positive blood.

When the requirement is of about 4 crore units of blood in India ,availability is as scarce as only 40 lakh units .Inspite of the fact that there are ample number of blood bank registered,there has not been a direct contact between the donor and the receiver and this automated blood bank project shall be an answer to many –a-problems.

II. LITERATURE REVIEW

Automated online blood bank database:

A number of online blood bank databases are available, however none of them offer the capability for a direct contact between the donor and recipient. This is a major drawback particularly in cases where there is an urgent need of blood. Our project aims to overcome this communication barrier by providing a direct call routing technique using Asterisk hardware. A blood bank database is created by collection of details from various sources like Blood banks, NSS, NGO's, hospitals and through web interface. The data collected will be maintained in a central server. This central server will be associated with a Toll free number that can be used to connect to it. The willingness of donor and the closeness of the donor to the place from where the call is coming are also accounted for in defining this algorithm. Based on the algorithm the most eligible donor is found out. From the server the call from the required person is routed to the eligible donor's number. Such a system considerably cuts down on the overheads involved in referring to an online database and then calling the donors and verifying their willingness at a time when there is a critical need for the blood.[5]

Design and implementation of automated blood bank using embedded systems:

Automated Blood Bank is an associate work that brings voluntary blood donors and those in need of blood on to a common platform. The mission is to fulfill every blood request in the country with a promising android application and motivated individuals who are willing to donate blood. The proposed work aims to overcome this communication barrier by providing a direct link between the donor and the recipient by using low cost and low power Raspberry Pi B+ kit. It requires Micro USB of 5V and 2A power supply only. Entire communication takes place via SMS (Short Messaging Service) which is compatible among all mobile types.

"Automated Blood Bank" is a project that brings voluntary blood donors and those in need of blood on to a common platform. This project aims at servicing the persons who seek donors who are willing to donate blood and also provide it in the time frame required. Automated Blood Bank tries to assist victims/patients/those in want of blood.

It is an endeavour to achieve dead set these people in want of blood and connect them to those willing to donate. The proposed work explores to find blood donors by using GSM based Smart Card CPU – Raspberry Pi B+ Kit. The vision is to be “The hope of every Indian in search of a voluntary blood donor”. [1]

Blood bank management system:

At present, the public can only know about the blood donation events through conventional media means such as radio, newspaper or television advertisements. There is no information regarding the blood donation programs available on any of the portal. The current system that is using by the blood bank is manual system. With the manual system, there are problems in managing the donors' records. The records of the donor might not be kept safely and there might be missing of donor's records due to human error or disasters. Besides that, errors might occur when the staff keeps more than one record for the same donor. There is no centralized database of volunteer donors. So, it becomes really tedious for a person to search blood in case of emergency. The only option is to manually search and match donors and then make phone calls to every donor. There is also no centralized database used to keep the donors' records. Each bank is having their own records of donors. If a donor makes donation in different hospital, no previous records can be traced except if the donor brings along the donation certificate. Hence, the donor is considered to be a first timer if they make blood donation in a new place. Without an automated management system, there are also problems in keeping track of the actual amount of each and every blood type in the blood bank. In addition, there is also no alert available when the blood quantity is below its par level or when the blood in the bank has expired.

Design of SMS based automated blood bank using embedded system

The paper suggests Data Mining to enhance wellbeing of blood donation prepare gives the accumulation and investigation of data identified with responses related with the procedure of blood gift. It utilizes Donor Hart instrument and Data Mining strategies to enhance contributor's wellbeing. The confinements of this framework are it neglects to apply early prevention methods to the benefactor. [2].

Blood Bank Management System using Cloud Computing for Rural Area

The paper presented by Blood Bank Management System using Cloud Computing for Rural Area gives a blood to at whatever point and any condition to searcher isolated from that searcher is furthermore prepared to call the suppliers in emergency. The limitations of this system are it just maintains Blood Bank data and does not focus on donor reactions while donating blood. [2]

A framework for a smart social Blood donation system based on mobile cloud computing

This paper which helps to communication between blood donors and blood donation centres so that the appropriate donor can be reached just on time using Mobile Cloud Computing but a wide range of applications are difficult to run in the mobile devices. [2]

III. MATERIAL & METHODS

All communication takes place via SMS (Short Messaging Service) which is compatible with almost all mobile types. "Automated Blood Bank" proposes to bring voluntary blood donors and those in need of blood on to a common platform. This project is originated on an android APP, this will help to find the donors. Blood donor will participate in donor list using APP. Suppose if any need in blood, will get the donor list in this APP. Here in this APP, only 3 Blood group (A+, B+, O+) Data base is established. The recent interested donor number will be available in the data base. Automated Blood Bank brings blood donors and those in need of blood on to a common platform. Through this application, individuals look for donors who are willing to gift blood, furthermore as give the timeliest support to those in frantic want of it. The mission is to fulfill every blood request in the country with a promising web portal and motivated individuals who are willing to donate blood. The vision is to be "The hope of every Indian in search of a voluntary blood donor". The slogan is "Donate blood to save the most precious human life".

