



GPS BASED BLOOD BANKING SYSTEM USING IOT

¹Mr.A.Ganesan, ²Mr.M.Dhilip, ³Mr.K.Chandrukumar

¹MCA, M.Phil, Associate Professor, ²Final MCA Student, ³Final MCA Student

¹PG and Research Department of Computer Applications(MCA),

¹Hindusthan College of Arts and Science (Autonomous), Coimbatore, India

ABSTRACT

The unit which administers and manages the requisition and distribution of the blood is named as a blood bank. The main objectives of the blood banks are providing blood to the patients with minimal blood transfusion error. The blood is very important medical supplies so it should be managed well. As the blood bank management consists of a number of manual steps, therefore it will become difficult for the blood banks to provide a high level of accuracy, reliability, automation in blood storage and transfusion process. The system is installed in rack of blood bank, and the GSM Module for sending request of blood to the donors and blood banks all these are interfaced with Node MCU. Second segment consists of wi-fi module for data transfer to the server and third segment is displaying the status of available blood stock. All the real time status relates to the available blood stock of the blood bank is displayed on web page, so that the blood seeker can get the blood from their nearest blood bank.

Keywords: Blood bank, blood transfusion, Node MCU, GSM Module, Wi-Fi Module, Web page.

INTRODUCTION

The process of managing the blood bag that is received from the blood donation events needs a proper and systematic management that is done by the blood banks. As the blood is related to someone's life so the bags must be handled with care and treated thoroughly. The blood consists of different blood constituents and every constituent of blood is having a specific function. Statistics say that in our India every two seconds someone needs a blood transfusion. The Blood transfusions are used for trauma victims - due to accidents and burns - heart surgery, organ transplants, women with complications

during childbirth, newborns and premature babies, and patients receiving treatment for leukaemia, cancer or other diseases, such as sickle cell disease and thalassemia. The different blood constituent is applied to the patient for different type's disease given in table 1. India today faces a blood shortage of 10% relative to its blood requirements. It means that we require covering a shortfall of over 12 lakhs of blood units. Given that the eligible donor population of our India is more than 512 million, this deficit is surprising. Every day more than 1200 road crashes occurring in our India, 60 million trauma induced surgeries are performed in the country every year. Near about 230 million major operations, 331 million cancer-related procedures like chemotherapy and 10 million pregnancy complications all these require the blood transfusion. Besides all this, the patients which are for sickle cell anaemia, thalassemia and haemophilia require large quantities of blood daily. Another reason for the shortage of the blood supply is the ban on payment to blood donors that was enacted in 1995. Previously near about one third of the blood supply was from paid donors. But with the ban, both private and government hospitals have faced a larger shortage in the blood supply.

The current system that is using by the blood bank is manual system. With the manual system, there are problems in managing the records related with blood stock. There is no centralized database of volunteer donors. So, it becomes really tedious for a person to search blood in case of emergency. 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 it become zero. Healthcare as a sector is a definite beneficiary of the increasing adoption of technologies such as the Internet of Things. One of the areas where IoT can be used is blood bank management. In our country thousands of liters of blood get wasted every day due to less than adequate management practices, thousands of litres of this precious resource get wasted every day across the country. Such a wastage is occurring during a day and age when healthcare providers are battling an acute shortage of blood units for various medical procedures. Given this backdrop, the significance of deploying technologies that encourage efficient management of blood banks cannot be understated. The purpose of the blood bank management system is to simplify and automate the process of searching for blood in case of emergency and maintain the records of blood stocks in the bank.

