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GPS Based Real Time Soldier Tracking and Health Indication System

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Abstract - *In this system, smart sensors are attached to the body of soldiers. As soon as any other soldier enters the enemy lines it is very difficult for the army base station to know about the location as well as the health status of all soldiers. The important and vital role is played by the soldiers. This system will be useful for soldiers, who involve in missions or in special operations. This personal server will provide the connectivity to the server at the base station using a wireless connection. There are many concerns regarding the safety of these soldiers. The M-health can be defined as mobile computing, medical sensors and communication technologies for health care. Each soldier also has a GSM (Global system for Mobile communication) module which enables the communication with the base station in case of injuries. In today's era enemy warfare is an important factor in any nation's security. The national security mainly depends on army (ground), navy (sea), air-force (air). In our project we have come up with an idea of tracking soldier as well as to give status of the soldier during the war. It is possible by M-Health. The defense department of country must be effective for the security of that country. This is implemented with a personal server for complete mobility. This system enables GPS (Global positioning systems) tracking of these soldiers.*

***Key Words*: GPS Tracking, GSM Module, M-Health, Nations Security.**

1. INTRODUCTION

A portable, wireless low cost tracking system w ith high reliability is the need of hour for the protection of valuable life of the soldiers on the battle fields. Further, soldiers can be guided for the correct directions during the operations using GPS. The army suffers a lot due to the unavailability of information of injuries to its personnel which may increase the death/ permanent disability toll. The armed forces when deployed in battlefield need to be monitored for better utilization of soldiers and using strategies to man oeuvre them to combat. It is observed that the causalities are caused due to injuries rather than the direct assaults in the battlefield. These number can be minimized if the real-time information is available at the control room about the health and location of the soldier. There are many issues regarding the safety of soldiers. The transmission of these parameters to the control room is carried out by the control room receives the position and orientation of soldier from GPS. In the last decades, technologies such as cable based systems RF transceiver, walkie-talkie, ZigBee and GSM based tracking systems were most dominantly used methodologies for the tracking of soldiers life on the battlefield. Medical attention can be provided at right time.

Pulse rate, body temperature, and oxygen level in an environment can be monitored along with the location tracking of the soldiers using GPS can be monitored using the proposed system. However, all these technologies suffered from one or more reasons like high installation cost, loss of signal, high noiseas well as the bulky nature. Knowledge of current location of soldiers, inability of continuous communication with the control room during the operations, lack of immediate medical attention and operations under different geographical conditions are the few prominent safety issues. Indian armed forces are the third largest standing army in the world with 1,200,255 active troops and 990,960 reserve troops. Rather than reporting on the status of their health and current location which may sometimes be wrong due to human error, a device attached with sensors can be used to get precise results.

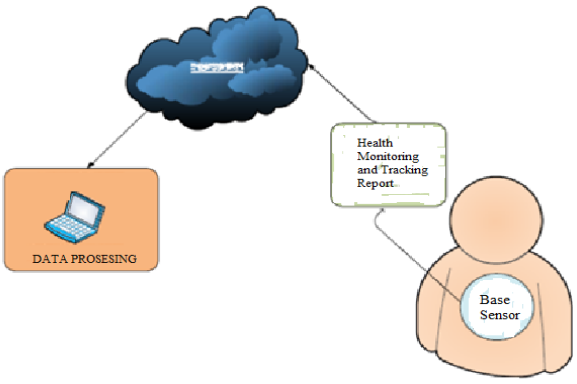

Fig.1.1 Diagram of Soldier Health Monitoring and Tracking System.

The goal is to develop a low cost, low power, reliable, non-intrusive and non-invasive signs of health status. To track the location of the soldier i.e. longitudes and latitudes. The methodology adopted for this project is to use non-invasive sensors to measure heart rate and body temperature. Signal conditioning circuits are designed to filter and amplify signals to provide desired output. All the components used in the circuit are low powered and cheap.

The acquired data is real time and is sent through ADC and into Micro controller.

2. RELATED WORK

ZigBee and GSM wireless technology were used to send current updates of patients to the doctor and then doctors can take immediate action against that patient. So ATmega328P better than other processors. Data originating from sensors and GPS receiver is processed and collected using Arduino (ATmega328P) processor. AT89C51 microcontroller was used to collect health parameters and then these parameters are transferred through GSM to the base unit. LM35 temperature sensor, Pulse Rate sensor and oxygen level detector sensor for continuously monitoring health status of soldier. Many efforts were reported by different academicians and researchers to track the location of the soldiers' along with their health condition on the battlefield Pavan Kumar et.al. The base station can access the current status of the soldier using IOT as the different tracking parameters of the soldier get transmitted via Wi-Fi module. reporteda GPS based technology to monitor the soldier health parameters and location tracking using GPS. Jassaz al .proposed an idea of integration of wireless sensor network and cloud computing for the information processing in real-time and speedy manner.

A ZigBee based approach was proposed in the collected information were then added to the cloud-based websites with the help of IoT. A wireless body area sensor networks (WBASNs) technology using ZigBee was reported in to continuously monitor the human health and its location. A real-time, ARM processor based approach for the monitoring and collection of temperature, heartbeat, ECG parameters of patients by GPS is used to determine real time position and orientation. A Google map based approach was proposed in to track the location of the soldiers. These information will be stored on the Cloud and can be extracted on the PC of control room, as and when extracted. Using various biomedical sensors, health parameters of a soldier is observed along with its surrounding environment condition observed .The proposed system is divided into two unit i.e. of the GPS to guide the soldier in correct direction. Based on these information, the authorities can initiate immediate action by deploying a medical, rescue team or any backup force for their help. RF based module to gather the live information of soldiers on the battlefield was proposed by G. Shaikh. The specific choice of processor is due to the facts that, as compared to the other data possessors used in existing system; Arduino board is a low cost and easily available with flexible interfacing capability. Hence, a portable wireless real-time system based on IoT concept is developed and proposed in this paper which will be an effective alternative to the existing technologies in the area of soldiers' health and location tracking on the battlefields. Soldier unit and control room unit.

