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Soldier Health Monitoring and Position Tracking System

[1]Shital Shinde , [1]Madhura Nale, [1]Prerna Sonawale, [1]Gayatri Buddhe
[1]Electronics & Telecommunication, KIT's College of Engineering, Maharashtra, India
[2]Head Of Department Electronics & Telecommunication, KIT's College of Engineering, Maharashtra, India
Corresponding Author: [2] Yuvraj M. Patil

ABSTRACT
This paper presents a smart health monitoring and position tracking system which facilitates real-time position of a soldier and collect and transmit health data to the base station. Defence Sector is a backbone of a any country. In a modern era, Indian Air force, Indian Army and Indian Navy plays vital role in making security strategy of nation. We are familiar with the attacks done by enemies on a Indian soldiers, like a URI and a Pulwama. Already India has lost thousands of soldiers in this attack. In this project, for the safety purpose of troopers, a number of appliances and devices are attached with them to take a check on their health status. GPS used for a place the latitude and longitude to find exact position of a soldier. Health related sensors like Amax30102 Heart Rate, Pulse oximeter Sensor Module, AHT10 high Precision Digital Temperature And Humidity Measurement Module can help to make low -priced wearable solution for health monitoring. This can help troopers for enhancing situational awareness and search operations. The soldier health monitoring and position tracking system permit military base unit to trace the present GPS position of soldier and also checks health parameter including body temperature, heart rate, blood pressure. This technique will be deliver both these details to the base unit. An emergency switch is also allocate with the soldier for emergency motive. The system is handy and very useful for getting health data of soldiers and providing them immediate help.
KEYWORDS;- *soldier safety, soldier health monitoring, Global system for communication, Global positioning system*

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I. INTRODUCTION

In today's world, the nation's security is that the important factor and the military plays leading role in the protection of nation.Soldier's face many problems due to lack of medical treatments especially in remote areas also they face lack of communication to the control room which leads to ultimate death of the soldier.lifetime of the soldier is incredibly vital for the nation so we have proposed the project named as Soldier Health Monitoring and Position Tracking System. This System measures health parameters such as heart rate ,body temperature and also tracks the location using global positioning system(GPS).So this paper focuses on tracking the location of the soldier from GPS which is beneficial for control room to grab position of the soldier.GPS module also provides latitude and longitude values.We use MAX030102 Heart rate and Pulse Oximetre Sensor Module for monitoring health parameters such as heart rate ,Body temperature.The gathered details are sent to the control unit via Lora module. Thus when any soldier gets trapped in the any issue, saved easily from the most information collected from the Wireless technologies like GPS and Lora module

II. LITERATURE SURVEY

Jasvinder Singh in (2018) proposed Internet of Things (IOT) and GPS based soldier positioning and health tracking.In the Emergency situation,The soldier can communicate to each other.The power consumption is reduced by the use of ARM CPU and peripheral with minimum requirements.Soldiers safety is achieved by the health monitoring System,Which also tracks location via GPS.

Mr.Palve Pramod proposed soldier tracking and communication system which was GPS based, In this the soldier can ask for help to the army control unit in case if he feels lost.The army control unit can assist the soldier to take them to safe zone and GSM will enable the soldier unit with Base unit.By getting the accurate location of the soldier .It will help soldier to discuss about battle strategies and can take advice from soldier Base unit.

Akshay Gondalic in(2019) proposed Healthcare system for the soldier using Machine learning. This system helps army base station to track the location Using GPS and see health status of the soldier using Heart Beat

sensor. The information from this GPS and heart beat and temparature sensors gets wireless transmitted to other soldiers Using Zigbee System.In addition Lora can be also used to for the wireless networking.

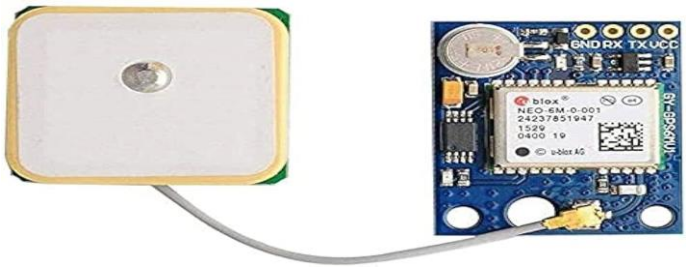
Manoj K. In (2020) proposed a research paper named as Soldier Health Monitoring and position tracking using GSM and GPS technology.In this method,they concentrated on the knowing exact location of soldier and also medical status of soldier.when the message gets sent to the arm base station through GPS.the base station will come to that exact spot where soldier is present.It also checks health status and provides medical treatment to soldiers.here Google Maps are used to display location of the soldier.

III. Component Selection and Functionality in the Smart Notice Board

- **HEART BEAT SENSOR AND PULSE OXYMETER**

MAX30102 is a combination of pulse oximeter and heart rate monitor biosensor module. It combines red LED a nd infrared LED, photodetectors, optical components, and low-
noise electronic circuitry that suppresses ambient light. Devices worn on the fingers, ears and wrists to monitor h eart rate and heart rate collect oxygen in the blood.

- **NEO-6M GPS Module with EPROM**



NEO6M GPS module can be used for GPS tracking and location. Works with cars and other mobile apps. This is done to provide better location information and includes a 25x25mm active GPS antenna with UART TTL sock et.

