

# Soldier Navigation and Health Monitoring System

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**Abstract---**These days, all countries keep their security at high need. Wars are being fought for land, water, and energy the position of the most powerful nation. A country's arm forces carry with it three masterly clad services: the military, the navy, and the air force. Troopers being the backbone of any armed force typically lose their lives due to lack of medical facilitate once in an emergency, also troopers unit are involved in missions or special operations get straggled on battlefields and lose contact with the authorities. To overcome these problems we implemented this project that, practice wireless body house device network (WBANS) like temperature device, heartbeat sensor, etc. will monitor the health standing of the soldier whenever required. Also practice GPS we've got an inclination as a unit of measurement, able to track the soldier's precise location whenever required. Using a gas level device, we incline to unit able to also monitor the condition, so authorities can provide essential aids. Communication is established between the troopers and authorities via GSM. Any abnormalities inside the readings of wireless body house device network (WBANS) is taken into account as a trigger for GSM to figure out the association between the soldier and base unit and send the current location and health standing to the receiver. By practice, all this equipment we've got an inclination to tend to had tried to implement the basic guarding system for the soldier in low value, lightweight, transportable, and precise device.

**Keywords---** Arduino Board / Microcontroller, GPS, GSM modem, temperature sensor

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## I. INTRODUCTION

The nation's security is monitored and unbroken by the army, navy and air force. The necessary and very important role is of troopers who sacrifice their lives for his or her country. There are several issues concerning the security of the soldier. Troopers coming into the enemy lines usually lose their lives because of lack of property, it's very important for the military base station to acknowledge the situation still as health standing of all soldiers. India has already lost such a colossal quantity of troopers in War field's as there was no correct health backup and property between the troopers on the War field's and additionally the officers at the military base stations. Recently on twenty-nine September 2016, a military confrontation between India and Pakistan began, Indian troopers conducted a strike against militant launch pads across the road of management in Pakistani administered Azad Kashmir, and inflicted "significant casualties." Indian troopers are in the main acknowledged for his or her spirit, in spite of scarce ammunition and safety measures, they need several triumphs to their credits. All should be very involved regarding the protection of the troopers, so we have got decided to create a project that is in a very position to with efficiency keep a check on the health standing of the soldier and his precise location to equip him with necessary medical treatments as presently as doable. Soldier's following is finished victimization GPS and GSM is employed to

provide wireless communication system. For watching the health parameters of the soldier, we tend to are victimization biomedical sensing elements like temperature sensor and pulse sensing element. The army unit soldier of tomorrow guarantees to be one altogether the foremost technologically advanced trendy warfare has ever seen. Round the world, varied analysis programs are presently being conducted, a bit like the United States' Future Force someone (FFW) and also the United Kingdom's Future army unit Soldier Technology (FIST), with the aim of making totally integrated combat systems. Alongside vast enhancements in protecting and assemblage subsystems, another major side of this technology are the power to provide information superiority at the operational fringe of military networks by militarization the dismounted soldier with the advanced visual, voice and knowledge communications. The helmet mounted visors, capable of displaying maps and real-time video from different squad members, ranges of physiological sensors show the heartbeat, sign, atmosphere pressure, encompassing chemical element level, etc. These devices can improve awareness for collateral military personnel any as who can exchange info victimization wireless networks beside the host. The challenge was to integrate these piecemeal parts into a lightweight package that may attain the desired result while not being too bulky associate cumbersome or requiring an excessive quantity of power. Human action with all-time low (control room) station become the elemental challenges in military

operations additionally the correct navigation between soldier's organizations plays necessary role for careful coming up with and coordination. So, this paper specializes in following things of the soldier from GPS, that is beneficial for area station to understand the precise location of the soldier, and consequently they're going to guide them. Additionally High-speed, short-range, soldier to soldier wireless communications to relay info on situational awareness, like biomedical sensors, GPS navigation, Wireless communication.

## II. LITERATURE SURVEY

**Kumar et al** they found their idea from the mountaineers as mountaineers uses wrist watch for tracking their position, to know the temperature of their surroundings and to know the direction. The idea of this paper was taken from the wristwatch used by mountaineers. The watch displays position, direction, surrounding temperature, and it also acts as altimeter.[1] Soldiers carry walkie-talkies, which are bulky and it is also used for the trekking purpose to know the direction to the people. So, it is been developing an alternative system using sensor system which will save the soldier during danger.