A Raspberry Pibased approach was proposed in to monitor the body temperature, respiration, movements and heartbeat of the patient. Further, a one-time password (OTP) based system was proposed in to secure and authenticate the data processing provides the state-of-the art soldiers health and location monitoring system. However, all these systems are stuck-up by one or more reasons like costly implementation, delay in response and bulky nature.

2.1: The Technology

A robust accurate positioning system with seamless indoor and outdoor coverage is highly needed tool for increasing safety in emergency response and military operation. GPS-based positioning methods mainly used to field rescue. The position and orientation of the rescuer and the trapped is acquired using GPS chip. Using the GPS data of both the units the relative distance, height and orientation between them are calculated from the geometric relationships based on a series of formulas in Geographic Information Science (GIS). Using this technology, we are doing the navigation between two soldier .the data will be send wirelessly by RF Transceiver. This device can do accurate coordination via wireless communication, helping soldier for situational awareness. GPS module have serial interface. Receiver information are broadcast via this interface in a special data format. This format standardized by the National Marine Electronics Association (NMEA).

2.2: Evaluation

The "soldier tracking and health monitoring system" is an effective security and safety system which is made by integrating the advancements in wireless and embedded technology. It helps for a successful secret mission. This system can be used in critical conditions. The most significance in this is implementation of M-Health. By implementing this system we can improve the security of our country this also help to improve the safety of the soldier. This system also helps to provide real time video information. Using this system we can reduce casualties of war. It also helps to giving critical information's and warnings to the soldiers and can apply more of them to the current weak locations. This strengthens the defense system. Thus we can conclude that these kinds of devices are very helpful for ensuring security to the soldiers.

3. METHODOLOGY

In today world the security of the nation is depends up on the enemies warfare and so the safety of the soldiers is considered as vital role in it. Concerning the soldiers safety there are many instruments to view their health status as well as ammunitions on the soldiers. In soldiers security, bio-sensors systems gives different types of small physiological sensors, Biomedical sensor , transmission modules and processing capabilities, and can thus facilitate low-cost wearable unobtrusive solutions for health monitoring. GPS

used to log the longitude and latitude so that direction can be known easily. These devices are being added to weapons, firearms, and militaries such as the Israeli an Army which are exploring the possibility of embedding GPS devices into soldiers vests and uniforms so that field commanders can track their soldier movements in real time.GSM module can be used for effective range of high-speed transmission, short-range and soldier-to-soldier wireless communications that will be required to relay information on situational awareness, tactical instructions, and covert surveillance related data during special operations reconnaissance and other missions .So by using these equipment we are trying to implement the basic lifeguarding system for soldier in low cost and high reliability.

Fig.3.1 Tracker on Soldier Suit

3.1 Block Diagram of the Soldier Unit

The block diagram of GPS based soldier tracking and health indication system is shown in fig. it consist of two units soldier unit and base station unit. As it requires high speed communication it is intended to use ARM processor which is based on a 32 bit ARM7 TDMI-S™ CPU with real-time emulation and embedded trace support, that combines the microcontroller with 512 Kb of embedded high speed Flash memory. Biosensors such as Body temperature and pulse rate are integrated to ARM processor to monitor the health status. The GPS receiver is used to log the longitude and latitude of soldier, which is stored in microcontroller memory. GPS Receiver receives and compares the signal from orbiting GPS satellite to determine geographic position.

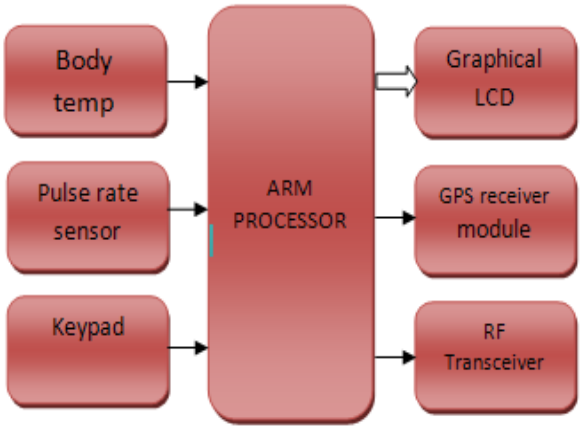

Fig.3.2: Block diagram of Soldier unit

Using keypad we can send messages to other unit. RF Transceiver gets the latitude and longitude of other soldier unit and calculate distance, speed and height between them .it also sent the information to the army base station containing the health parameter and the location of soldier. At Army Base station unit it gets the details of soldier unit through RF receiver ,the soldier location and health Status displayed on PC at base station using software VB for Front end.

3.2: Advantages

- Detect the current location of the soldier.
- If the battery is discharge, because of solar plate we can charge the battery.
- We can directly get the information of soldier's pulse rate.
- If the battery is not working at that time the unit will directly work on solar power without using battery.
- The total information of soldiers health and location will be always available on the Web Portal.

3.3: Disadvantages

- In some places where there is no provision of GSM network it is difficult from communication

4. CONCLUSION

Security and safety for soldiers: GPS tracks position of soldier anywhere on globe and also health system monitors soldiers vital health parameters Which provides security and safety for soldiers. Continuous Communication is Possible Soldiers can communicate anywhere using RF,DS-SS,FH-SS which can help soldier to communicate among their

squad members whenever in need. Less complex circuit and power consumption. Use of ARM 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 during 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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