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Design and Implementation of Automated Blood Bank using Embedded Systems

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ABSTACT: 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 phone 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 a Microcontroller. 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 uses regulated 3.3V for modules and LPC2148 micro controller. 7805 three terminal voltage regulator is used for voltage regulation. Bridge type full wave rectifier is used to rectify the ac output of secondary of 230/12V step down transformer.

I.INTRODUCTION:

Blood is one of the most critical elements and it's truly referred to as 'river' of life. There are number of scenarios where urgent need of blood comes. At these critical time, the online blood bank with has an automatic call routing facility will be of great aid. We here intend to achieve this through the direct call routing function. An algorithm is defined to find the suitable donor at every point of time. This kind of a system is more advantageous compared to present systems available as immediate contact with the donor is provided every time. This helps in getting an immediate response than a messaging based system or simply internet based database system. An immediate fulfilment of the blood requirement is possible in this system. Every year the nation requires 4 Crore units of blood, but only a meager 40 Lakh units of blood available. There are multiple online 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 in cases wherever there is associate degree pressing would like of blood. This project aims to beat this type of communication barrier by providing an immediate link between the donor and the recipient. "Automated Blood Bank" proposes to bring voluntary blood donors and those in need of blood on to a common platform. The main objective of proposed work is servicing the persons who seek donors who are willing to donate blood

and also provide it within the time frame. Every year the state needs regarding four Crore units of blood, out of that solely a meagre forty Lakh units of blood square measure out there. Every two seconds somebody desires blood. More than thirty eight thousand blood donations area unit is required per day. A complete of thirty million blood parts area units transfused annually.

II. Aim of project

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 connects them to those willing to donate. The proposed work explores to find blood donors by using GSM based CPU – Microcontroller kit. The vision is to be "The hope of every Indian in search of a voluntary blood donor".

2.1 Block diagram

Hardware

1.Micro controller

2. Power supply

3.LCD

4.Buzzer

5.GSM

6.ZIGBEE MODULE

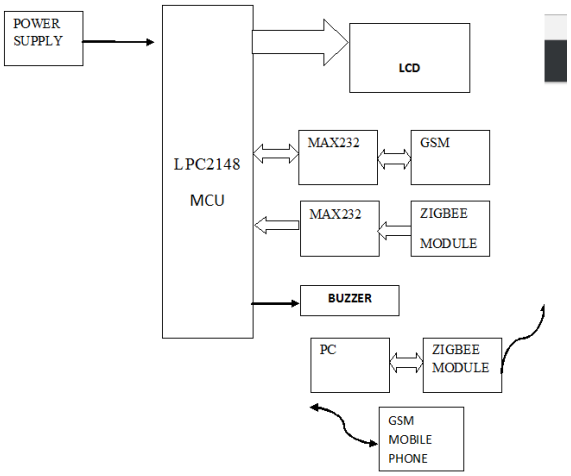


Fig: Proposed block diagram

III.MICROCONTROLLER

Microprocessors and microcontrollers are widely used in embedded systems products. Microcontroller is a programmable device. A microcontroller has a CPU in addition to a fixed amount of RAM, ROM, I/O ports and a timer embedded all on a single chip. The fixed amount of on-chip ROM, RAM and number of I/O ports in microcontrollers makes them ideal for many applications in which cost and space are critical.

General factors that govern the selection are:

- Complexity of overall design
- Design reuse
- Performance
- Power size
- Cost tools
- Operating system support and availability

Many systems such as industrial timer may fit this category, as the memory footprint is small, the signal is slow and battery consumption must be extremely low.

The application and its interaction will dictate the design's complexity and may also determine whether it requires a real-time operating system (RTOS). Typically, as the complexity of the application increases, the need for a greater bit-width processor increases. The selection of the CPU will greatly impact performance of the overall system. Specifically, features like 8/16/24/32 bit architecture, RISC / CISC / DSP architecture, cache, MMU, pipelining, branch prediction and super-scalar architecture, all affect the speed of a system.

3.1 LPC2148 (ARM7) Microcontroller

The LPC2148 microcontrollers are based on a 32 bit ARM7TDMI-S CPU with real-time emulation and embedded trace support, that combines the microcontroller with embedded high speed flash memory of 512 kB. A 128-bit wide memory interface and a unique accelerator architecture enable 32-bit code execution at the maximum clock rate. For critical code size applications, the alternative 16-bit Thumb mode reduces the code by more than 30 % with minimal performance penalty.