SYSTEM STUDY

PROPOSED SYSTEM:

The proposed system is an embedded system which will closely monitor the available status of the blood and temperature of the refrigerator which is present inside the blood bank. The proposed system includes service domain and administration domain. Service domain has blood bank that has sensing unit installed to it which has array IR sensor,

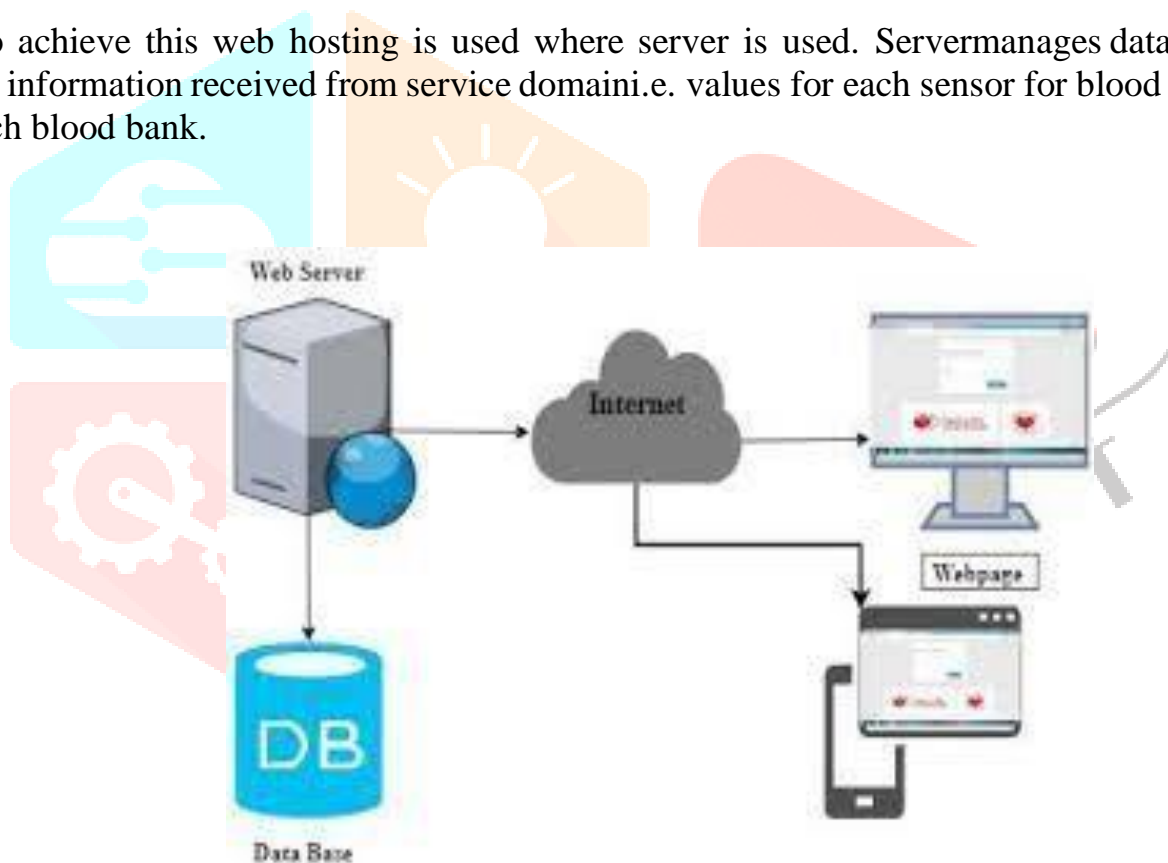
temperature sensor, Node MCU as a gateway with Wi-Fi module using wireless protocol for wireless communication between blood bank and cloud, RTC for real-time operation.

In Administration domain information transferred from the blood bank is analysed and processed. It includes webpage hosted on a server, for analysis and processing of the received data from the blood bank, depending on which corresponding notifications are displayed. It uses HTTP protocol for secure communication between server and blood bank in an application layer of IoT. For the more efficient operation, the called blood bank locations are located using maps. The domain of proposed system is given below.

Administration domain:

In this domain, the Blood bank information, Blood status information, location of blood bank, the data received is collected.

