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DESIGN OF SMART SOLDIER HEALTH CARE MONITORING AND TRACKING SYSTEM

Nimmala Shirisha,
M.Tech Student,
Sri Indu College of Engineering and Technology,
nshirisha2000@gmail.com

Dr.P.Ramesh,
Professor, ECE dept.,
Sri Indu College of Engineering and Technology,
drpramesh87@gmail.com

Dr.P.Mukunthan,
Professor, ECE dept.,
Sri Indu College of Engineering and Technology,
drmukunthan@sriindu.ac.in

E.Parushuramu,
Assoc.Prof, ECE dept.,
Sri Indu College of Engineering and Technology,
parushuece@gmail.com

Abstract:*In today's world, war is an important aspect of national security. The main role is played by military personnel. There are many concerns regarding the safety of soldiers. Therefore, for safety reasons, some measuring equipment is connected to monitor its current health and location. Bio sensing systems consist of a variety of small physiological sensors, delivery modules and functions, thus providing low cost, portability and non-invasive healthcare. This program provides real-time monitoring and monitoring of the health of soldiers lost or injured on the battlefield. It helps reduce the time the military spends on search and rescue operations. The system allows military commanders to track location and monitor military health using GPS modules and Wireless Body Area Sensor Networks (WBASN) like temperature, heart rate and other things. The GPS receiver is sent wirelessly to other units by the ZigBee module. Wi-Fi network infrastructure has also been recommended by military leaders and control centers in high-profile locations where mobile phones are not available or are not allowed to transmit data. The collected data will be uploaded to the cloud and algorithms will be used to analyze the data and make predictions*

Keywords: WBASNs, GPS, ZigBee, Wi-Fi network

I. Introduction

The soldier must be coordinated with cutting edge medicinal services observing, continuous GPS (Global Positioning System) and information interchanges to send and get retrieve data to or from the control unit. To do this, the soldier may need remote-

control systems to talk not only to the control unit, but also to the other soldier's. Apart from the security of the country, the soldier needs to feel comfortable by equipping from state-of-art weapons, and it is essential for the military control unit to check the officer's health status. To satisfy this need, bio therapeutic sensors and control devices are installed in the officers in this paper. The built-in parts must be lightweight and should provide the desired results without requiring much energy.

One of the main difficulties in military activities is that officers are unwilling to talk to the control unit. Moreover, the best possible route between combatants is an important task that must be must be carefully arranged and coordinated. Therefore, the present proposal work mainly focus on the tracking the soldier's area, which is valuable for the control unit to know the cautions area of the officers and guide them if needed. The control unit obtains area of the soldier using GPS.

This paper will be valuable for the war fighters include in extraordinary activities or missions. Sophisticated biological sensors such as heartbeat sensor, temperature and humidity sensor, bomb identifier, etc. are arranged to the mantle of fighters. These are embedded with the fighter to ensure complete portability. The frame is provided to the server at the base station through a remote association. This information gathered at the base station can be used further forecast calculation. This can allow the control station to reflect on the circumstance at the deployment site.

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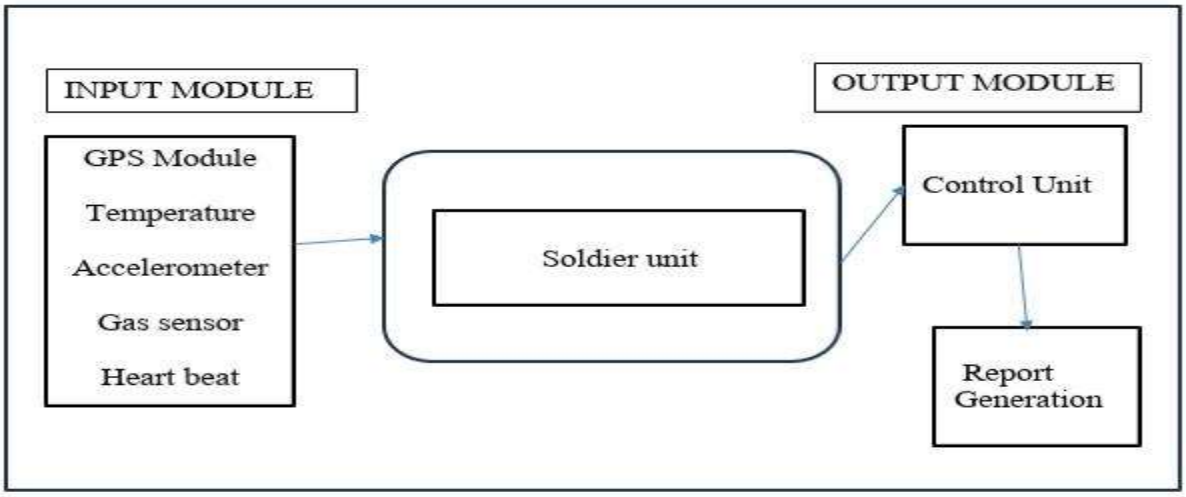

