

RESEARCH ARTICLE



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INTERNET OF THINGS BASED SOLDIER NAVIGATOR

SUJATA DAMODAR¹, SIDDHESH AREKAR², ONKAR DEVADIGA³,

PROF.PRASHANT AVHAD⁴

¹²³Undergraduate student, Department of Electronics and Telecommunication Engineering, Dr. D.Y. Patil College of Engineering (Ambi), Pune, SavitribaiPhulePune University, Pune.

⁴Assistant Professor, Department of Electronics and Telecommunication Engineering, Dr. D.Y. Patil College of Engineering (Ambi), Pune, SavitribaiPhule Pune University, Pune.

ABSTRACT

During wars and search operations, soldiers get injured and many of the soldiers may get lost. Soldiers play a very important part for any nation's security system as, soldiers are the saviour of our country who protects us from suspicious activities, terrorist activities and from many enemy attacks which can harm us as well as our nation also, soldiers health is very important. This project gives an ability to track the location and monitor health of the soldiers in real time who got lost and suffer through various injuries in the battlefield. This will lead minimizing the time, search and rescue operation efforts from army control unit. This system enables to track the location and monitor health of soldiers to army base station using GPS module and wireless body area sensor networks, such as temperature sensor, humidity sensor, etc... The data from sensors and GPS receiver is transmitted wirelessly using ZigBee module. Also, a soldier can ask for help from army control room and can communicate with other fellow soldier present within the reception range and wireless transmission.

Keywords:IOT, wireless communication, GPS, ZigBee Module, protection of soldiers

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SUJATA DAMODAR



SIDDHESH AREKAR



ONKAR DEVADIGA



Prof.PRASHANT AVHAD

I. Introduction

Internet of Things (IOT) is an upcoming technology in which machine to machine communication and human to machine communication is possible by the use of internet. The basic idea is that the data from one location is transmitted to a server and also stored. This data can be accessed at other locations by using the same server. It is a technology for sharing of information.

In today's battlefields, it is essential to have a bird's eye view of the entire situation for proper manipulation of resources. Such a view can be obtained by plotting the position of each resource on the battlefield as a function of latitude and longitude. Further strategies have to be planned accordingly. The project hence not only considers monitoring the soldiers and the other resources but

also monitors the environment in which the war is taking place.

The defense services firmly adopt immersing advance technologies are to provide some safety precaution to our soldiers.

Defense services has many parameters by which they can provide safety to the soldiers. One of the fundamental challenges in military operations is that the soldiers are not able to communicate with control room and sometimes not even with the other fellow soldiers. In this situation the soldiers in the battle field may face many problems, due to lack of help, or advice which the soldiers need in emergency from the military control room.

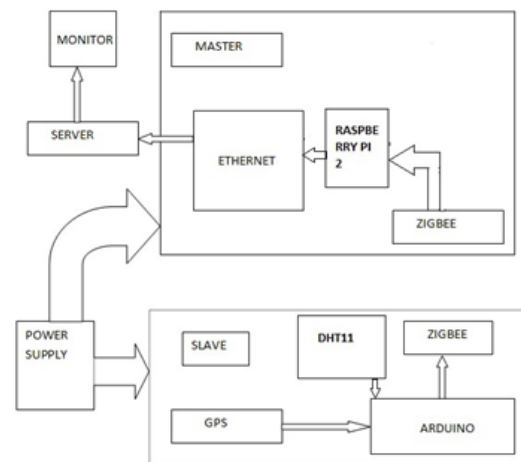
Once a troop or a soldier become lost during the war and the fight is going on in the Battlefield. Due to some unfavorable environment or adverse fight conditions, then it becomes more difficult to search the lost soldiers and bring them back to the army base station. In addition, every defense organization needs to design and develop some advance, small, portable and robust system to provide safety measures to their soldiers. There are many problems which are faced by soldiers during wars in battlefield, like:

1. Sometimes soldiers in the battlefield might be in the need to know their location when they get lost during the war but they are not able to do so because they cannot contact or communicate with the military control room.
2. During wars sometimes it may happen that the soldiers need some help during panic situations but they are not able to ask for help
3. Sometimes soldiers are not able to get help when they get injured during war.