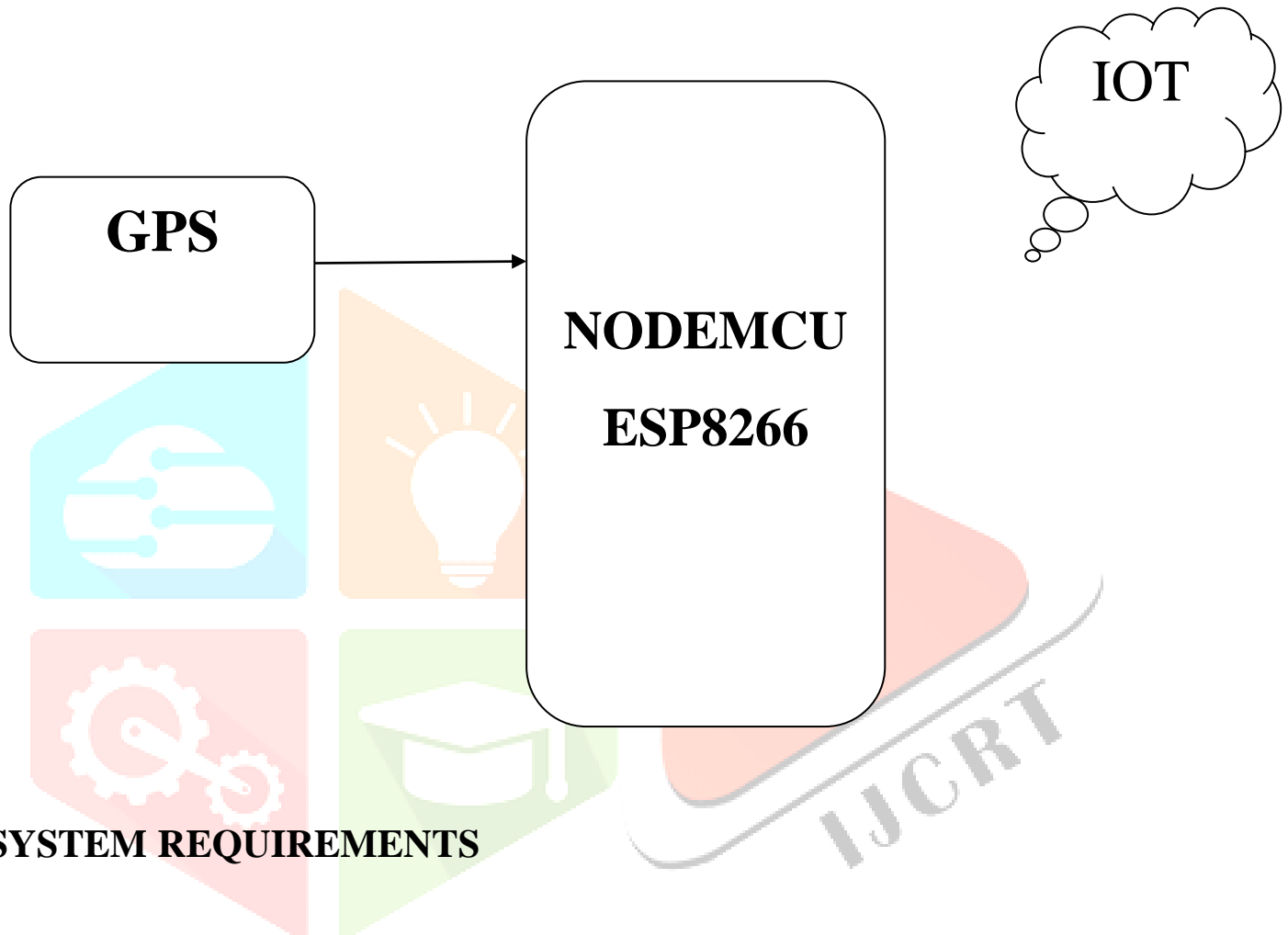
To achieve this web hosting is used where server is used. Server manages database for the information received from service domain i.e. values for each sensor for blood unit of each blood bank.



