IoT Based Soldier Monitoring System

N. Aishwarya[#1], R. Akila[#1], R. Gayathri[#1], Mr. S. Dhamodharan[*2]

[#1]Student &*Department of Electronics and Communication & Anna University*
SSM Institute of Engineering and Technology, Tamil Nadu, India
[*2] *Assistant Professor &Department of Electronics and Communication & Anna University*
SSM Institute of Engineering and Technology, Tamil Nadu, India

Abstract

In today's human race the safety of the nation is depends upon the enemy's warfare and so the security of the defense force is measured as vital role in it. The security of any nation depends on military, air-force and navy of country and the backbone of all these forces is our soldiers. One of the fundamental charges in military operations is that soldier will not able to converse with control room station. In this project, the exact location and health status constraint of soldier can be sent to the base station in real time so that the suitable action can be taken in case of disaster.

GPS is used to log the longitude and latitude so that route can be known with no trouble. Here to find the physical condition status of the soldier, the body temperature sensor is used to measure the temperature of body, and to calculate heart beat rate of soldier, heart beat sensor is used. The IoT makes the entire monitoring process fast, efficient and the decisions can be taken in less amount of time. So by using this equipment's, the basic life guarding system for soldier can be executed in low cost and high trustworthiness.

I.INTRODUCTION

A. IoT (INTERNET OF THINGS)

IoT is simply the network of interconnected things/devices which are embedded with sensors, software, network connectivity and necessary electronics that enables them to collect and exchange data making them responsive. More than a idea Internet of Things is essentially an architectural frame which allows incorporation and information change over between the bodily world and supercomputer systems over alive network communications.Many people misguidedly think of IoT as a sovereign technology.

Amusingly internet of things is being enabled by the presence of other self-determining technologies which make original mechanism of IoT.
The original mechanism that make internet of things a reality is:

Hardware- Making material objects reactive and giving them ability to recover information and react to instructions.

Software – Enabling the data gathering, storage, processing, manipulating and instructing.

Communication Transport – Most important of all is the communication transportation which consists of protocols and technology which enable two physical objects to exchange statistics.

As telecommunication division is becoming more widespread and resourceful, broadband internet is widely accessible. With scientific development it is now much cheaper to produce essential sensors with fitted WiFi capabilities making concerning devices less expensive.

Most essential, the smart phone practice has surpassed all the predicted restrictions and telecommunication division is already functioning on its toes to keep their customers content by getting better their infrastructure. As IoT devices need no divide communication than the existing one, building IoT tech is very not expensive and it is highly reachable. To put things basically, any object that can be connected will be connected IoT. This might not make wisdom on the front position but it is of high value. With consistent devices one can better organize the life and be more creative, safer, smarter and well-versed than ever before.   For example, how simple it will be to begin the day if the alarm clock is not only able to wake but also able to speak with brewer to notify it that the person's awake at the same time notifies the geezer to start water heating.

Or the wearable wrist health band keeps track of vitals to notify when the person is most creative during the day. These are just few examples but applications of internet of things are plentiful.

On large scale shipping, healthcare, security environment monitoring, manufacturing and every other field one can imagine ofIoT. It is very important to consider the whole application field of internet of things at the instant but you can clearly know why it is such a fascinating and hot topic at the moment.

Internet of Things is truly a game altering concept and whatever challenges may be present, there will be fast growth in the number of connected devices. There is still need to understand concepts of IoT and the flaws that are primary. As more and more devices start to connect the need will force technocrats to come up with most highly developed concepts and methods to make certain growth of this technology. By the time what one can do best is to educate ourselves on various IoT technologies and keep experimenting with new matter.

Fig.1 Real Time Wireless Health Monitoring of a Battalion in Combat

II. LITERATURE REVIEW

Prof. Sagar Pokharkar et al proposed that, the infantry soldier of tomorrow promises to be one of the most technologically advanced modern warfare has ever seen. Around the world, various research programs are currently being conducted with the aim of creating fully integrated combat systems. One of the fundamental challenges in military operations lays that the soldiers are not able to communicate with control room station.   In addition, the proper navigation between soldier's organizations plays important role for careful planning and coordination.

So this paper focus on tracking the location of soldier from GPS, which is useful for control room station to know the exact location of soldier and accordingly they will guide them.

The idea of tracking the soldier as well as to give the health status of the soldier using biomedical sensors during the war, which the enables the army persons to plan the war strategies. But has disadvantages like GSM is less secured so it can be hacked easily.

ShruthiNikam et al proposed that, nowadays world enemy's warfare is an important factor in any nations security. One of the important and vital role is played by the army soldiers. There are many concerns regarding the safety of the soldiers. So for their security purpose, many instruments are mounted on them to view their health status. GPS used to log the longitude and latitude so that direction can be known easily. It also has an idea of tracking the soldier and navigation between soldier to soldier such as knowing their speed, distance, height as well as health status of them during the war. Here RF transceiver is used for sending and receiving the information, where multiple data cannot be sent simultaneously and losses may occur.