Fig. 1: Block diagram of soldier's unit showing health and environmental sensors

II. Literature Survey

Islam *et al* [1] have provided a comprehensive review have supplied a complete evaluation of the impact of IoT on electronic health monitoring, the parameters monitored and the services supplied. Current IoT-based totally fitness monitoring structures suffer from three most important boundaries. First, they often use fairly luxurious communication hyperlinks along with 3G/4G [2, 3]. Second, they commonly do now not address privateness problems [4, 5]. Third, most of them do not examine the monitored fitness parameters to prevent crucial situations [6, 7].

Monitoring of soldier track and his health measurements are based on GPS has been developed to track soldiers and navigate between them such as knowing their distance, speed and altitude and health status during war [7]. The control unit station gets location of soldier from GPS. The control unit can only access the status of current location of the soldier that should be in a link path if lost on the battlefield and only access of status location displayed on the PC. Two-way communication is not implemented in this paper according to the survey.

In [8, 9] authors proposed an IoT-based approach to fitness monitoring that addresses the above troubles have proposed architecture for e-fitness monitoring systems.

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III. Proposed Work

The system consists of two units viz, Soldier's unit and Base station unit. Soldier's unit can be integrated to the soldier's vest. In this fig.2 soldiers unit, Raspberry pi 3 is used as a controller module at the node (soldier), which collects data from the different sensors, processes the data and send information to the base station via LoRa module, Neo 6M GPS sensor is used together.

