

Design and Implementation of Automated Blood Bank Using Embedded Systems

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Abstract-

Automated Blood Bank is an associate work that brings wilful blood contributors and those needing blood on to a typical stage. The mission is to satisfy each blood ask for in the nation with a promising android application and inspired people who will give blood. The proposed work means to defeat this correspondence boundary by giving an immediate connection between the contributor and the beneficiary by utilizing ease and low power Raspberry Pi B+ unit. It requires Micro USB of 5V and 2A control supply as it were. Whole correspondence happens through SMS (Short Messaging Service) which is good among every mobile sort. "Computerized Blood Bank" is a task that brings deliberate blood benefactors and those needing blood on to a typical stage. This venture goes for adjusting the people who look for contributors who will give blood and furthermore give it in the time span required. Mechanized Blood Bank attempts to help exploited people/patients/those in need of blood. It is an undertaking to accomplish bound and determined these individuals in need of blood and associate them to those ready to give. The proposed work investigates to discover blood contributors by utilizing GSM based Smart Card CPU - Raspberry Pi B+ Kit. The vision is to be "The desire for each Indian looking for a deliberate blood benefactor".

Presentation:

A framework is a method for working, sorting out or completing one or numerous assignments as indicated by a settled arrangement, program or set of principles. A framework is additionally a game plan in which every one of its units amass and cooperate as indicated by the arrangement or program. An implanted framework is a PC framework with a committed capacity inside a bigger mechanical or electrical framework, frequently with real-time registering imperatives. It is implanted as a component of an entire gadget frequently including equipment and mechanical parts. Installed frameworks control numerous gadgets in like manner utilize today. Ninety-eight percent of all chip are fabricated as segments of inserted frameworks.

Present day installed frameworks are regularly founded on microcontrollers (i.e. CPU's with coordinated memory or fringe interfaces),[7] yet conventional microchips (utilizing outer chips for memory and fringe interface circuits) are likewise normal, particularly in more-complex frameworks. In either case, the processor(s) utilized might be types going from broadly useful to those had practical experience in certain class of calculations or even specially crafted for the current application. A typical

standard class of committed processors is the computerized flag processor (DSP).

Fundamental Structure of an Embedded System

Basic Structure of an Embedded System

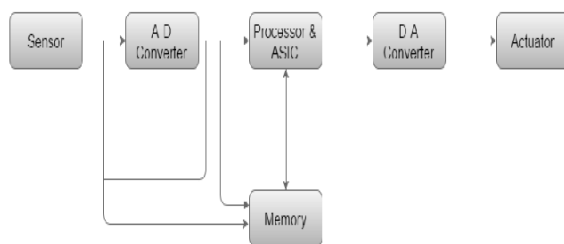


Figure :1.1

Figure :1.1

Sensor – It quantifies the physical amount and changes over it to an electrical flag which can be perused by a spectator or by any electronic instrument like an A2D converter. A sensor stores the deliberate amount to the memory.

A-D Converter – A simple to-advanced converter changes over the simple flag sent by the sensor into a computerized flag.

Processor and ASICs – Processors process the information to gauge the yield and store it to the memory.

D-A Converter – An advanced to-simple converter changes over the computerized information encouraged by the processor to simple information.

Actuator – An actuator looks at the yield given by the D-A Converter to the genuine (expected) yield put away in it and stores the endorsed yield.

RELATED WORKS:

Computerized online blood donation center database: various online blood donation center databases are accessible, in any case none of them offer the capacity for an

immediate contact between the giver and beneficiary. This is a noteworthy downside especially in situations where there is a dire need of blood. Our undertaking plans to conquer this correspondence boundary by giving an immediate call directing strategy utilizing Asterisk equipment. A blood bank database is made by gathering of points of interest from different sources like Blood banks, NSS, NGO's, clinics and through web interface.

The information gathered will be kept up in a focal server. This focal server will be related with a Toll free number that can be utilized to associate with it. The eagerness of giver and the closeness of the contributor to the place from where the call is coming are moreover represented in characterizing this calculation. In view of the calculation the most qualified benefactor is discovered. From the server the call from the required individual is steered to the qualified giver's number.