III. PROPOSED SYSTEM

The population of the world is ageing rapidly, how to provide appropriate healthcare to the elderly and unwell people becomes an important issue and draws high attention from medical, academic and industrial fields of the society.

The internet of things (IoT) drives the evolution of the internet and is regarded as a great potential to improve quality of life for the surging number of elderly people significantly. As android operating system gains immense popularity nowadays, it is a trend to make use of it for the wider access of IoT utility.

This paper has an idea of tracking the soldier and navigation between soldier-to-soldier such as deliberate their swiftness, distance, and height as well as health status of them during the war, which enables the army workforce to plan the conflict strategies. This system(soldier unit) enables GPS (Global positioning systems) tracking of these soldiers. It is possible by M-Health. The M-health can be defined as portable computing, medical sensors and communication technologies for physical condition care. This system will perk up, not only for the host, but also for located together/properly arranged armed labor force who will swap over information using wireless networks. One of the basic challenges in military operations lies that the defense force is not able to converse with control room station. In this system an innovative, efficient and real time cost beneficial technique that enables to monitor the person.

A portable, wireless low cost tracking system with high reliability is the need of hour for the protection of valuable life of the soldiers on the battlefields. Further, the cell mechanism must also be real time in nature so that the immediate and effective rescue operations can be initiated. Motivated from these issues, a portable real time tracking mechanism is proposed in this project.
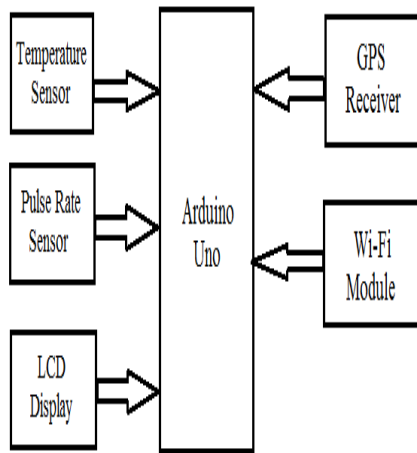

Fig.2 Block Diagram for Soldier Monitoring System (Soldier Unit)

The proposed system uses IoT which will be helpful in the real time continuous monitoring of soldier's health parameters and location. Pulse rate and body temperature can be monitored along with the location tracking of the soldiers using the proposed system. The transmission of these parameters to the control room is carried out by IoT.

The control room receives the position and orientation of the soldier. Further soldiers can be guided for the correct directions.

Hardware Description:

A. Arduino Uno:

Arduino is an open-source electronics podium based on easy to use hardware and software. Arduino boards are able to interpret inputs light on a sensor, a finger on a push button, or a Twitter message and turn it into an output activating a motor, turning on an LED, publishing somewhat online. Over the years Arduino has been the brain of thousands of projects, from on a daily basis objects to compound technical instruments. A universal community of makers students, hobbyists, artists, programmers, and professionals has gathered approximately this open source stage, their offerings have added up to an hard to believe amount of accessible knowledge that can be of huge help to novices and experts the same.

Arduino board started altering to get used to new requirements and challenges, differentiate its offer from effortless 8-bit boards to goods for IoT applications, wearable, 3D printing, and embedded environments. All Arduino boards are entirely open-source, empowering users to build them independently and eventually adapt them to their careful needs. The software, too, is open source, and it is increasing through the donations of users universal.

Fig.3 Arduino Uno

It is uncomplicated and easily reached user knowledge. Arduino has been used in thousands of dissimilar projects and applications. The Arduino software is easy-to-use for basic, yet bendable enough for superior users. It runs on Mac, Windows, and Linux.

B. Heart Beat Sensor:

This sensor is intended to determine heart beat when finger is positioned on it. The digital output of this sensor will be interfaced to Arduino board and it will openly determine heartbeats in beats per minute (BPM) rate.

It works on the standard of light inflection by blood flow through finger at every pulse. An ordinary heart rate depends on the individual's age and body size. For adults 18 and elder, a usual sleeping heart rate is among 60 and 100 beats per minute (bpm), depending on the person's substantial situation and age. Hence, the quantity threshold is set from 60 to 100 bpm. Whenever heartbeat of fighter will diverge from the threshold value, the system will broadcast information to manage room.

C. Temperature Sensor:

The digital temperature and humidity sensor DHT11 is a multifaceted sensor that have a calibrated digital signal output of temperature and humidity. The knowledge of a devoted digital modules compilation and the temperature and humidity sensing machinery are practical to make sure that the creation has high dependability and outstanding long-standing constancy.