A. SOLDIER's UNIT

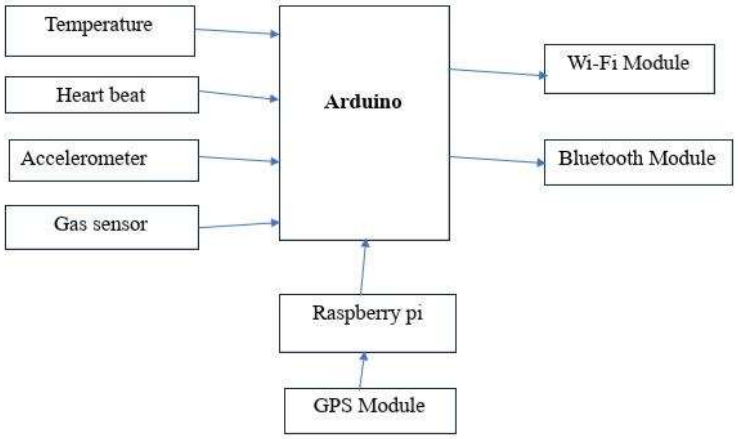

Fig. 2: Soldier Unit with connected sensors

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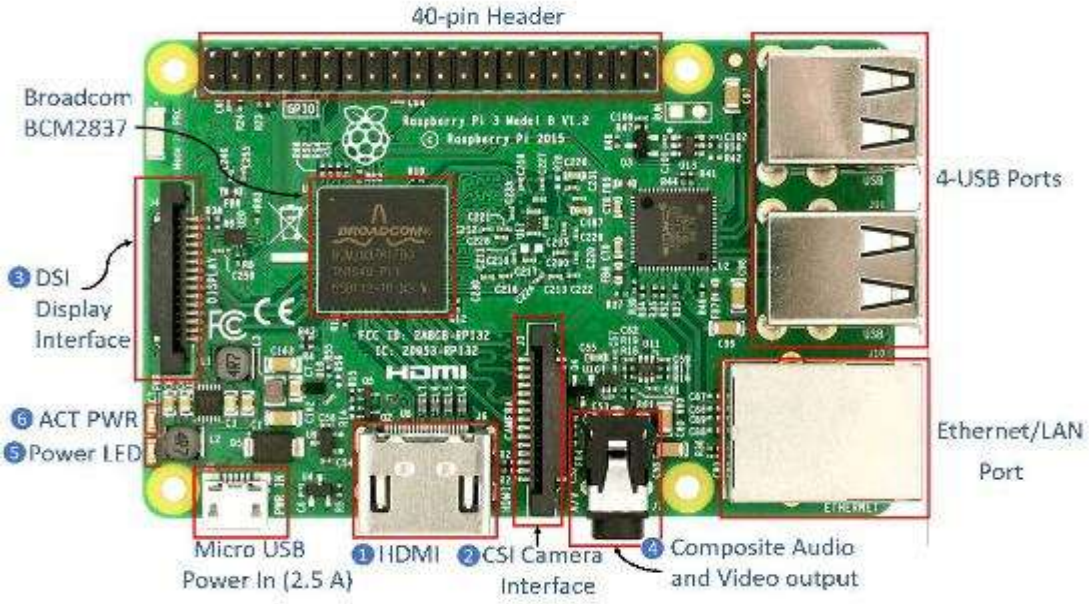

Fig.3: On-chip hardware of Raspberry Pi 3

The proposed framework plays out the assignment of wellbeing observing as well as does the following of troopers utilizing IoT. The solider unit comprises of body region sensor systems, for example, temperature sensor, heart beat sensor, tilt sensor, GPS and metal finder. These sensors are utilized to detect the wellbeing parameters of officers, following their area and to help troopers to move around in the Warfield. The detected simple signs will be changed over into computerized signals utilizing simple to advanced converter and after that contrasted and the typical restrictive signs. On the off chance that any inconsistency happens between detected flags and characterized typical signs, at that point it will be considered as a crisis. The warrior's unit will have a Wi-Fi module that will be utilized for correspondence between the fighter and the particular head.

The control room can procure the Insights concerning the position and introduction of warrior from GPS. Indeed, even if there should be an

occurrence of losing their course, it is the obligation of the GPS to manage the trooper right way. The base station can get to the present status of the warrior utilizing IoT as the distinctive following parameters of the fighter get transmitted by means of Wi-Fi module. Thisinformation's will be put away on the Cloud and can be removed on the PC of control room, as and when separated. In light of thisinformation's, the specialists can start quick activity by conveying a restorative, salvage group or any reinforcement drive for their assistance. Utilizing different biomedical sensors, wellbeing parameters of an officer is seen alongside its encompassing condition watched. The proposed framework is partitioned into two unit for example Fighter unit and control room unit. It has LM35 temperature sensor, Pulse Rate sensor and accelerometer finder sensor for persistently checking wellbeing status of warrior. GPS is utilized to decide continuous position and introduction. Information starting from sensors and GPS recipient is prepared and gathered utilizing Raspberry Pi (Raspberry Pi) fig.3 on chip hardware processor. The particular decision of processor is because of the actualities that, when contrasted with different information owners utilized in existing framework; Raspberry Pi board is an ease and effectively accessible with adaptable interfacing ability.

A. BASIC UNIT:

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Control Unit:

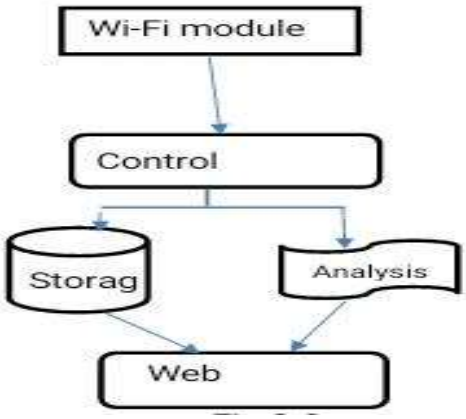

Fig. 4: Control unit with parameters

The Raspberry Pi processor will go about as the cerebrum of the unit. Trooper unit comprise of Temperature Sensor, Pulse rate sensor, metal finder, GPS Receiver, Raspberry Pi, and Wi-Fi module. The edge estimations of the ideal parameter are set and pre-customized in the Raspberry Pi according to the encompassing condition and the individual under test.