Such a framework significantly eliminates the overheads engaged with alluding to an online database and afterward considering the benefactors and confirming their eagerness when there is a basic requirement for the blood.

Existing framework:

Blood donation center administration framework: At present, the open can just think about the blood gift occasions through regular media means, for example, radio, daily paper or TV promotions. There is no data in regards to the blood gift programs accessible on any of the gateway. The present framework that is utilizing by the blood donation center is manual framework. With the manual framework, there are issues in dealing with the benefactors' records. The records of the benefactor probably won't be kept securely and there

may miss of benefactor's records because of human blunder or catastrophes. Other than that, blunders may happen when the staff keeps more than one record for a similar benefactor. There is no brought together database of volunteer contributors. Along these lines, it turns out to be really dreary for a man to look blood if there should be an occurrence of crisis.

The main choice is to physically pursuit and match contributors and afterward make phone calls to each benefactor. There is additionally no concentrated database used to keep the givers' records. Each bank is having their own records of givers. On the off chance that a benefactor makes gift in various healing facility, no past records can be followed with the exception of if the benefactor brings along the gift testament. Henceforth, the benefactor is viewed as a newbie in the event that they make

blood gift in another place. Without a mechanized administration framework, there are likewise issues in monitoring the genuine measure of every single blood classification in the blood donation center. What's more, there is additionally no caution accessible when the blood amount is underneath its standard dimension or when the blood in the bank has lapsed.

Proposed framework:

All correspondence happens by means of SMS (Short Informing Service) which is perfect with nearly every single mobile sort. "Robotized Blood Bank" proposes to bring intentional blood contributors and those needing blood on to a typical stage. This task is begun on an android APP, this will discover the benefactors. Blood benefactor will partake in giver list utilizing Application. Assume if any need in blood, will get the benefactor list in this APP. Here

in this APP, just 3 Blood gathering (A+, B+, O+) Data base is set up. The ongoing intrigued contributor number will be accessible in the information base. This venture utilizes GSM modem interfaced to the controller i.e LPC2148. GSM is interfaced through the MAX232 to the Controller.

SYSTEM ARCHITECHTURE :

The 8051 microcontrollers work with 8-bit information transport. So they can bolster outer information memory up to 64K and outside program memory of 64k, best case scenario. Altogether, 8051 microcontrollers can address 128k of outside memory.

Whenever information and code lie in various memory squares, at that point the design is alluded as Harvard engineering. In the event that information and code lie in a similar memory square, at that point the engineering is alluded as Von Neumann design.

Von Neumann Architecture

The Von Neumann engineering was first proposed by a PC researcher John von Neumann. In this engineering, one information way or transport exists for both guidance and information. Thus, the CPU completes one activity at any given moment. It either brings a guidance from memory, or performs read/compose task on information. So a guidance get and an information activity can't happen at the same time, sharing a typical

transport.
Memory space

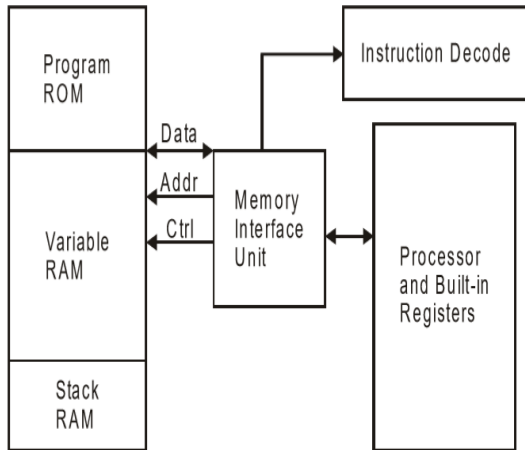


Figure: 1.4 Von-Neumann Architecture
Von-Neumann architecture supports simple hardware. It allows the use of a single, sequential memory. Today's processing speeds vastly outpace memory access times, and we employ a very fast but small amount of memory (cache) local to the processor.