**Pramod** has focused on integrating the bulky components into lightweight package which could acquire more power without using large power source. Global Positioning System (GPS) is used to guide the soldiers in the war field when they get lost and also to guide them to find the safe place whenever needed. Because many soldiers lost their lives when they entered in the enemy region without even knowing so this will help to guide them towards the right path. Temperature sensor and heart beat sensor will help to check their health status. Fundamentally it is meant for establishing communication between the soldier and the base.

**Madhya and Kadam** have proposed a Zig-Bee transceiver is used to transmit the data, coming from sensors and Global Positioning System (GPS) receiver through microcontroller, to the army control room wirelessly a Zig-Bee[3] is low cost, low power, wireless mesh network standard especially designed and developed for long battery life devices in wireless controlling and monitoring applications. Zig-Bee devices have low latency which can further reduce the average current. Additionally, an alphanumeric Liquid Crystal Display (LCD) display is used to display the health parameters (i.e., body temperature and heart beats) and location information of soldier. Also, a buzzer and a panic switch are provided. A soldier can press the panic switch to ask for help in panic situation from army control room and from another fellow soldier within the wireless range. The buzzer of other fellow soldier will sound when panic button is pressed by the soldier in

paniccondition.

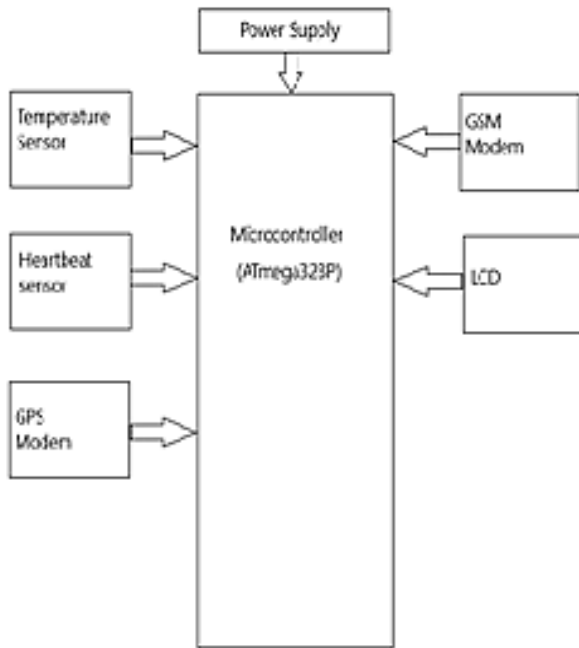
**Nikam et al** have presented an idea for the safety of soldiers. There are many instruments which can be used to view the health status of soldiers as well as ammunitions on them. The biosensor which consists of various types of small physiological sensors, transmission modules have great processing capabilities[2] and can facilitates the low-Cost wearable solutions for health monitoring. The biosensor reader device with the associated electronics or signal processors that are primarily responsible for the display of the results in a user-friendly way. This sometimes accounts for the most expensive part of the sensor device; however, it is possible to generate a user-friendly display that includes transducer and sensitive element. The readers are usually custom designed and manufactured to suit the different working principles of biosensors.

**Srijani et al[5]** have proposed "Patient Health Management System". This system is based on smart devices and wireless sensor networks for real time analysis of various parameters of patients. This system is aimed at developing a set of modules which can facilitate the diagnosis for the doctors through tele-monitoring of patients. It also facilitates continuous investigation of the patient for emergencies looked over by attendees and caregivers. A set of medical and environmental sensors is used to monitor the health, as well as the surroundings, of the patient. This sensor data is then relayed to the server using a smart device or a base station. Each of the systems discussed above provides a feature needed before, during and after a combat. Multichannel Television Sound (MTS) provides continuous tracking of soldiers' movements, but their health statuses are missing. "Smart real-time healthcare monitoring" system provides health statuses tracing, but not continuously, "Patient Health Management System" provides health monitoring using smartphone over the Internet or using servers to extract information.

## III. PROBLEM STATEMENTS

One of the fundamental challenges in military operations lays in that the Soldier not able to communicate with control room administrator. In addition, each organization needs to enforce certain administrative and operational work when they interact over the network owned and operated by other organizations. Thus, without careful planning and coordination, one group cannot communicate with the other groups. Current problems faced by the military are as follows: 1. Soldier to soldier communication to relay information is difficult. 2. Soldiers cannot seek help in emergency situation. 3. Soldiers are not trackable.