The military base station unit or the control unit will comprise of a PC and a WIFI handset module which will be associated with one another. From fig.4 control unit represents various parameters which will have the information originating from Wi-Fi module will be shown on PC screen with the assistance of a web-based interface called Tomcat Manger Web application

The implanted c programming language is utilized in the microcontrollers. The implanted c language is a universally useful programming language that gives code productivity, components of organized programming and a rich arrangement of administrators. Implanted c is certainly not a major language and isn't intended for any one specific region of use. It's commonly joined with its nonappearance of limitation, makes implanted c a helpful and powerful

programming answer for a wide assortment of programming errands. Numerous applications can be unraveled more effectively and proficiently with installed c than with other increasingly particular languages. The implanted c language all alone isn't equipped for performing activities, (for example, information and yield) that would regularly require intercession from the working framework. Rather, these abilities are given as a piece of standard library. Since these capacities are isolated from the language itself, inserted c is particularly appropriate for creating code that is compact crosswise over wide stages.

Favorable circumstances of Embedded C

- High code effectiveness
- Applicable in any stages
- Easy to aggregate

IV. Results & Discussion

The hardware kit as shown in fig.5 and data can be displayed through Bluetooth terminal as shown in fig.6and Screen shot of soldier emergency message as shown in fig.7 then tracked location is displayed as shown in fig.8.The display of real image representation of soldier unit as fig.9 and base station unit i.e. control unit as shown in fig.10

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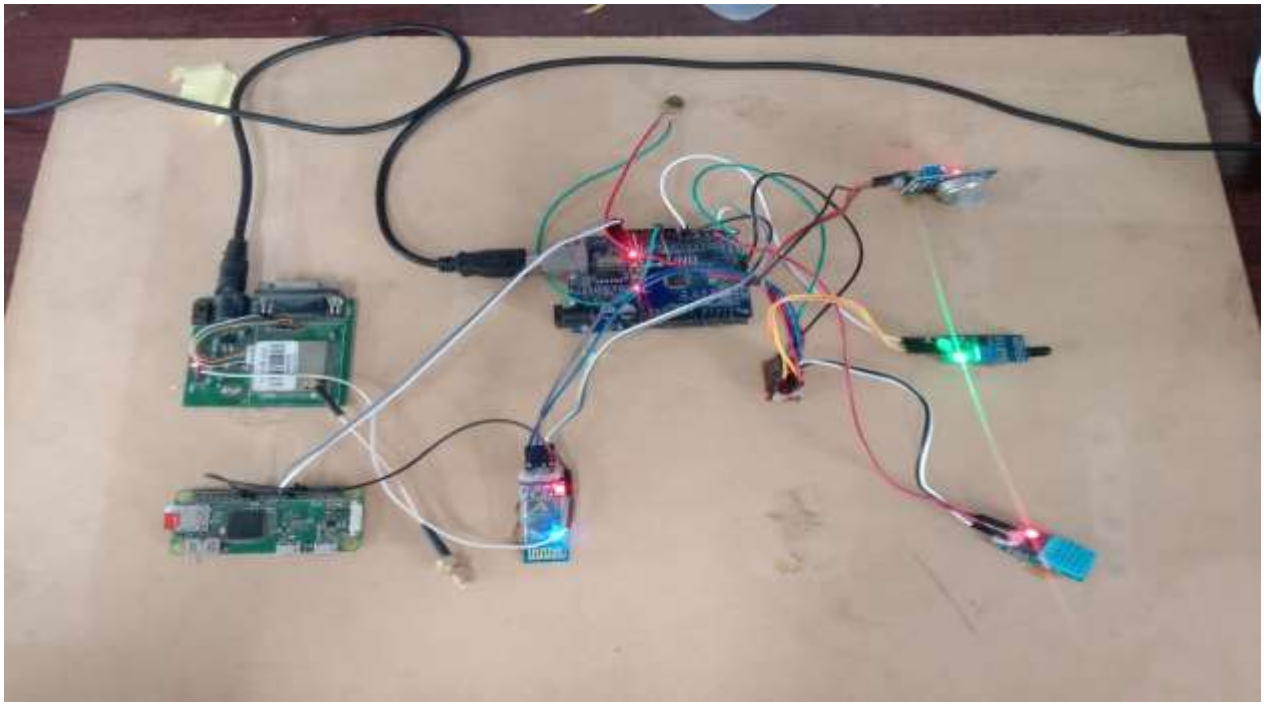