1.4.2. Harvard Architecture

The Harvard architecture offers separate storage and signal buses for instructions and data. This architecture has data storage entirely contained within the CPU, and there is no access to the instruction storage as data. Computers have separate memory areas for program instructions and data using internal data buses, allowing simultaneous access to both instructions and data. Programs needed to be loaded by an operator; the processor could not boot itself. In a Harvard architecture, there is no need to make the two memories share properties.

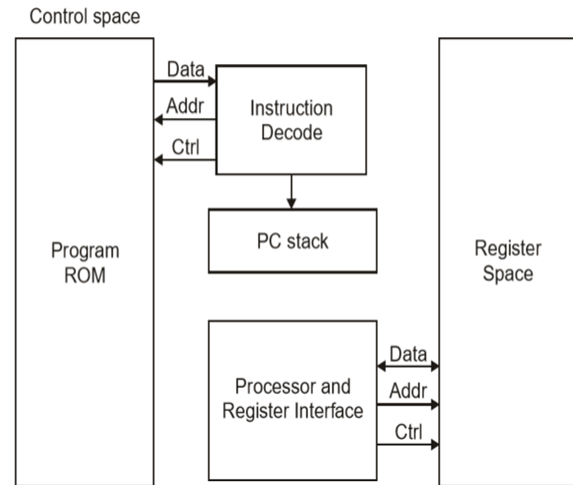


Figure: 1.5 Harvard Architecture

Von-Neumann Architecture vs Harvard Architecture :

The following points distinguish the Von Neumann Architecture from the Harvard Architecture.

Von-Neumann Architecture	Harvard Architecture
Single memory shared by both code and data.	to be Separate memories for code and data.
Processor needs fetch code in a separate clock cycle and data in another clock cycle. So it requires two clock cycles.	Single clock cycle is sufficient, as separate buses are used to access code and data.
Higher speed, thus less time consuming	Slower in speed, thus more time-consuming.
Simple in design.	Complex in design.

INTRODUCTION

Consistently the country requires around 4 Crore units of blood, out of which just a pitiful 40 Lakh units of blood are accessible. There are different blood donation centers far and wide, anyway none of them offer the ability for an immediate contact between the giver and beneficiary. This is regularly a genuine weakness prominently in cases wherever there is relate degree squeezing might want of blood. This venture plans to beat this correspondence hindrance by giving a quick connection between the giver and thusly the beneficiary by exploitation low cost and low power Raspberry Pi B+ unit. It requires Micro USB of 5V and 2A control supply as it were. All correspondence happens by means of SMS (Short Messaging Service) which is perfect with every single mobile sort. "Mechanized Blood Bank" proposes to bring deliberate blood contributors and those needing blood on to a typical stage.

The proposed work goes for adjusting the people who look for benefactors who will give blood and furthermore give it in the time span required. Consistently the state needs with respect to four Crore units of blood, out of that exclusively a pitiful forty Lakh units of blood square measure out there. Like clockwork someone wants blood. In excess of thirty eight thousand blood gifts zone unit required multi day. An entire of thirty million blood parts zone units transfused every year. In excess of one million new people are unit determined to have malignant growth yearly. A few of them can would require blood, commonly every day, all through their treatment. One car crash unfortunate casualty will require as a few as hundred units of blood. All the over needs are met by the arranged work. Mechanized Blood Bank attempts to encourage unfortunate casualties/patients/those needing blood. The

proposed work investigates to discover blood contributors by utilizing GSM based Smart Card CPU - Raspberry Pi B+ Kit.

Globalsystem For Mobile Communications

The acronym for GSM is Global System for Mobile Communications. Amid the mid 1980s, simple cell telephone frameworks were encountering quick development in Europe, especially in Scandina by means of and the United Kingdom ,yet in addition in France and Germany . Every nation built up its own framework, which was in perfect with every other person' sin gear and task .This was unfortunate ,in light of the fact that not exclusively was the mobile hardware restricted to activity inside national limits, which in a bound together Europe were progressively insignificant, however there was likewise an extremely constrained market for each kind of gear, so economies of scale and the resulting investment funds couldn't be realized.

