

Smart Uniform for Military Soldier's

Pratik Bonde, Rohini Bangar, Rutuja Takawale, Pooja Khedekar, Prof. Vajid N. Khan
^{#1234}Department of Computer Engineering,
 JSPM's JSCOE 2019-2020 Hadapsar, Pune.

Abstract: In enemy territory soldiers not only have to deal with the physical threat, but also with stress and fatigue caused by protracted operations or lack of sleep. So for the security purpose we need a tool for remote soldier performance and health monitoring. So in this project a tool are implemented using biosensors like heartbeat sensor, temperature sensor for health monitoring purpose using the arduino microcontroller. Also a GPS system is used in order to track the location of soldier. Additionally a ESP8266 Wi-Fi module is also used to send the all values continuously to the military center for continuously analysis soldier records.

Keywords: Atmega328 microcontroller, GPS, LM35 temperature sensor, Heartbeat sensor, battery.

I. INTRODUCTION

The soldier must be integrated with advanced visual, voice and data communications to receive information from the control station or from the superiority. For that Soldier might need wireless networks such as displaying maps and real time video not only to communicate with control room but also with side by side military personnel. Apart from the nation's security, the soldier must need safety by protecting himself with advanced weapons and also it is necessary for the army base station to monitor the health status of the soldier.

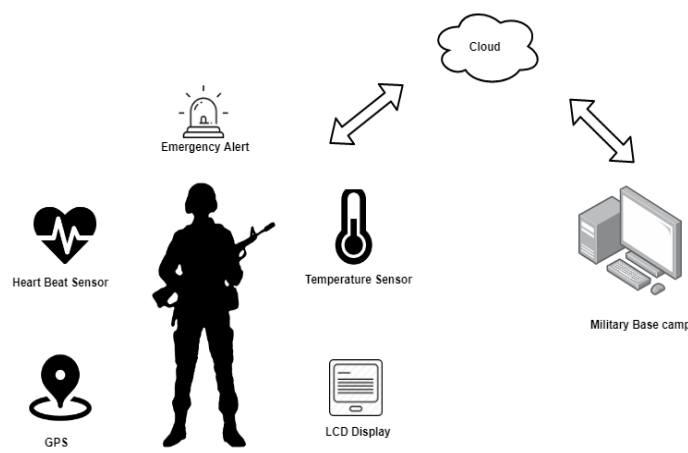


Fig 1. Overall System

Problem Statement:

Many other jackets existing in the market can provide both cooling and hot service with the jacket. The different climatic conditions such as very cold and very hot temperatures could be dangerous to health. Since in very cold temperatures, the most serious concern is the risk of hypothermia or dangerous overcooling of the body. Henceforth we have developed a smart army jacket as an important resource for the army soldiers as soldiers play a very important role to protect our country in extreme cold conditions.

The smart army jacket is proposed in such a way that it could monitor the health, internal temperature as well as emergency notification in the form of short message service for the soldier.

II. LITERATURE SURVEY

[1] Soldier Security and Health Monitoring Thanga Dharsni, Hanifa Zakir, Pradeep Naik, Mallikarjuna, Raghu.2018, the proposed framework can be mounted on the warrior's body to track their wellbeing status and current area utilizing GPS. These data will be transmitted to the control room through distributed computing. The proposed frame work involves small wearable physiological equipment's, sensors, transmission modules. Consequently, with the utilization of the proposed hardware, it is conceivable to execute a minimal effort component to ensure the important human life on the war zone GSM is used which is irrelevant and excessive use of sensors unnecessarily.

[2] Health Monitoring and Tracking System For Soldiers Using Internet of Things(IoT) Niket Patil 2017, the paper reports an Internet of Thing (IoT) based health monitoring and tracking system for soldiers. The proposed system can be mounted on the soldier's body to track their health status and current location using GPS. This information will be transmitted to the control room through IoT. The proposed system comprise of tiny wearable physiological equipment's, sensors, transmission modules Only hardware approach and no use of software systems. Didn't utilized cloud processing as well.

[3] Wearable Systems for Monitoring the Health Condition of Soldiers: Review and Application Patrik Kutilek, Petr Volf, Slavka Viteckova, Pavel Smrcka 2017, systems for measuring of physical and medical data for the diagnostics of physical and psychological state have significantly spread. This study, however, examines the current technologies and usage of the wearable monitoring systems in military. The article can serve as a guide for choosing suitable and affordable systems of quantitative evaluation of physical and psychological conditions of soldiers Wearable system but with higher cost. High end simulation software required.

