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Internet of Things (IoT) Based Soldiers Monitoring System

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ABSTRACT: The paper reports a soldiers wellbeing monitoring and tracking system focused on the Internet of Thing (IoT). In present scenario, nations security has become important constrain. During war, tactics is main factor in any country's security. The nation's security mainly depends on army (ground), navy (sea) and air-force (air). Of which army soldiers plays a crucial role and there are many concerns regarding safety of soldiers. As soon as any soldier enters any remote area it is very vital for the army base station to know the location as well as the health status of him. This paper focuses on tracking the soldier as well as monitoring the health status of the soldier. By using the location sent by GPS, the base station can know about the position of soldier (Latitude and Longitude). The proposed system can be installed on the body of the soldier, using GPS to monitor their health status and current location. Via IoT, these details will be forwarded to the control room. The devices introduced consist of tiny portable biomedical equipment, communication units. The device is also having LoRa, Which is used for long distance communication over low network. Therefore, a low cost system can be introduced with the use of the planned hardware to preserve the valuable human life on the battlefield.

KEYWORDS: Raspberry pi 0; Biomedical sensors; GPS; IoT; Remote control of health; Tracking; LoRa

I. INTRODUCTION

Indian military forces are the world's third largest standing army, with 1,200,255 combat troops and 990,960 reserve troops. The army loses a lot because of the unavailability of accident details to its staff and can raise the risk of death/permanent disability. The casualties are likely to be caused by casualties rather than overt attacks on the battlefield. This number can be reduced if the real-time information about the soldier's safety and status is accessible at the control room. There are several concerns affecting the soldiers' safety. Knowledge of the actual soldiers location, failure to communicate constantly with the control room during the operations, lack of timely medical care and activities under different geographical circumstances are the few prominent safety issues.

Technologies such as cable-based systems, RF transceiver, walkie-talkie, ZigBee and GSM-based monitoring networks have been the most prevalent methodologies used on the frontline to track soldiers' lives. All of these systems, however, suffered from one or more causes, such as high installation costs, lack of signal, excessive noise and the voluminous design. A compact, low-cost wireless tracking system with high reliability is therefore the need for an hour to secure the soldiers' valuable life on the battlefields. Furthermore, the said system must also be of a real-time sort, in order to initiate the urgent and successful rescue operations. Motivated by those problems, a real-time portable. In an environment, the heart rate, body temperature, and ADXL can be tracked along with the distance monitoring of the soldiers using GPS using the proposed system. IoT carries out the delivery of those parameters to the control room. The



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search room gathers soldier's position and orientation from GPS. In reality, GPS can be used to guide the soldiers to the right directions during operations. The proposed system is also having LoRa device for long distance communication.

II. RELATED WORK

[1] "Soldier Position Tracking and Health Monitoring System:(March 2018)" :[Priyanka R. Pawar1, Abhijeet B. Desai] Their project efficiently keeps a check on the health status of the soldier, and his precise location to equip him with necessary medical treatments as soon as possible. Soldier's tracking is done by using GPS and Wi-Fi module, which is used to provide wireless communication system. For monitoring the health parameters of soldier they used bio medical sensors such as temperature sensor and heart beat sensor. An oxygen level sensor is used to monitor atmospheric oxygen so if any climatic changes, the soldiers will be equipped accordingly.

[2] "GPS Based Soldier Tracking and Health Monitoring: (March 2017)" : [Mr.Patil Akshay, Mr. Shelake Balaji, Mr. Pinjari Raju, Ms.Mirajkar P] Their project has come up with an idea of tracking the soldier as well as to give the health status of the soldier during the war, which enables the army personnel to plan the war strategies. Also the soldier can ask for directions to the army base unit in case he feels that he is lost. By using the location sent by the GPS, the base station can guide the soldier to safe area. The system composes of two parts, which are portable remote soldier unit and the monitoring center.