The Europeans realized this at an early stage, and in1982 the Conference of European Posts and Telegraphs (CEPT) shaped an investigation gather called the Groupe Special Mobile (GSM) to think about and build up a skillet European open land mobile framework. The proposed framework needed to meet certain criteria:

- Good abstract discourse quality
- Low terminal and administration cost
- Low terminal and administration cost
- Ability to help hand held terminals
- Support for scope of new administrations and offices

- Spectral proficiency
- ISDN similarity

Skillet European means expansive. ISDN through put at 64Kbs was never imagined, in reality, the most astounding rate an ordinary GSM system can accomplish is 9.6kbs.

Europe saw cell benefit presented in 1981, when the Nordic Mobile Telephone

Framework or NMT 450 started working in Denmark, Sweden, Finland, and Norway in the

450MHz territory. It was the primary global cell framework. In 1985 Great Britain begun utilizing the Total Access Communications System or TACS at 900MHz. Afterward, the West German C-Netz, the French Radio COM 2000, and the Italian RTMI/RTMS helped make up Europe's nine simple in good radio telephone frameworks. Plans were a foot amid the mid 1980s, be that as it may, to make a solitary European wide computerized mobile administration with cutting edge highlights and simple wandering. While North American gatherings focused on working out their hearty yet progressively misrepresentation tormented and featureless simple system, Europe got ready for an advanced future.

In 1989, GSM obligation was exchanged to the European Telecommunication Standards Institute (ETSI), and stage I of the GSM details were distributed in 1990. Business benefit was begun in mid-1991, and by 1993 there were 36 GSM organizes in 22 nations. Albeit institutionalized in Europe, GSM isn't just an European standard. More than 200 GSM systems (counting DCS1800 and PCS 1900) are operational in

110 nations around the globe. In the start of 1994, there were 1.3 million endorsers worldwide, which had developed to in excess of 55 million by October 1997. With North America making a postponed section in to the GSM field with a subsidiary of GSM called PCS 1900, GSM frameworks exist on each mainland, and the acronym GSM presently suitably remains for Global System for Mobile interchanges.

The engineers of GSM picked a dubious (at the time) advanced framework, instead of the then-standard simple cell frameworks like AMPS in the United States and TACS in the United Kingdom. They had confidence that headways in pressure calculations and advanced flag processors would permit the satisfaction of the first criteria and the persistent enhancement of the framework as far as quality and cost. The more than 8000 pages of GSM suggestions endeavor to permit adaptability and aggressive development among providers, yet give enough institutionalization to ensure legitimate systems administration between the parts of the framework. This is finished by giving utilitarian and interface portrayals to every one of the practical substances characterized in the framework.

5.1 Services Provided by GSM

From the earliest starting point, the organizers of GSM needed ISDN similarity regarding the administrations offered and the control flagging utilized. Be that as it may, radio transmission constraints, as far as data transfer capacity and cost, don't permit the standard ISDNB-channel bit rate of 64 kbps to be for all intents and purposes accomplished.

Media transmission administrations can be isolated in to conveyor administrations, teleservices, and advantageous

administrations. The most essential teleservice bolstered by GSM is communication. Similarly as with every single other correspondence, discourse is carefully encoded and transmitted through the GSM organize as a computerized stream. There is additionally a crisis benefit, where the closest crisis specialist co-op is informed by dialing three digits.

5.2 Bearer administrations: Typically information transmission rather than voice. Fax and SMS are models.

5.3 Teleservices: Voice arranged movement.

5.4 Supplementary administrations: Call sending, guest ID, call pausing and such.

An assortment of information administrations is advertised. GSM clients can send and get information, at rates up to 9600bps, to clients on POTS (Plain Old Telephone Service), ISDN, Packet Switched Public Data Networks, and Circuit Switched Public Data Networks utilizing an assortment of access techniques and conventions, for example, X.25 or X.32. Since GSM is an advanced system, a modem isn't required between the client and GSM organize, despite the fact that a sound modem is required inside the GSM system to interwork with POTS.