Due to their tiny size and low power consumption, LPC2148 microcontrollers are ideal for the applications where miniaturization is a key requirement, such as access control and point-of-sale. A blend of serial communications interfaces ranging from a USB 2.0 Full Speed device, multiple UARTS, SPI, SSP to I2Cs and on-chip SRAM of 8 kB up to 40 kB, make these devices very well suited for communication gateways and protocol converters, soft modems, voice recognition and low end imaging, providing both large buffer size and high processing power. Various 32-bit timers, single or dual 10-bit ADC(s), 10-bit DAC, PWM channels and 45 fast GPIO lines with up to nine edge or level sensitive external interrupt pins make these microcontrollers particularly suitable for industrial control and medical systems.

3.2 Block Diagram of LPC2148 Microcontroller

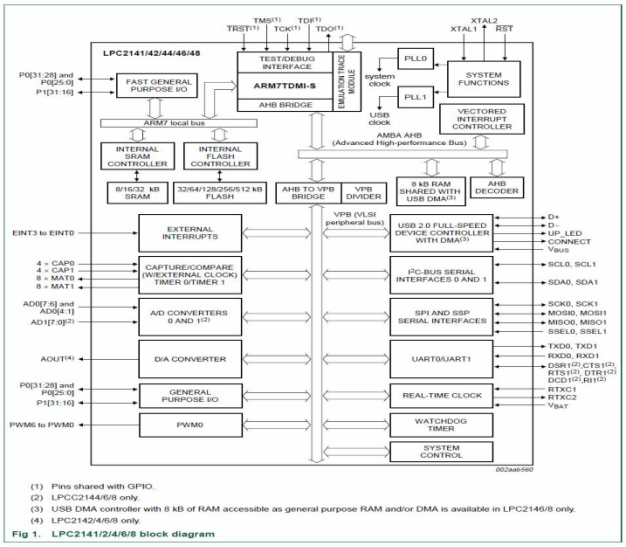


Figure 3.2.2Block Diagram of LPC2148 Microcontroller

IV.POWER SUPPLY, GSM AND ZIGBEE

4.1 Power supply

The power supplies are designed to convert high voltage AC mains electricity to a suitable low voltage supply for electronic circuits and other devices. A power supply can by broken down into a series of blocks, each of which performs a particular function. A d.c power supply which maintains the output voltage constant irrespective of a.c mains fluctuations or load

variations is known as "Regulated D.C Power Supply".

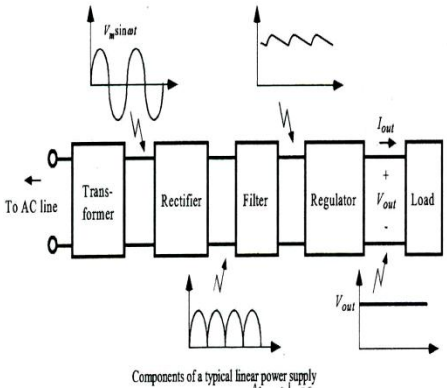


Figure 4.1: Block Diagram of Power Supply

4.1.1TRANSFORMER:

A transformer is an electrical device which is used to convert electrical power from one Electrical circuit to another without change in frequency.When AC is applied to the primary winding of the power transformer it can either be stepped down or up depending on the value of DC needed. In our circuit the transformer of 230v/15-0-15v is used to perform the step down operation where a 230V AC appears as 15V AC across the secondary winding. One alteration of input causes the top of the transformer to be positive and the bottom negative.

The next alteration will temporarily cause the reverse. The current rating of the transformer used in our project is 2A. Apart from stepping down AC voltages, it gives isolation between the power source and power supply circuitries.

4.1.2RECTIFIER

A circuit which is used to convert a.c to dc is known as rectifier. The process of conversion a.c to d.c is called "rectification.

In the power supply unit, rectification is normally achieved using a solid state diode. Diode has the property that will let the electron flow easily in one direction at proper biasing condition. As AC is applied to the diode, electrons only flow when the anode and cathode is negative. Reversing the polarity of voltage will not permit electron flow.

4.1.3 FILTER

A Filter is a device which removes the a.c component of rectifier output but allows the d.c component to reach the load.

Capacitor Filter: We have seen that the ripple content in the rectified output of half wave rectifier is **121%** or that of full-wave or bridge rectifier or bridge rectifier is **48%** such high percentages of ripples is not acceptable for most of the applications. Ripples can be removed by one of the following methods of filtering.

(a) A capacitor, in parallel to the load, provides an easier by –pass for the ripples voltage though it due to low impedance. At ripple frequency and leave the d.c.to appears the load.

(b) An inductor, in series with the load, prevents the passage of the ripple current (due to high impedance at ripple frequency) while allowing the d.c (due to low resistance to d.c)

4.2 GSM

Definition:

Global System for Mobile (GSM) is a second generation cellular standard developed to cater voice services and data delivery using digital modulation.