[3] "IOT Based Soldier Navigation and Health Monitoring System: (2017)" : [Krutika Patil, Omkar Kumbhar, Sakshi Basangar, Priyanka Bagul] They proposed an efficient system which has an application of tracking the soldier's location and health parameters during the war, which also invokes the military or army officers to plan the war strategies. Base station gets location of soldier from GPS and communication takes place through the Zigbee modules. An important service of the base station is to guide the soldier on correct path if he is lost in the battlefield. The base station can access the current status of the soldier which is displayed on the PC and this system uses The IOT. Using various biomedical sensor health parameters of soldier's are observed, the position and orientation of soldier is trapped using GPS.

[4] "IoT-based Healthcare Monitoring System for War Soldiers using Machine Learning: (2018)" : [Aashay Gondalia, Dhruv Dixit, Shubham Parashar, Vijayanand Raghava, Animesh Sengupta] In this paper bio medical sensors and monitoring devices are integrated with the soldiers. The integrated components must be light weight package and must provide desired result without requiring much power. One of the fundamental challenges in military operations lies that the soldiers are not able to communicate with control unit. In addition, the proper navigation between soldiers plays an important role for careful planning and co-ordination. So, the proposed work focuses on tracking the location of soldier which is useful for control room station to know the exact location of soldier and accordingly they will guide them. Control unit gets location of soldier using GPS. It is necessary for the base station to guide the soldier on correct path if he lost in the battlefield. This paper will be useful for the soldiers, who involve in special operations or missions. Smart Bio medical sensors including Heartbeat sensor, ECG module, Temperature & Humidity sensor, Vibration sensor, bomb detector, etc are attached to the jacket of soldiers. These are implanted with the soldier for complete mobility. This system will provide connectivity to the server at the base station using a wireless connection. The data collected at the base station can be used for further prediction using K-Means Clustering algorithm. This may help the control station to know about the situation at the mission field.

[5] "Real Time Health Monitoring System of Remote Patient Using Arm7, 2012" : [R. Shaikh] Care of critical patient, requires spontaneous and accurate decisions so that life-protecting and lifesaving therapy can be properly applied. Statistics reveal that every minute human is life across the globe. More close in India, every day many lives are affected by heart attack and more importantly because the patient did not get timely and proper help. This paper is based on monitoring of remote patients, after he is discharged from hospital. They have designed and developed a reliable, energy efficient remote remote patient monitoring system. It is able to send parameters of patient in real life. It enables the doctor to monitor patient's parameters(temp, heartbeat, ECG) in real life. Here the parameters of patient are measured continuously and wireless transmission using Zigbee.

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[6] “Health Monitoring and Tracking of Soldier Using GPS, 2014” : [P. Kumar, G. Rasika, V.Patil, and S. Bobade]
The paper is based on Internet of things(IoT) for health monitoring and tracking system for soldiers. The GPS is used for transmitting location of Soldier to the base station. These health parameters and location are transmitted to base station using IoT. Using these information we can save valuable soldiers life.

III. PROPOSED SYSTEM

A. Block Diagram :

Figure shows the block diagram of Proposed System. It consist of controller, various sensors and required softwares.