It consists the IoT part, as ESP module sends the information of available blood is sent to the cloud. The cloud is connected to the website so the website will show all available bloodstock on 24*7 basis. So initially user has to select their region from options of the website the according to that the website will display all the blood bank of that region. And that blood bank provides real-time available bloodstock on the webpage. Also, the direction of that specific blood bank is provided on the google map for that one tab is provide as locate on the map.

SYSTEM DESIGN

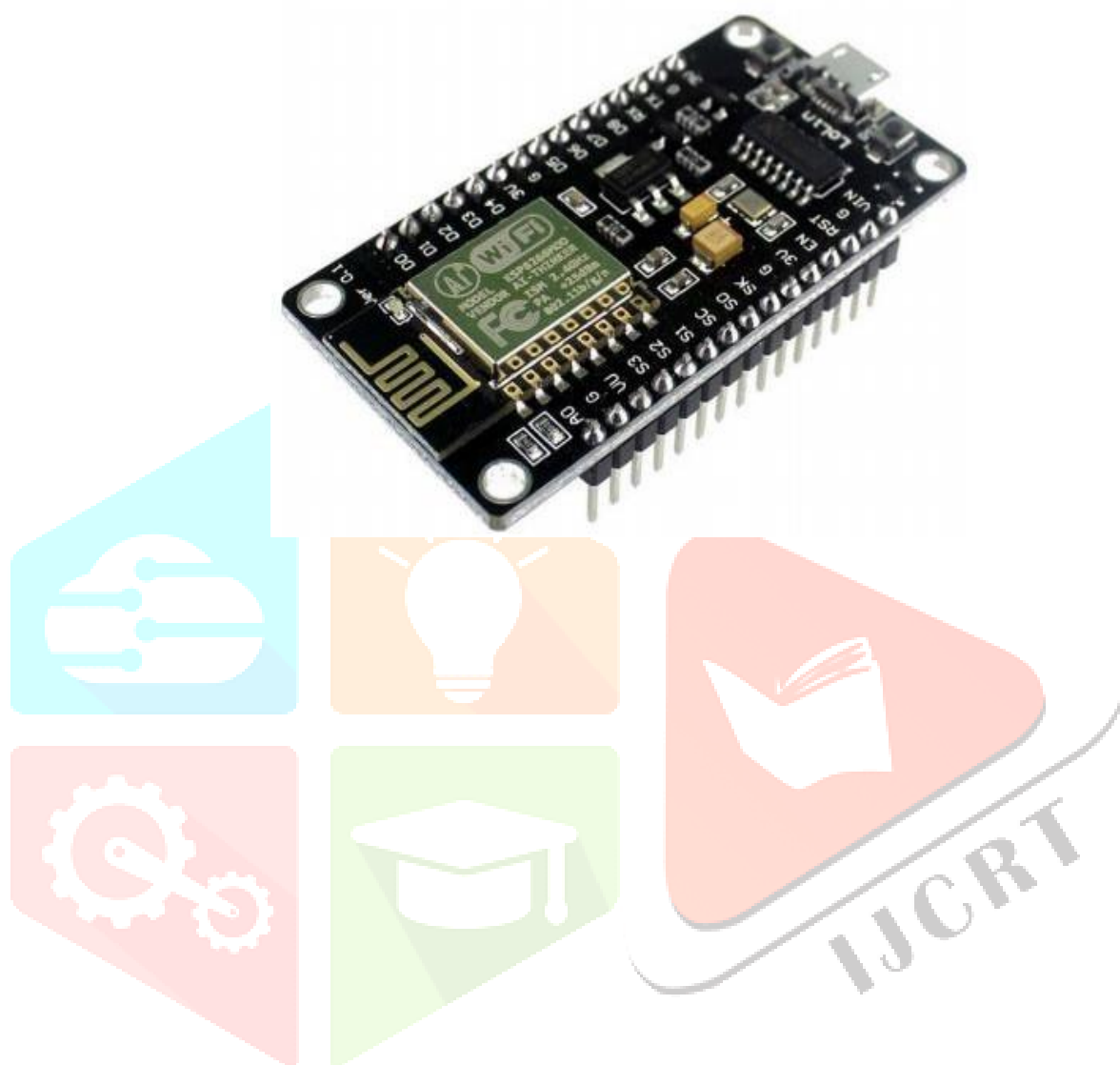
BLOCK DIAGRAM:



SYSTEM REQUIREMENTS

HARDWARE TOOLS:

- NODE MCU ESP8266
- GPS





SOFTWARE TOOL:

- Arduino IDE
- Language: Embedded C

ARDUINO IDE:

Arduino IDE stands for “Integrated Development Environment”: it is an official software introduced by Arduino.cc that is mainly used for editing, compiling and uploading the code in the Arduino Device. Almost all Arduino modules are compatible with this software that is an open source and is readily available to install and start compiling the code on the go. In this article, we will introduce the Software, how we can

install it, and make it ready for developing applications using Arduino modules.

Arduino IDE Definition:

1. Arduino IDE is an open source software that is mainly used for writing and compiling the code into the Arduino Module.
2. It is an official Arduino software, making code compilation too easy that even a common person with no prior technical knowledge can get their feet wet with the learning process.
3. It is easily available for operating systems like MAC, Windows, Linux and runs on the Java Platform that comes with inbuilt functions and commands that play a vital role for debugging, editing and Compiling the code in the environment.
4. A range of Arduino modules available including Arduino Uno, Arduino Mega, Arduino Leonardo, Arduino Micro and many more.
5. Each of them contains a microcontroller on the board that is actually programmed and accepts the information in the form of code.
6. The main code, also known as a sketch, created on the IDE platform will ultimately generate a Hex File which is then transferred and uploaded in the controller on the board.
7. The IDE environment mainly contains two basic parts: Editor and Compiler where former is used for writing the required code and later is used for compiling and uploading the code into the given Arduino Module.
8. This environment supports both C and C++ languages.

Program Structure:

• Variables

Whenever you're using Arduino, you need to declare global variables and instances to be used later on. In a nutshell, a variable allows you to name and store a value to be used in the future. For example, you would store data acquired from a sensor in order to use it later. To declare a variable you simply define its type, name and initial value. It's worth mentioning that declaring global variables isn't an absolute necessity. However, it's advisable that you declare your variables to make it easy to utilize your values further down the line.

• Instances

In software programming, a class is a collection of functions and variables that are kept together in one place. Each class has a special function known as a constructor, which is used to create an instance of the class. In order to use the functions of the class, we need to

declare an instance for it.

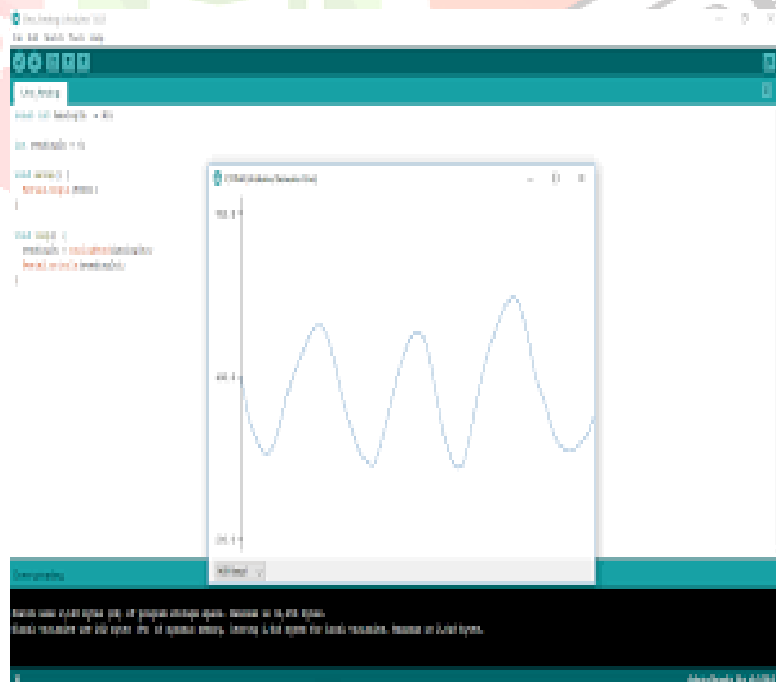
• Setup()