Hence the project cover the overall scenario of the war.

II. Proposed System Description:

1) Block Diagram:



2)

Description

We are using Raspberry Pi 2 which is a Single Board Computer (SBC) for the managing the interfaced devices. Therefore, the SBC is the main controlling element.

A GSM device is used to transmit information from the master to the server where the data is stored and from where the data can be accessed by authorised people.

A GPS is a global positioning system .It is a device which is used to locate the soldiers. It provides location and time information in any climatic conditions, anywhere. The system provides critical capabilities to military, civil, mechanical and commercial users around the world. The accuracy of a position determined with GPS depends on type of receiver. The master then sends this information to the server. ZigBee is used to communicate between the master and the slaves. We cannot use GSM for the purpose as battlefields are fitted with jammers for GSM by the enemy.

In a batch of 10 soldiers, one is the master and nine others are the slaves. All the soldiers are fitted with the navigator. On the slave side, the GPS module conveys its location to the respective Raspberry Pi 2.

Raspberry Pi 2 communicates the location using ZigBee to its master. On the master's side, the GPS module provides his location to the Atmega328. The Atmega328 of the master also collects the location of his slaves and transfers them to the Raspberry Pi2. The Raspberry Pi 2 transfers this data

to the GSM module which in turn uploads the data on the server of the chosen open source website such as lively using GPRS service.

In the control room, the commander can login to the website and access the location of each soldier. Hence he can get a bird's eye view of the battlefield

III. Why RASPBERRY PI 2

1. Operating system Linux, RISC OS, FreeBSD, net BSD, plan 9, inferno, AROS, Ubuntu.
2. CPU-900MHZ quad-core ARM cortex-A7.
3. Memory-1GB RAM.
4. Power-4.0W
5. Storage-microSD slot.

IV. Methodology:

The system enables the control room to monitor the status of the soldiers in the real time without the need of satellite communication. Each slave is fitted with a device which contains a GPS tracker, a humidity sensor and temperature sensor, Arduino and a ZigBee. The Arduino accepts and processes the data from the GPS tracker, the humidity sensor and the temperature sensor. These devices are communicate serially with Arduino.

Arduino then passes this data to the ZigBee so that it can be transferred wirelessly to the control room. The GPS tracker used is L80 and the temperature sensor used is LM35. In the control room, the data is received via another ZigBee and is passed on to raspberry pi2. Raspberry pi2 is connected to the internet via LAN cable. It uploads the received data to a server of an open source website "Thingspaeak". The controller can access this data from around the world after signing in the website.

The data is displayed in the form of graph and each soldier's position is shown as a function of latitude and longitude against the time.

V. Advantages:

1. Bird's eye view of battlefield possible.
2. Directions to soldiers can be given depending on their real-time position.
3. Soldiers can be guided along the shortest path.
4. Less time delays.
5. Fully automatic system.
6. Quick response time.

VI. Application:

1. Security and safety for soldiers: GPS tracks position of soldier monitors the soldiers' vital health parameters which provides security and safety for soldiers.
2. Continuous Communication is Possible: Soldiers can communicate anywhere which can help soldier to communicate among their squad members whenever in need.

Future scope

By increasing the number of sensors like the heart rate detector, SPO2 detector, etc. the scope of this device can be increased to monitor the health of soldiers and provide them with medical help.

Conclusions

Following conclusion can be retrieved from above implementation are:

1. Security and safety for soldiers: GPS tracks position of soldier anywhere on globe and also health system monitors soldier's vital health parameters which provides security and safety for soldiers.
2. Continuous Communication is Possible: Soldiers can communicate anywhere using RF, DS-SS and FH-SS which can help soldier to communicate among their squad members whenever in need.
3. Less complex circuit and power consumption. Use of RASPBERRY PI 2 processor and low power requiring peripherals reduce overall power usage of system. Modules used are smaller in size and also lightweight so that they can be carried around. So in this way concept of tracking and navigation system is very useful for soldiers when they are on military field war. And also for base station so that they can get real-time view of soldier's on field displayed on pc.

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