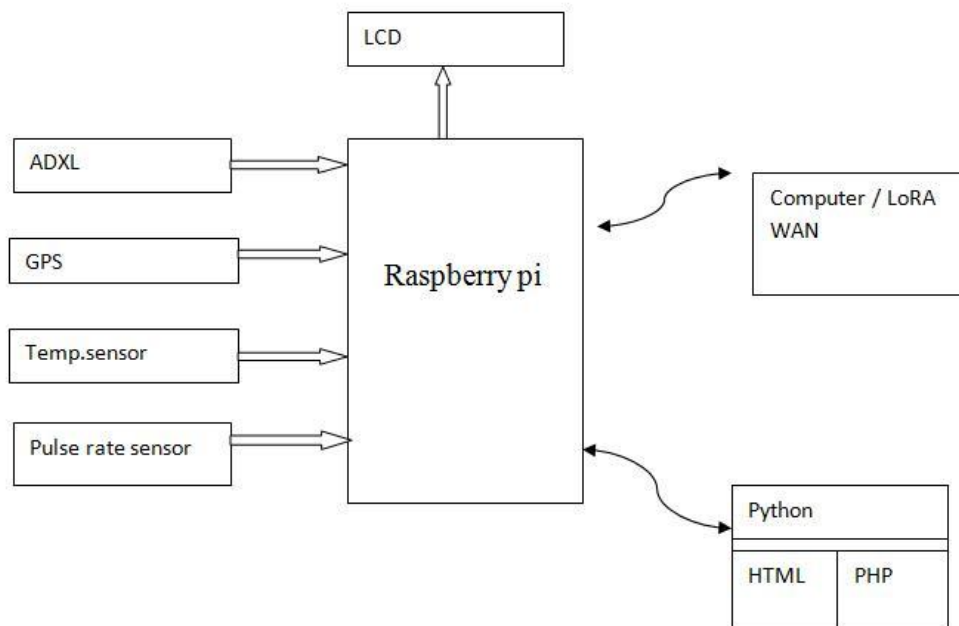


Fig. 1. Block Diagram of IoT based soldier monitoring system

IV. RESULT

The proposed system not only performs the task of health monitoring but also does the tracking of soldiers using IoT. The control room can acquire the details about the position and orientation of soldier from GPS. Even in case of losing their direction, it is the responsibility of the GPS to guide the soldier in correct direction. 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. These information is store on the Cloud and can be extracted on the PC of control room, as and when extracted. Based on these information, the authorities can initiate immediate action by deploying a medical, rescue team or any backup force for their help. Using various biomedical sensors, health parameters of a soldier is observed along with its surrounding environment condition observed.

The system is divided into two unit i.e. Soldier unit and control room unit. LM35 temperature sensor, Pulse Rate sensor and ADXL sensor for continuously monitoring health status of soldier. GPS is used to determine real time position and orientation. Data originating from sensors and GPS receiver is processed and collected using controller. The soldier's

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body parameters such as heartbeat, temperature and soldier's location (latitude and longitude) is received at control station.

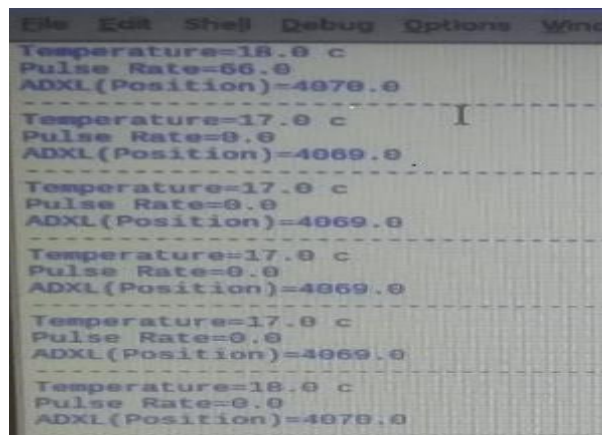


Fig. 2. Experimental result

V. CONCLUSION AND FUTURE WORK

This project focuses on an IoT-based system to monitor and control the soldier's safety. Biomedical sensors provide monitoring for any soldier's heartbeat, body temperature, and environmental parameters. Such device can be valuable in having the exact location of the missing soldier in critical condition, and in solving the downside of the missing soldiers in combat. The addressing scheme is also helpful in improving communication in emergency situations from soldier to soldier and providing adequate control room navigation. In this system LoRa device enables system to communicate over a long distance upto 10 km. So we can assume that this machine can act as a lifeguard for military persons around the world. In the future, a compact mobile sensor unit with more sensing capabilities can be developed to help the troops. This system can be used, apart from the excellent use of Soldier Navigation and Health Monitoring, by pro trekkers who travel extensively in remote areas and have no means of communication. The trekkers can be tracked by using this device and support can be sent to them as soon as possible in case of crisis. Also, this device can be used by specialists such as wildlife photographers and vet doctors who need to go deep into the jungle. This method is often useful to miners because they operate in dark caves, and can face health problems.

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