

Design and Implementation of Automated Blood Bank using Embedded Systems

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Abstract— 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 an 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 endeavor 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".

Index Terms— Raspberry Pi; Mobile Blood Bank; Embedded Systems; Blood Donors; GSM Based Smart Card CPU

I. INTRODUCTION

Every year the nation requires about 4 Crore units of blood, out of which only a meager 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 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 therefore the recipient by victimization low price and low power Raspberry Pi B+ kit. It requires Micro USB of 5V and 2A power supply only. 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.

The proposed work aims at servicing the persons who seek donors who are willing to donate blood and also provide it in the time frame required. Every year the state needs regarding four Crore units of blood, out of that solely a meager forty Lakh units of blood square measure out there. Every two seconds somebody desires blood. More than thirty eight thousand blood donations area unit required a day. A complete of thirty million blood parts area units transfused annually. More than one million new individuals are unit diagnosed with cancer annually. Several of them can would need blood, typically daily, throughout their therapy treatment. One automotive accident victim will need as several as hundred units of blood. All the on top of wants are met by the planned work. Automated Blood Bank tries to help victims/patients/those in need of blood. The proposed work explores to find blood donors by using GSM based Smart Card CPU - Raspberry Pi B+ Kit.

II. RASPBERRY PI - MODEL B+

The credit-card sized laptop is capable of the many of the items that consumer desktop laptop will, like spreadsheets, word-processing and games. It additionally plays high-definition video. It will run many flavors of UNIX operating system and is getting used to show children everywhere the plant the way to program. The secret sauce that makes this computer so tiny and powerful is that the Broadcom BCM2835, a System-on-Chip that contains associate degree ARM1176JZFS with floating purpose, running at 700MHz, and a Video core four GPU. It means that if the user plug the Raspberry Pi into HDTV, people could watch Blue Ray quality video, using H.264 at 40MBits/s. The new Model B+ also has a 10/100 Ethernet port so the user can surf the web (or serve web pages) from wherever they are using the Pi. The system volume no longer lives on an SD card but instead a micro SD card, so it is even easier to organize, run and rectify many totally different operating systems on an equivalent hardware. This means no more large SD cards and no more

deceptively difficult to handle adapters Most Linux distributions for the Pi will happily live on a 2GB micro SD card but larger cards are supported. Figure 1 shows the Raspberry Pi B+ Kit diagram.



Figure 1 Raspberry Pi B+ Kit

III EASE OF USE

Global system for mobile communication (GSM) is a globally accepted standard for digital cellular communication. GSM is that the name of a standardization cluster established in 1982 to make a Standard European mobile phone standard that may formulate specifications for a pan-European mobile cellular radio system operating at 900 MHz. It is estimated that several countries outside of Europe can be a part of the GSM partnership. Alex Varshavsky. M. Y. Chen. E. de Lara. J. Haehnel. J. LaMarca. Hightower. A. F. Potter. Froehlich. D. T. Sohn. K. Tang. and I. Smith (2006), ‘Are GSM Phones The Solution for Localization?’.

IV. AUTOMATED BLOOD BANK

Automated Blood Bank brings voluntary 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 motto - “Donate blood to save the most precious human life”. Ibrahim. M and M. Youssef (2012), ‘CellSense: An Accurate Energy-Efficient GSM Positioning System Vehicular Technology.

Raspbian Wheezy: Raspbian wheezy is an open source operating system based on Debian optimized for the raspberry pi hardware. It is Linux kernel based operating system which uses on the light weight ARMv6 instruction set that a typical Broadcom processor understand. Apache2:

It is also known as “Apache HTTP Server” which allows the online distribution of website service using Hyper Text Transfer Protocol (HTTP). It is wide widespread net server for various operating systems like Linux, Unix, Windows, Solaris, Novell NetWare, Mac OS X, OS/2 etc. Apache2 version was utilized in this project for making net server. Figure 2 shows the functional block diagram. PHP5: The PHP hypertext preprocessor (PHP) is a server- side scripting language designed for web development. PHP code is integrated by a web server with a PHP processor module which generates the resulting web page. PHP is largely used for developing net primarily based code applications and conjointly to manage database, dynamic content, session chase, even build entire e-commerce sites. PHP5 version was utilized in this project. It support standard SQL and compiles on variety of platform. MySQL is open source, free to download and use. Proftpd: Proftpd is a File Transfer Protocol(FTP) server which is used to transfer website from computer to raspberry pi. It is free and open source software, compatible to number of platforms such as Linux, Mac OS X, Solaris, Sun OS, Windows(via Cygwin) etc. It is a secure and configurable FTP server with more number of option’s. Mohamed Ibrahim and Moustafa Youssef (2011), ‘A Hidden Markov Model for Localization using Low-End GSM Cell Phone’.