4.2.1 GSM-History

• Developed by Group Special Mobile (founded 1982) which was an initiative ofCEPT (Conference of European Post and Telecommunication)

• Aim : to replace the incompatible analog system

• Presently the responsibility of GSM standardization resides with special mobile group under ETSI (European telecommunication Standards Institute)

- Full set of specifications phase-I became available in 1990

• Under ETSI, GSM is named as "Global **S**ystem for **M**obile communication "

• Today many providers all over the world use GSM (more than 135 Countries in Asia, Africa, Europe, Australia, America)

• More than 1300 million subscribers in world and 45 million subscribers in India.

4.3 ZIGBEE

ZigBee is the name of a specification for a suite of high level communication protocols using small, low-power digital radios base on the IEEE 802.15.4-2006standard for wireless personal area networks (WPANs), such as wireless headphones connecting with cell phones via short-range radio. The technology is intended to be simpler and less expensive than other WPANs, such as Bluetooth. ZigBee is targeted at radio-frequency (RF) applications that require a low data rate, long battery life, and secure networking.

Device types:

There are three different types of ZigBee devices:

- ZigBee coordinator (ZC): The most capable device, the coordinator forms the root of the network tree and might bridge to other networks. There is exactly one ZigBee coordinator in each network since it is the device that started the network originally. It is able to store information about the network, including acting as the Trust Centre & repository for security keys.
- ZigBee Router (ZR): As well as running an application function a router can act as an intermediate router, passing data from other devices
- ZigBee End Device (ZED): Contains just enough functionality to talk to the parent node (either the coordinator or a router); it cannot relay data from other devices. This relationship allows the node to be asleep a significant amount of the time thereby giving long battery life. A ZED requires the least amount of memory, and therefore can be less expensive to manufacture than a ZR or ZC.

4.3.2 ZigBee Topologies

Topology Overview:

A ZigBee network can adopt one of the three topologies: **Star**, **Tree**, **Mesh**. These are illustrated on the left and briefly described below.

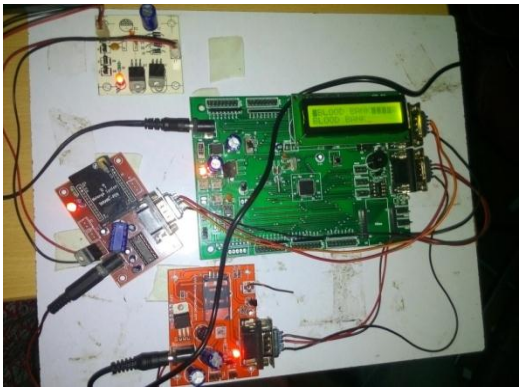
Star Topology:A Star network has a central node, which is linked to all other nodes in the network. All messages travel via the central node.

Tree Topology: A Tree network has a top node with a branch/leaf structure below. To reach its destination, a message travels up the tree (as far as necessary) and then down the tree.

Mesh Topology: A Mesh network has a tree-like structure in which some leaves are directly linked. Messages can travel across the tree, when a suitable route is available.

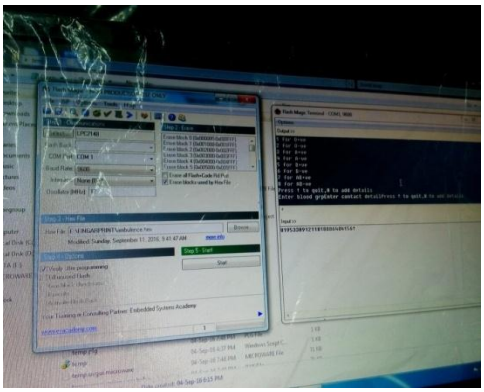
V. RESULTS

Automated blood bank using embedded system kit

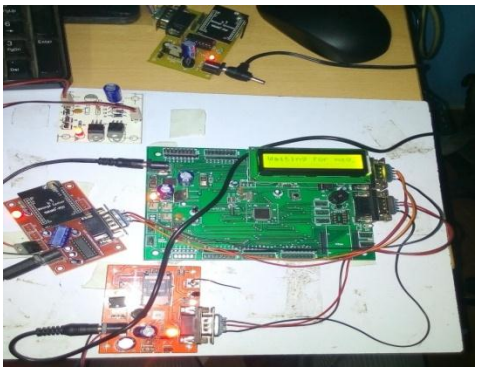


After dumping the program below screen will be displays

Add the blood group number and donor's numbers as shown below screen



After adding the cell numbers it is waiting for massage



We have to send SMS name of blood group to registered number.After sending SMS Acceptor number displays on LCD as shown below

After that automatically it will send the donors number to acceptor.

Again we can send SMS name of blood group, above steps repeats.

VI.CONCLUSION

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.

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.

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