[4] Wireless detection system for Health and military application Yallalinga, Nirmalkumar S. Benni 2017, upon detection of fall/collapse the sensor system transmits the information wirelessly, which will be received by the care-taker's mobile. The sensor is a belt shaped wearable device consisting of accelerometer (tri-axial) and gyroscope. These sensors are used to classify the posture and dynamics of the user. The main aim of the project is to develop efficient algorithms to detect falls and distinguish between falls and non-falls using these sensors. GSM is outdated. Zigbee is used for wireless communication and it has many limitations such as range and obstacles in communication channel.

[5] Monitoring of Soldier's Health and Transmission of Secret Codes Zeeshan Raza, Kamran Liaquat 2016, in this paper we are going to design a smart device for soldier using modern technologies and techniques. This device would be carried by soldier in warfare. The device will be able to sense heart beat and body temperature of soldier and transmit the reading on base station where the cumulative data will be displayed. A small database is organized for storage of readings. Solder can also sent a secret message on base station. In order to make the reading accurate and precise a formula is designed which is a correlation of body temperature and heartbeat. Hardware approach, LCD is not necessary to use if we use software interfaces. No cloud processing. Secret codes are already implemented.

[6] Heart Rate, Skin Temperature and Skin Humidity and their Relationship to Accumulated Fatigue Decho Surangsrirat, Songphon Dumnin and Supat Samphanyuth 2016, the objective of this study is to monitor the heart rate, skin temperature and skin humidity of the new recruited soldiers during the last week of multiple weeks training period in high temperature where accumulated fatigue is expected. The measurements are collected during their sleep. Experimental results show an increasing trend of the average resting heart rate in multiple participants. There is an increasing trend of skin temperature in one participant, the data also show consistently high skin humidity for this participant. However, there are two participants with decreasing trend of skin temperature. Average skin humidity measurements are mostly stable for all of the participants. Deals with the frustration of soldiers and not actually with health and no tracking is present.

III. PROPOSED SYSTEM

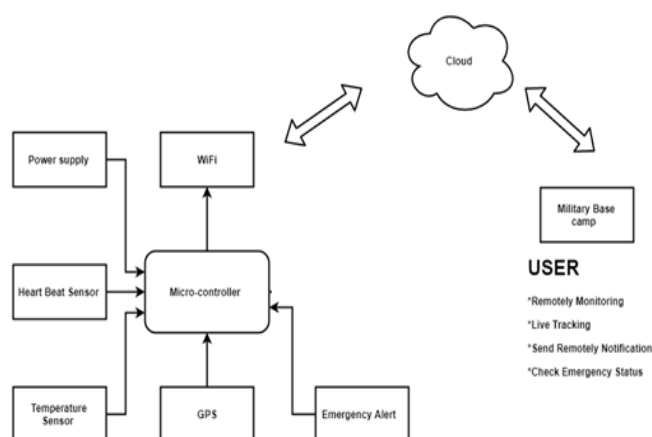


Fig 2. System diagram

A. Hardware Used:

Controller, Temperature Sensor, Heartbeat Sensor, GPS, Buzzer.

ESP8266 WI-FI MODEL:

Fig 3. ESP8266 wifi model

Feature:

- Voltage:3.3V.
- Wi-Fi Direct (P2P), soft-AP.
- Current consumption: 10uA~170mA.
- Flash memory attachable: 16MB max (512K normal).
- Integrated TCP/IP protocol stack.
- Processor: Tensilica L106 32-bit.
- Processor speed: 80~160MHz.
- RAM: 32K + 80K. • GPIOs: 17 (multiplexed with other functions).
- Analog to Digital: 1 input with 1024 step resolution.

CABLES:

We use various types of cables for making connection between the materials. We use jumper cable, male female wire, BRB cables and 1m cables.

Heart beat Sensor:

Fig 4. Heartbeat sensor

Feature:

- Use IR LED and an optical transistor to detect pulsation in fingers
- Small and Compact module
- Easy to use.

Temperature Sensor:

Fig 5. Temperature sensor

The LM35 series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Celsius (Centigrade) temperature. Since it has Linear + 10.0 mV/°C scale factor it is very easy to calculate temperature value.