Other information administrations incorporate Group 3 copy, as portrayed in ITU-T proposal T.30, which is upheld by utilization of a proper fax connector. A novel component of GSM, not found in more established simple frameworks, is the Short Message Service (SMS). SMS is a bidirectional administration for short alphanumeric (up to 160 bytes) messages. Messages are transported in a store-and-forward design. For point-to-point SMS, a message can be sent to another endorser of

the administration, and an affirmation of receipt is given to the sender. SMS can likewise be utilized in a cell-communicated mode, for sending messages, for example, activity updates or news refreshes. Messages can likewise be put away in the SIM card for later recovery.

Beneficial administrations are given over tele administrations or carrier administrations. In the current (Phase I) details, they incorporate a few types of call forward, (for example, call sending when the mobile endorser is inaccessible by the system), and call notwithstanding of active or approaching calls, for instance while wandering in another nation. Numerous extra beneficial administrations will be given in the Phase 2 details, for example, guest distinguishing proof, call pausing, multi-party discussions.

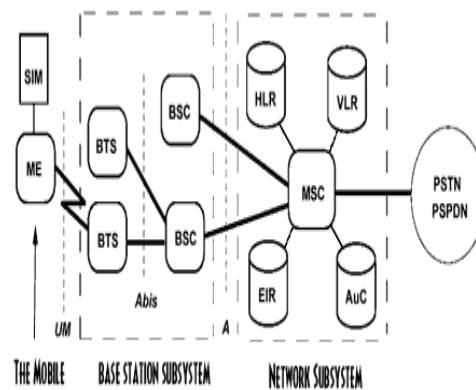


Figure 2.17: General architecture of a GSM network

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

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?'

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), 'Cell Sense: 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 pre

processor (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'.

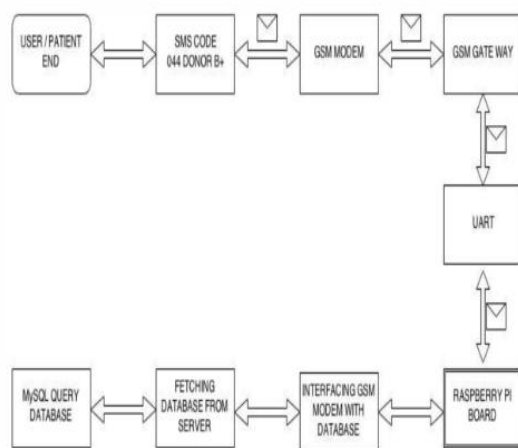


Figure 2 Functional Block Diagram

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 Cana Kit Basic Kit (ASIN # BOODG9D6IK) 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 play acting compared to social class cards, however this can mainly only affect boot time where ever there is the foremost 110. Karan Punjabi, Pooja Bolaj, Pratibha Mantur, 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 110, power status, etc. Expansion capabilities - There are numerous devices available for the Pi, all at very valuable prices. Everything from an 110 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 1920x1200, 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 Sanoxy 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 what 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 time, performance capability - The Pi is over clocked if there are 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'

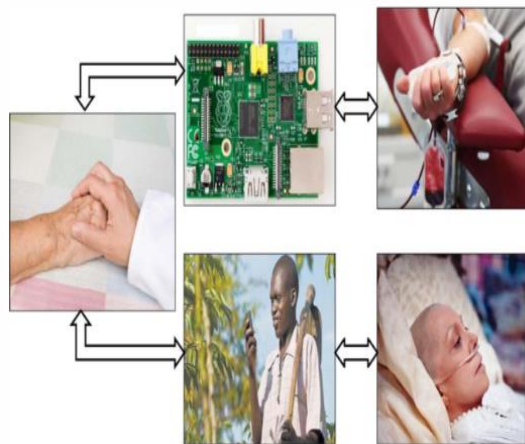


Figure 3 Pictorial Representation

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.

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 15 minutes. 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

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 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. Blood is the essential need of life. There are distinctive situations accessible for looking blood contributors. This proposed framework will be one stage ahead from the other blood gift frameworks. Blood beneficiary can contact the blood contributor straightforwardly by utilizing this framework

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