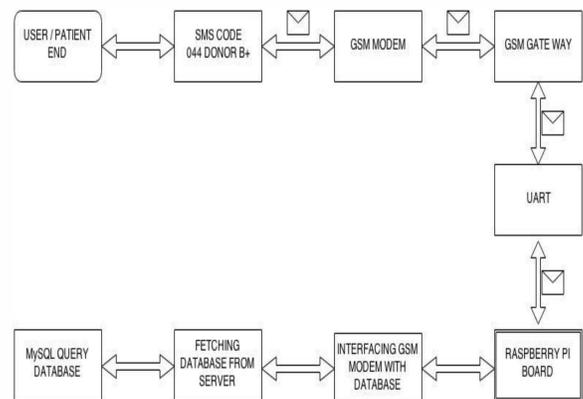


Figure 2 Functional Block Diagram

Power consumption - The Pi attracts concerning five to seven watts of electricity. This is often be concerning one tenth of what a comparable life-sized box can use. Since servers are running perpetually night and day, the electrical savings will extremely add up. It has been calculated that the basic Pi kit (Pi board, case, and power supply) will pay for itself with about one year's worth of electricity savings if it's left to run 24x7x365. It has been decided to use the CanaKit Basic Kit (ASIN # B00DG9D6IK) which is very affordable and good quality. No moving components - There are also no fans and alternative things to fret regarding. A Class 10 SD card is typically the simplest playacting compared to social class cards, however this can mainly only affect boot time wherever there is the

foremost I/O. Karan Punjabi, Pooja Bolaj, Pratibha Matur, and Sneha Wali (2014), ‘Bus Locator via SMS Using Android Application’.

Small form factor - The Pi (with a case) can be held by self. A comparable large box cannot. This means that the Pi will be integrated within of devices, too. No noise - The Pi is completely silent. Status lights - There are several status lights on the Pi's motherboard. With a clear case the NIC activity can be seen, disk I/O, power status, etc. Expansion capabilities - There are numerous devices available for the Pi, all at very valuable prices. Everything from an I/O board (GPIO) to a camera. The Pi has four USB ports, however by hooking up a powered USB hub, more devices will be added. Built-in HDMI capable graphics - The show port on the Pi is HDMI and should handle resolutions up to 1920×1200, which is sweet for creating the Pi in to a video player box for instance. There are some converters which will convert to VGA for backwards compatibility. It uses the Sanoxxy HDMI to VGA cable (ASIN # B0088K7QUQ) which has worked well so far. It is one of the few devices in its class that offers 512 MB of RAM. Figure 3 shows the pictorial representation.

The Pi has come back down in value since it initial arrived, and is finally reasonable as a hobby, business use, or no matter want there is. Large community support - The Pi has extraordinary community support. Support is obtained quite simply for the hardware and/or GNU/Linux package that runs on the Pi primarily in user forums, counting on the GNU/Linux distribution used. Over continuance capability - The Pi is over clocked if there area units performance issues with the applying used, however it is at the user's risk to try to do this. Raspberry Pi Camera - The Raspberry Pi camera board contains a 5 MPixel sensing element, and connects via a ribbon cable to the CSI connective on the Raspberry Pi. The video and still image quality is best than a USB webcam of similar price. Spyropoulos. B., Botsivaly. M., Tzavaras. A., and Spyropoulou, P (2009), ‘Towards digital blood-banking’.

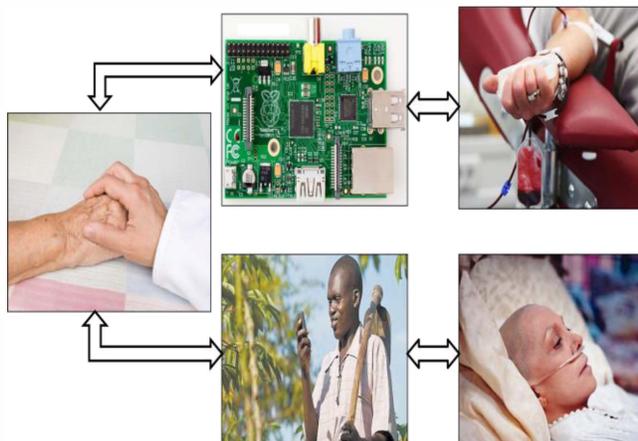


Figure 3 Pictorial Representation

A. Abbreviations

ADT - Android Development Tools, AMPS - Advanced Mobile Phone Service, C2DM - Cloud To Device Messaging, CSCC - Computer Supported Cooperative Care, EWS - Embedded Web Server, FTP - File Transfer Protocol, GCM - Google Cloud Messaging, GPS - Global Positioning System, GSM - Global System for Mobile Communication, HTTP - Hyper Text Transfer Protocol, IDE - Integrated Development Environment, LTS - Long Term Support, LVS - Linux Virtual Server, NMT - Nordic Mobile Telephone, OOM - Out of Memory, SDK - Software Development Kit, SMS - Short Messaging Service.

B. Facts about the blood supply

Blood cannot be factory made – it will solely return from generous donors. Type O-negative blood (red cells) can be transfused to patients of all blood sorts. It is forever in great demand and sometimes in brief offer. Type AB-positive plasma can be transfused to patients of all different blood sorts. AB plasma is additionally typically in brief offer. Facts concerning the blood donation method. Donating blood could be a safe method. A sterile needle is employed one time for every donor and so discarded.