Fig.5: Hardware kit

Fig. 6: Data collected through Bluetooth terminal

Fig. 7: Screenshot of emergency message

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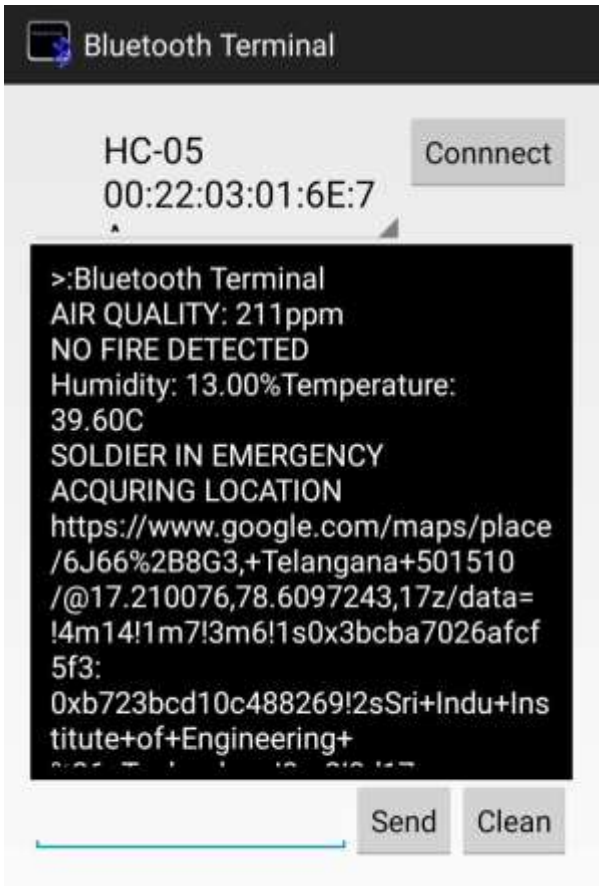

Fig. 8: Location obtained through GPS.

Fig. 9: Soldier Unit

Fig. 10: Base station Unit

V. Conclusion

From the proposed system, we can conclude that we are able to transmit the data which is sensed from remote soldier to the control unit using WIFI as the wireless transmission technology. This system helps to monitor health parameters of soldier, track their position, detect nearby bombs and predict the warzone environment using various sensors and K-Means machine learning algorithm. The system helps the soldier to get help from army control unit and/or from other fellow soldiers in panic situation. It will prove to be very useful to military forces during war and rescue operations as it can be used without any network restriction combining the capabilities of ZigBee and Wifi. Thus, this system provides security and safety to our soldiers.

VI. Future Scope

The proposed work can be expanded in the future in many directions. Gyroscope and Accelerometer can also be used together for human activity recognition using machine learning. Blood pressure sensor and electro dermal activity sensor can also be implemented together to classify if the soldier is calm or is in distress. A suitable and better routing algorithm can be used to make this system more reliable and energy efficient. Ubiquitous computing will surround the entire soldier's environment that merges physical and computational infrastructures forming a whole new integration. It will feature a proliferation of hundreds or thousands of computing devices and sensors that will provide new functionalities without being bulky. The selection of the squadron leader has been done statically in this paper while it can be done dynamically in the future using an appropriate and efficient cluster-head selection algorithm.

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