The system explores to find blood donors by using GSM based Smart Card CPU Arduino Nano Kit. Figure shows overall system architecture.

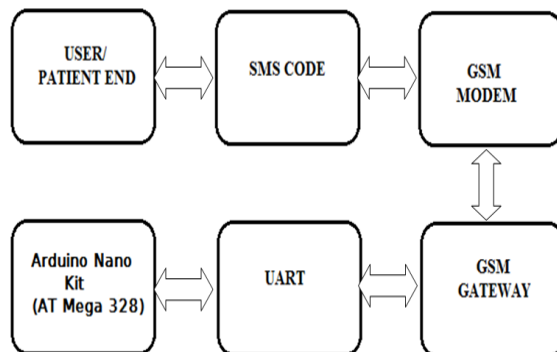


Figure 3.1 Block diagram of system architecture

REQUIREMENT OF PATIENT:

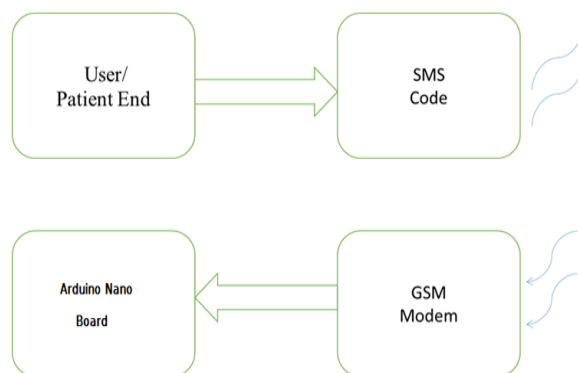


Figure 3.2. Block diagram of patient requirement

In this, blood donors (user) or patients in need of blood can send a SMS (Short Messaging Service) to a specific number which includes particular syntax for sending SMS.

This SMS is received through GSM in a Arduino nano and then fetching is done by using arduino via UART.

ACKNOWLEDGEMENT FROM ARDUINO NANO:

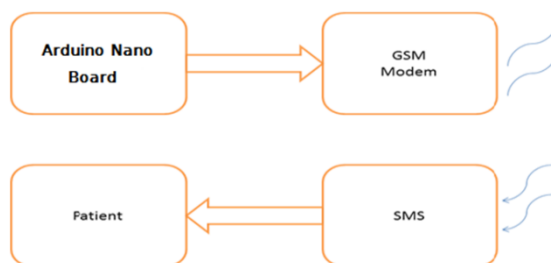


Figure 3.3. Block diagram of Arduino Nano acknowledgement

On the other hand, it is stored in Arduino Nano and according to that SMS it checks availability. Finally reply is send through GSM on that same number according to requirements of user/patient. This project uses GSM modem interfaced to the controller i.e ATMega 328. GSM is interfaced through the MAX232 to the Controller.

HARDWARE INTERFACING

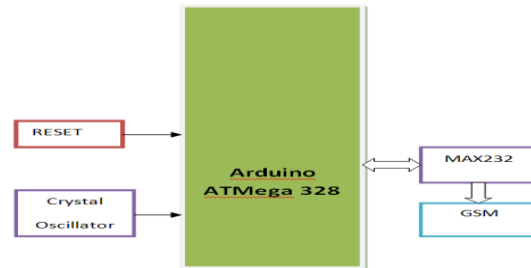


Figure 3.4. Diagram for Hardware interfacing

IV. WORKING PRINCIPLE

All the communication of this automated blood bank system takes place via short messaging service. The project helps the needy to determine the available quantity of blood groups at various blood storing centre .It comprises of GSM based smart card CPU ,Arduino nano kit .At the beginning ,The needy send an SMS to the blood bank station having a specific number which should follow a proper syntax .The SMS is received through GSM in a Arduino Nano and then fetching is done by arduino using Universal asynchronous receiver and transmitter .

The arduino Nano checks its availability. Finally; the GSM replies it to the needies number according to the requirement of the needy.

This project uses GSM modem interfaced to the controller that is .ATmega 328 .GSM is interfaced through MAX 232 to the controller .The system is very easy to use ,Accessible and does not uses internet for its working .The project would definitely prove a boon to the needy.

V. RESULT AND DISCUSSIONS

When a seeker sends a SMS to given number, system gives reply through GSM modem to the seeker according to the availability of blood group. Seeker can send SMS by using specified syntax for sending SMS as given below.