The sensor includes a resistive sense of wet module and an NTC temperature measurement device, and is linked with a high-performance 8-bit microcontroller. Only three pins are accessible for use: VCC, GND, and DATA. The communication procedure begins with the DATA line distribution start signals to DHT11, and DHT11 receives the signals and proceeds an answer signal. Then the host receives the reply signal and begins to take delivery of 40-bit humidity and temperature data.

D. GPS Receiver:

The GPS element is installed in addressing scheme so that base site can track their activities and actual time information in all weather conditions, at all period form wherever on globe.

A GPS navigation device, GPS receiver, or on the whole GPS is a device that is capable of receiving information from GPS satellites and then to compute the device's geographical location. Using appropriate software, the device may exhibit the location on a map, and it may offer guidelines.
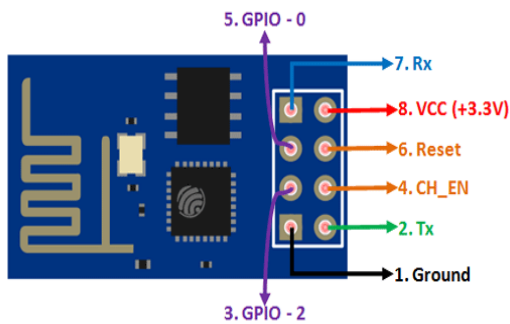
E. WiFi Module:

Fig.4 WiFi Module (ESP8266)

The ESP8266 is a low-cost Wi-Fi microchip with full TCP/IP stack andmicrocontroller capability produced by manufacturer Espressif Systems in Shanghai, China.The ESP8266 WiFi Module is a self-contained microcontroller that can give any microcontroller access to your WiFi network. The ESP8266 is able to host an application or offloading all Wi-Fi networking purposes from another application processor.

F. LCD Display:

The Graphical Liquid Crystal Display are used to demonstrate modified characters and pictures. They are used in games, phones, elevators,etc. as display units. This LCD has 128x64 display format. Here it is used to display all details of soldier such as location and also their health parameters.A liquid-crystal display is a flat display.

This uses the light-modulating properties of liquid crystals. Liquid crystals do not produce light directly, instead using a backlight or reflector to generate pictures in color or monochrome.

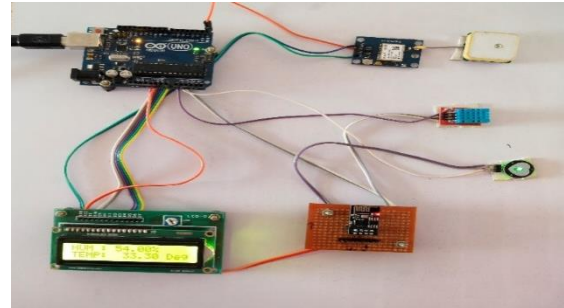## IV. RESULT

A. Soldier Unit

Fig.5 – Soldier Unit

The figure.5 shows the soldier unit kit which has LCD display where the temperature of the surrounding, location and health parameters of the soldiers are displayed for their reference.

B. Base Unit

The figures.6, 7, 8 shows the base unit output which is displayed through IoT by using the thingspeak platform. It updates the soldier's status for every few seconds.
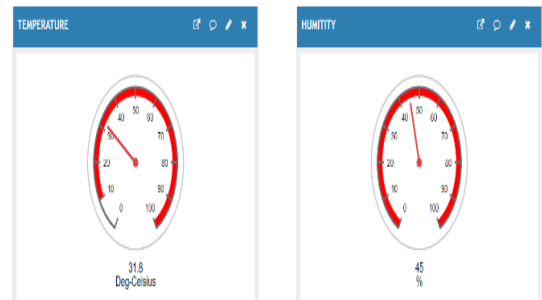

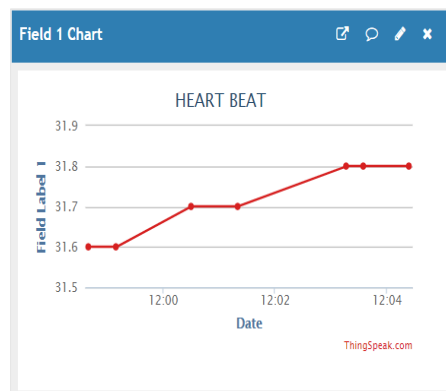Fig.6 - Temperature and humidity sensor outputof the soldier

Fig.7 – Heartbeat sensor output of soldier

Fig.8 – GPS Receiver output

V. CONCLUSION

The system can provide more security to soldiers by adding heart beat sensor, temperature sensor and GPS module for the purpose of health parameters and location of soldier's. By using these sensors base station can monitor the soldier and they can be given medical instruction to overcome the problems. We can add grove sensor for oxygen level monitoring and GSM for better communication.

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