**IV. BLOCK DIAGRAM**



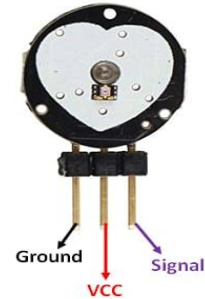
**Fig-1.** Block Diagram

**V. METHODOLOGY**

Real-time Data Sensing in the Warzone: Data which is collected from the war zone will be the measure of soldier's health condition. Appropriate sensors are used for deployment so the data analytics performed using K-Means helps the control unit in mapping the conditions around the soldiers. Data Transmission: Data is transmitted from the soldier to the squad leader using wifi module. The squad leader then collects this data and passes it to the control unit using Lora WAN (Long Range Wide Area Network). Data can either be sent periodically after some fixed intervals of time or only when there is a significant change in the biomedical sensor readings of the soldier. Data Analysis & Prediction: Instead of using simple conditional statements, K-Means[4] Clustering algorithm has been used. Clustering is the assignment of a set of observations into subsets (called clusters) so that observations in the same cluster are similar in some sense. Clustering is a method of unsupervised learning, and a common technique for statistical data analysis used in many fields. Due to the unavailability of real time soldier data, clustering has been proposed initially. K-Means Classification can be easily applied on the real time data that will be collected eventually. The difference in sensor values will help us in clustering the data into clusters such as healthy, ill, abnormal and dead. Once the data has been collected and clustered, these clusters can be visualized for more instinctive summaries at the control unit.

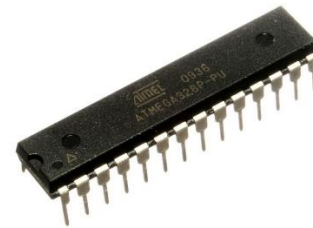
**VI. HARDWARE MODULES**

1. Pulse sensor: Pulse rate sensor gives digital output of heart beat when finger is placed on it. it works on the principle of light modulation by blood flow through finger at each pulse.



**Fig-2.** Pulse sensor

2. ATMEGA328P: It is high performance, low power controller from Microchip. ATMEGA328P is an 8-bit microcontroller based on AVR RISC architecture. It is the most popular of all AVR controllers as it is used in ARDUINO boards.



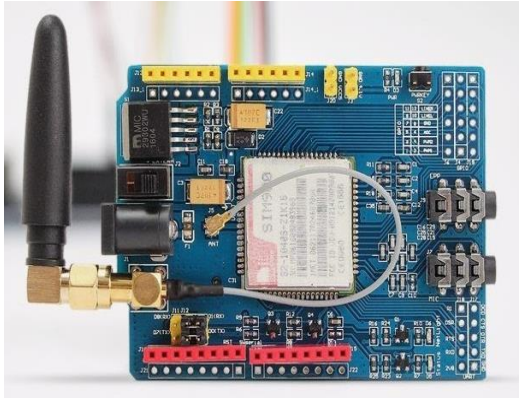
**Fig-3.** ATMEGA389P

3. GPS Modem: The GPS is used to log the longitude and the latitude of soldier, which is stored in the  $\mu$ c memory. The GSM unit sends the SMS to the army base camp containing the health parameters and the location of soldier.



**Fig-4.** GPS Modem

4. GSM Modem: It is a specialized type of modem which accepts a SIM card, and operates over a subscription to a mobile operator, just like a mobile phone. It helps soldier to communicate with army base station wireless.



**Fig-5. GSM Modem**

### **VII. ADVANTAGES**

1. Precise location of soldier is known by remote located authority office.
2. Health parameters of soldier are known by remote located authority office.
3. With health parameter and location miss communication between authority and soldier is eliminated.
4. Provide more security.
5. Provide more safety to soldiers.
6. Continuous communication is possible.
7. Continuous tracking is possible.

### **VIII. CONCLUSION**

A system is designed in which Soldier to soldier communication can be established, seek help in emergency situation and can be traceable by authorities.

### **IX. FUTURE SCOPE**

Apart from the brilliant Soldier Navigation and Health Monitoring usage, this system can be utilised by pro trekkers who trek extensively in remote areas and have no means of communication. By using this system the trekkers can be monitored and in case of crisis help can be sent to them as soon as possible. Also, for professionals like wild life photographers and vet doctors who have to go deep into the jungle can make use of this system. This system is useful for the miners too as they work in deep caves and might face health issues.

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