<WANT><BLOOD GROUP NAME>

For example, if seeker is searching for AB+ blood group, then he/she must write SMS as ‘WANT AB+’. System will give reply to the same seeker. System will reply in three cases given below.

Case 1:

If seeker texted as only ‘WANT’ as a message, the system will reply as ‘Please Enter Valid Blood Group’.

Case 2:

if seeker texted as only ‘WANT O-’ as a message, the system will reply according to availability of blood group.

Case 3:

if seeker texted as only ‘AB’ as a message, the system will take this message as invalid and reply as ‘Invalid Keyword’.

Case 4:

if seeker texted as only ‘WANT Z’ as a message, the system will reply as ‘Wrong Blood Group, Please Enter Valid Blood Group’.

- 1) Zero requirement for Internet: The biggest advantages of this automated blood bank system is that since it requires only a mobile phone well equipped with SMS service .This system does not require internet service.
- 2) Ease of use: The system is very easy to use .Even a layman can handle it successfully
- 3) less amount of money for installation and designing.
- 4) Low maintenance: The system is based on simple SMS service .Hence it does not require maintenance from time to time

VII. CONCLUSION

Blood is the primary necessity of life. There are different scenarios available for searching blood donors. This proposed system will be one step ahead from the other blood donation systems. Blood recipient can contact the blood donor directly by using this system. An algorithm was designed to find the eligible donor based on the blood group and location. When there is urgent need for blood, it may not be possible for people to connect to the internet to look into the online blood database systems that are already in existence. Online database with automated call routing functionality is the apt choice for immediate fulfilment of blood requirements.

REFERENCES

1. *Design and implementation of automated blood bank system using embedded system by Jamalpur Mohanlal and Mudrakolla Krishna published in International journal and magazine of Engineering, Technology and Management and Research.*
2. *A research paper entitled automated blood bank management system using direct call routing technique published in international journal of Novel research in computer science and software engineering by J.Aswin Rupsnath ,Dr.P.Marikkannu*
3. *Design of SMS based automated blood bank system using embedded system published by Pavitra H V and Dr.G.F.Ali Ahammed in international research journal in Engineering and technology.*
4. *Arif. M. Sreevas. S. Nafseer. K. and Rahul. R., Automated online Blood bank database India Conference (INDICON), Annual IEEE, Print ISBN:978-1-4673-2270-6, pp. 012 – 017, 2012*
5. *BalaSenthilMurugan L, Anitha Julian, "Design and Implementation of Automated Blood Bank using Embedded Systems", International Conference on Circuit, Power and Computing Technologies [ICCPCT], 2015.*
6. *Kapicak L, Nevlud P, Zdralek J, Dubec P, Plucar J,"Remote control of Asterisk via Web Services", 34th International Conference on Telecommunications and Signal Processing (TSP), 2011.*
7. *Peter Marbach, Oliver Mihatsch, and John N.Tsitsiklis, "Call Admission Control and Routing in Integrated Services Networks Using Neuro-Dynamic Programming", IEEE Journal on selected areas in communications, VOL.18, NO.2, February 2000.*
8. *R Vanitha M.E, P Divyarani, "BCloud App: Blood Donor Application for Android Mobile", International Journal of Innovations in Engineering and Technology (IJJET), Vol. 2 Issue 1 February 2013.*
9. *Nader Moayeri, Jalal Mapar, Stefanie Tompkins, KavehPahlavan, "Emerging opportunities for localization and tracking", IEEE Wireless Communications, April 2011.*
10. *E. Cohn, F. R. N. Gurd, D. Surgenor, B. Barnes, R. Brown, G. Derouaux, et al., "A System for the Separation of the Components of Human Blood: Quantitative Procedures for the Separation of the Protein Components of Human Plasma Ia, b, c," Journal of the American Chemical Society, vol. 72, pp. 465-474, 1950.*
11. *D. Pasqualetti, A. Ghirardini, M. Cristina Arista, S. Vaglio, A. Fakeri, A. A. Waldman, et al., "Blood component fractionation: manual versus automatic procedures," Transfusion and apheresis science, vol. 30, pp. 23-28, 2004.*
12. *P. Brown, R. Rohwer, B. Dunstan, C. MacAuley, D. Gajdusek, and W. Drohan, "The distribution of infectivity in blood components and plasma derivatives in experimental models of transmissible spongiform encephalopathy," Transfusion, vol. 38, pp. 810-816, 2003.*
13. *K. Tindell, H. Hansson, and A. J. Wellings, "Analysing real-time communications: controller area network (CAN)," in Real-Time Systems Symposium, 1994., Proceedings., 1994, pp. 259-263.*

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14. L. I. Y. S. Yafei, "Development of CAN-bus interface embedded system based on C8051F040 [J]," *Electronic Measurement Technology*, vol. 2, p. 026, 2009