Blood donation may be an easy straightforward four-step process: registration, case history, donation and refreshments. Every blood donor is given a mini-physical, checking the donor's temperature, pressure, pulse and Hb to guarantee it is safe for the donor to administer blood. The actual blood donation usually takes less than 10-12 minutes. The whole method, from the time arrives to the time to go away, takes concerning Associate in Nursing hour and 15 min. The average adult has concerning 10 units of blood in his body. Roughly 1 unit is given throughout a donation. A healthy donor might give red blood cells each 56 days, or double red cells each 112 days. A healthy donor might give platelets as few as 7 days apart, however a most of 24 times a year. All given blood is tested for HIV, hepatitis B and C, syphilis and different infectious diseases before it can be transfused to patients

V Result And Output

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. If people adopt this model, the caller is immediately connected to the donor. Consider a SMS based database system is in which whenever a SMS is send to prospective senders, based on the demand. Here there will be a significant delay in the recipient side in viewing the SMS and then responding to it. If the system that propose is setup, only the most eligible

donor is contacted and that too with no cost being borne by him. Arif. M. Sreevas. S. Nafseer. K. and Rahul. R. (2012), 'Automated online Blood bank database'.

Another significant advantage is the fact that location details of prospective donors is taken into account by the algorithm. This ensures that automatically the nearest donor is contacted and immediate fulfillment of blood requirement is done. In other similar systems, there is no such provision, which again adds on to the delay in getting a donor. 4) A toll free number is used to connect to the server. Any other additional cost that may occur will be minimal that can be borne by government or NGO's. So any common can at the time his utmost need can connect to this system for help. 5) Internet access is not a essential requirement for the effective working of this system. This enables the system to be used in rural areas as well, which are not well connected by internet service. Figure 4 show the output screen shots for the android application.

An apt scenario where the full use of this system can be described is some big vehicle accident. There will be a number of people who will be in urgent need of blood of different blood groups. Once they connect to this system, the IVRS system automatically directs to them the most eligible donor of that specific blood group.

Also, will multiple number of parallel ports provided, considerable amount of traffic can be easily handled. Everyone know blood is a primary necessity of life. There are lots of scenarios where immediate availability of blood can save human lives. This project makes one step in this direction. Online database aided with automatic call routing facility can is an apt choice for immediate fulfillment of blood requirements.

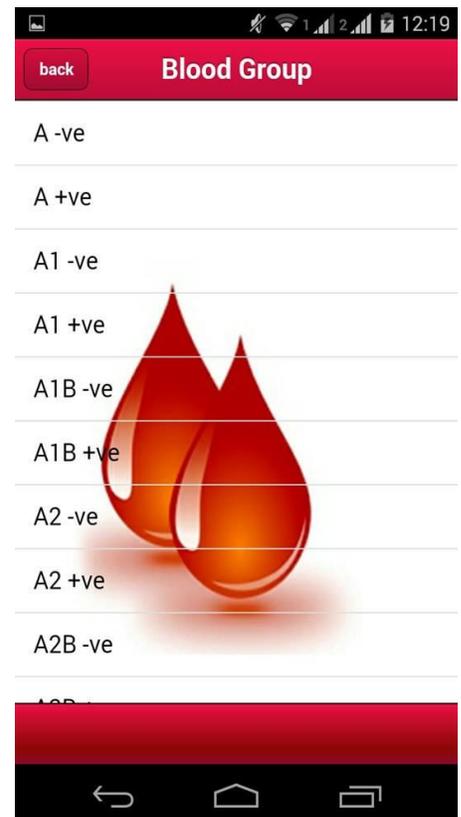
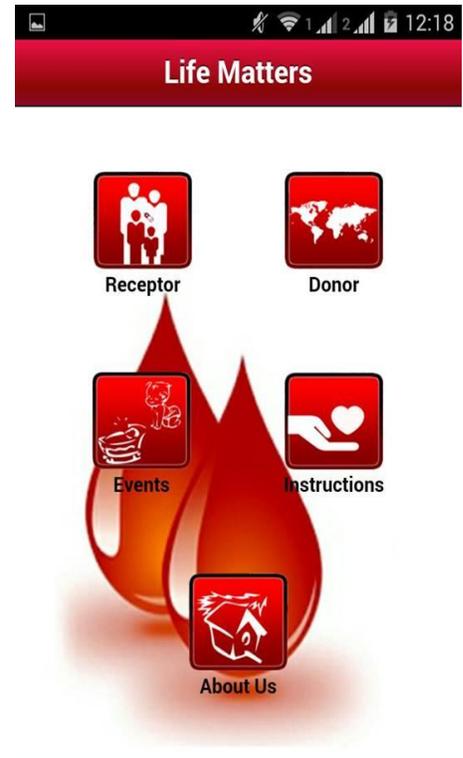


Figure 4 Result and Output

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