Every Arduino sketch must have a setup function. This function defines the initial state of the Arduino upon boot and runs only once. Here we'll define the following:

- Pin functionality using the pin Mode function
- Initial state of pins
- Initialize classes
- Initialize variables
- Code logic Loop () the loop function is also a must for every Arduino sketch and executes once setup () is complete. It is the main function and as its name hints, it runs in a loop over and over again. The loop describes the main logic of your circuit

Serial Plotter Arduino:

Serial plotter is another component of the Arduino IDE, which allows you to generate a real-time graph of your serial data. The serial plotter makes it much easier for you to analyze your data through a visual display. You're able to create graphs, negative value graphs, and conduct waveform analysis



CONCLUSION

Growing population has increased the need for the blood supply for various diseases. In every two seconds, some person required blood transfusion and currently India facing problem of the blood shortage. To address the problem an effective system is designed using the Internet of things. The system provides a methodology to fulfil the requirement of blood to the patients/victims without rushing to the blood bank to know the availability of the blood. An IR Sensors are connected to the Node MCU board which continuously monitors the status of the available bloodstock. The output data provided by the Node MCU is displayed on the webpage using the wifi module so anyone accesses the website and obtained the information of available bloodstock in real time. It will reduce the manpower required at the blood bank to update the online data also reduces the efforts of blood seeker of searching bloodstock at each blood bank. When bloodstock reaches to zero system helps to send a request message to the donor and nearest blood bank. By using IoT the real-time available bloodstock is displaying on the website it minimizes the efforts of blood seeker.

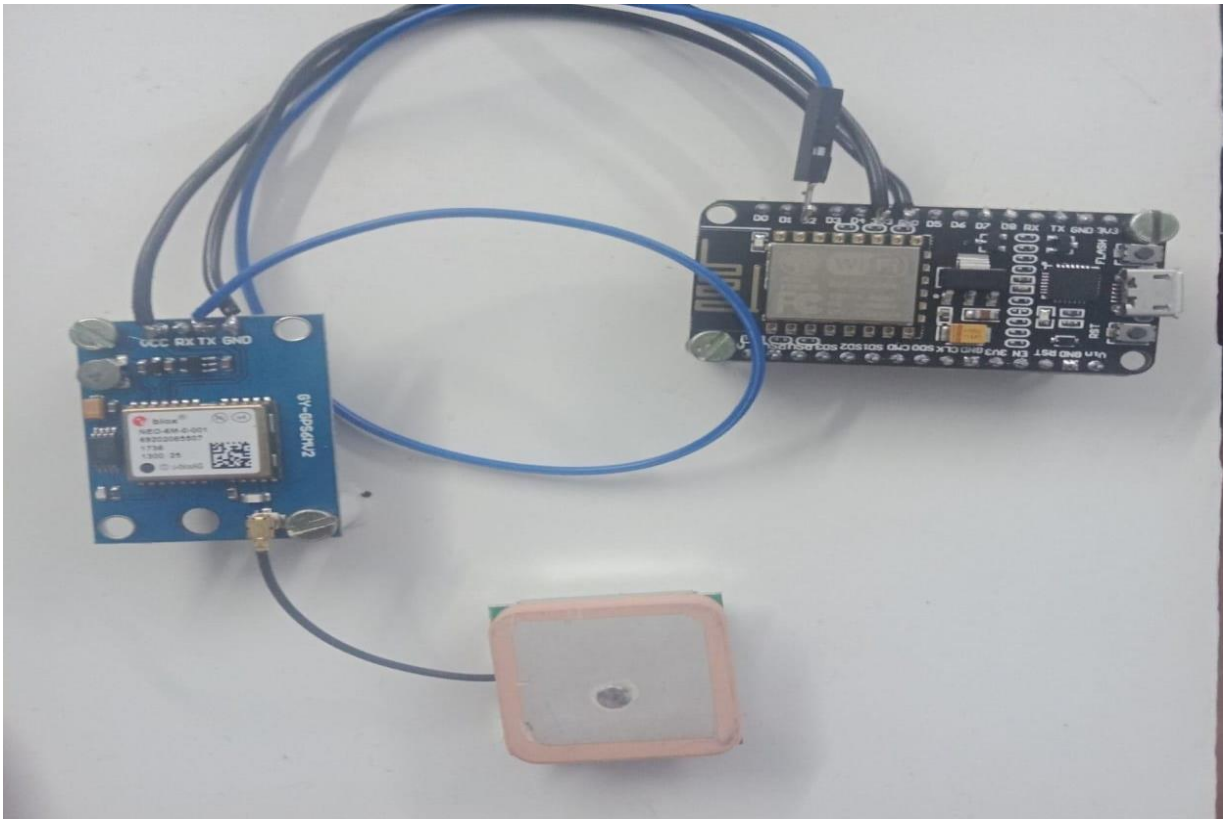
FUTURE IMPLEMENTATION:

There are three different topics related to the Internet of Things concept that has major future scope in terms of improvement and research: efficiency, scalability and quality of service. The developed system is prototype version which provides the information about the available bloodstock. It consists of an array of IR sensors that covers

the minimal area. To cover large blood packet the IR sensors can be replaced by the load cell. It will cover the large blood packet and help efficiently to provide information on bloodstock on a real-time basis. Also, one alert system using RFID Tag with smart temperature sensor can be also added to the system for indicating the expired blood packet and its temperature.

In the future, this work can be extended in the context of total blood banks of a country. Big Data analysis can be done on the gathered data from Region. So that the specific domain names can also be allocated to the blood bank site. Also on the website of blood bank, the login id and passwords can be provided to the blood seekers so that they can be made the online request for the blood units

TESTING



REFERENCE

- [1] J. S. Lee, Y. W. Su, and C. C. Shen, "A comparative study of wireless protocols:Bluetooth, UWB, ZigBee and Wi-Fi," in Proc. IEEE 33rd Annu. Conf.IECON, pp.46-51, Nov. 2007
- [2] Ala Al-Fuqaha, Mohsen Guizani, Mehdi Mohammadi, Mohammed Aledhari, and Moussa Ayyash, "Internet of Things: A Survey on Enabling Technologies, Protocols, and Applications" IEEE Communication Surveys Tutorials, Vol.17, No. 4, Fourth Quarter 2015, pp. 2347-2377.
- [3] G. Muddu Krishna; S. Nagaraju(2016), "Design and implementation of short message service (SMS) based blood bank", 2016 International Conference on Inventive Computation Technologies (ICICT)
- [4] Do-Sung Kim, Sun K. Yoo, HO Kim, BC Chang ,HS Bae , SJ Kim(2007), "Location Based Blood Bag Management using active RFID and Ubiquitous Sensor Network" ,6th International Special Topic Conference on ITAB, 2007, Tokyo
- [5] Wijai Boonyanusith; Phongchai Jittamai (2010), "The Development of Web-Based System for Blood Requisition within Blood Supply Chain", 2010 Seventh International Conference on Information Technology: New Generations
- [6] Muhammad Arif; S. Sreevas; K. Nafseer; R. Rahul(2012) "Automated online Blood bank database", 2012 Annual IEEE India Conference (INDICON)