GPS neo6 module:

The NEO-6M GPS module is shown in the figure below. It comes with an external antenna, and doesn't come with header pins. So, you'll need to get and solder some.

- This module has an external antenna and built-in EEPROM.
- Interface: RS232 TTL
- Power supply: 3V to 5V
- Default baud rate: 9600 bps



Fig 6. GPS model

B. Mathematical Model:

System Description:

$S = \{I, O, F, S1, S2\}$.

where,

S = System.

Input

I = Incoming sensor values.

Output

O = Detect all sensor values

$F = \{f1, f2, f3, f4\}$.

where,

$f1$ = Soldier Current Location using GPS.

$f2$ = Soldier Health records.

$f3$ = Live Track.

$f4$ = Get Alert to the center.

$S1$ = Initial state is the state in which system is waiting for incoming soldier sensor values for analysis.

$S2$ = Final state is the detect live sensor records.

C. Algorithm: Health prediction

Step 1: Start

Step 2: Microcontroller configuration.

Step 3: Temperature sensor initialization.

Step 4: Heart pulse rate configuration.

Step 5: Check temperature and heartbeat threshold value

Step 6: if (heartbeat > threshold value) OR if (temperature > threshold value)
 else, buzzer will active.

if (heartbeat < threshold value) OR if (temperature < threshold value)
 else, buzzer will active.

Step7: Stop

IV. RESULT



Fig 7. Home Page

 A screenshot of the Indian Army website showing a 'WELCOME' message and a table of soldier health information. The header is identical to Fig 7. The main content area displays the text 'WELCOME' above a table with the following data:

ID	Soldier Height	Soldier Weight	Soldier Age	Soldier Heartbeat	Soldier Temperature
1	5.6	78 Kg	34	32	43

Fig 8. Soldier health information

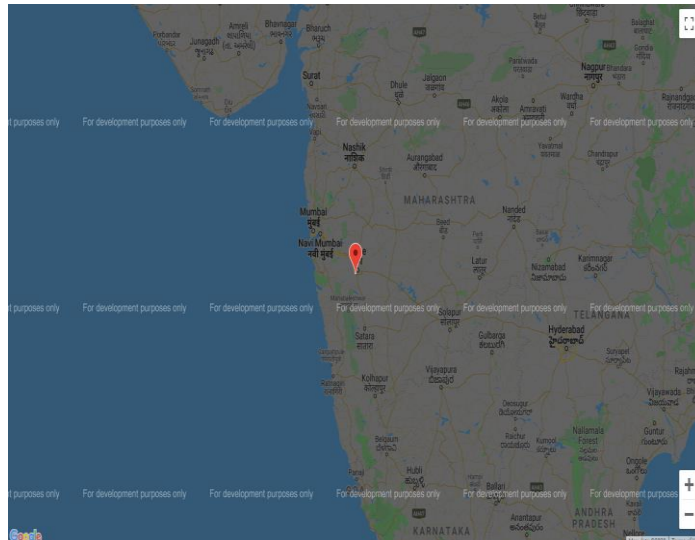


Fig 9. Soldier location

V. CONCLUSION

The proposed 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. Security and safety for soldiers: GPS tracks position of soldier anywhere on globe and also health system monitors soldier's vital health parameters which provides security and safety for soldiers.

VI. FUTURE SCOPE

In Future, we can add the gas detective sensors so that it can detect the gases which are harmful for the human beings in forest area specially. Combat soldiers can be dressed in high-tech uniforms, fitted with everything, and water purifying systems to climate control.

REFERENCES

- [1] Soldier Security and Health Monitoring Thanga Dharsni, Hanifa Zakir, Pradeep Naik, Mallikarjuna, Raghu. 2018.
- [2] Health Monitoring and Tracking System For Soldiers Using Internet of Things(IoT) Niket Patil 2017.
- [3] Wearable Systems for Monitoring the Health Condition of Soldiers: Review and Application Patrik Kutilek, Petr Volf, Slavka Viteckova, Pavel Smrcka 2017.
- [4] Wireless detection system for Health and military application Yallalinga, Nirmalkumar S. Benni 2017.
- [5] Monitoring of Soldier's Health and Transmission of Secret Codes Zeeshan Raza, Kamran Liaquat 2016.
- [6] Heart Rate, Skin Temperature and Skin Humidity and their Relationship to Accumulated Fatigue Decho Surangsrirat, Songphon Dummin and Supat Samphanyuth, 2016