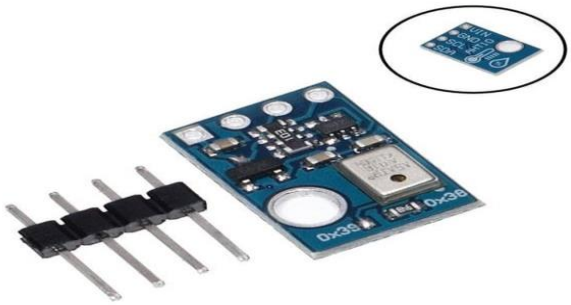
- **OLED Display Module**

The 0.96 inch OLED Display Module – SPI/I2C – 128×64 – 7 Pin (Blue) are one of the most attractive displays available for a microcontroller.
OLED's are the future of displays, as they possess some of the greatest advantages over both conventional display technologies of LCD's and LED's.

- **ESP32**

The ESP32 is integrated with onboard antennas, RF baluns, power amplifiers, low-
noise receiver amplifiers, filters and power control modules. ESP32 adds invaluable functionality and versatility t
o your application with printed circuit board (PCB) codes.

- **AHT10 High Precision Digital Temperature And Humidity Measurement Module**



The HT10 high
precision digital temperature and humidity measurement module is a new generation of temperature sensors that set new standards in terms of size and intelligence: housed in a two-
line flat structure without SMD packaging, suitable for reflow soldering. With a base size of 4 x 5 mm and a heig ht of 1.6 mm. The sensor produces a calibrated signal in standard I2C format.
AHT10 is equipped with a newly designed ASIC-
specific chip, improved MEMS semiconductor capacitive humidity sensing element, and a standard on-
chip temperature sensing element. Its performance has been greatly improved and surpasses the reliability of pre vious brands. The first generation temperature and humidity sensor was developed to be stable in harsh environm ents.

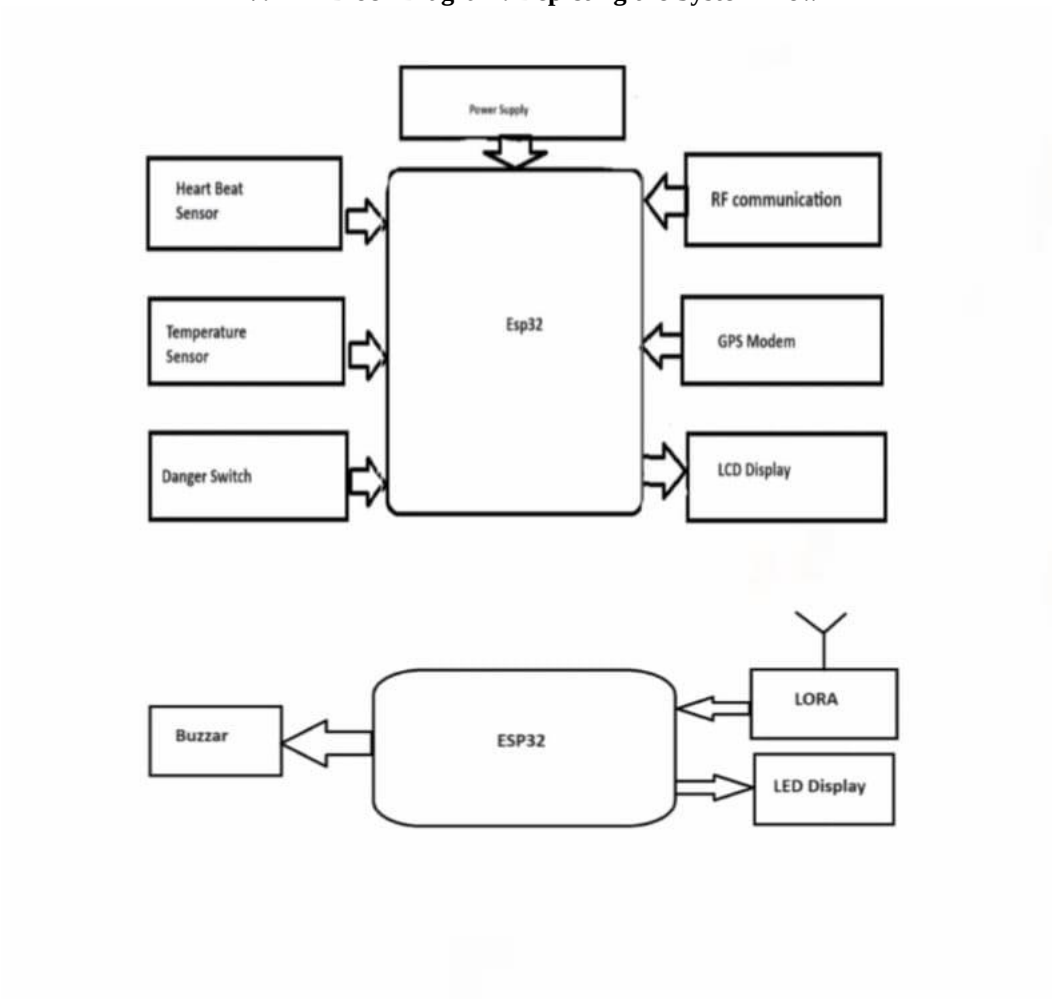
- **ESP8266 Serial WIFI wireless Gain Antenna**

MT76813DBI ESP8266 serial WIFI wireless gain antenna is a compact and high-
performance wireless network module that enables devices to connect to Wi-
Fi networks. It is designed to provide reliable, stable wireless connectivity for a variety of Internet of Things (IoT) applications.

- **GREEN 12 mm 12V-24 V Momentary Metal Switch**

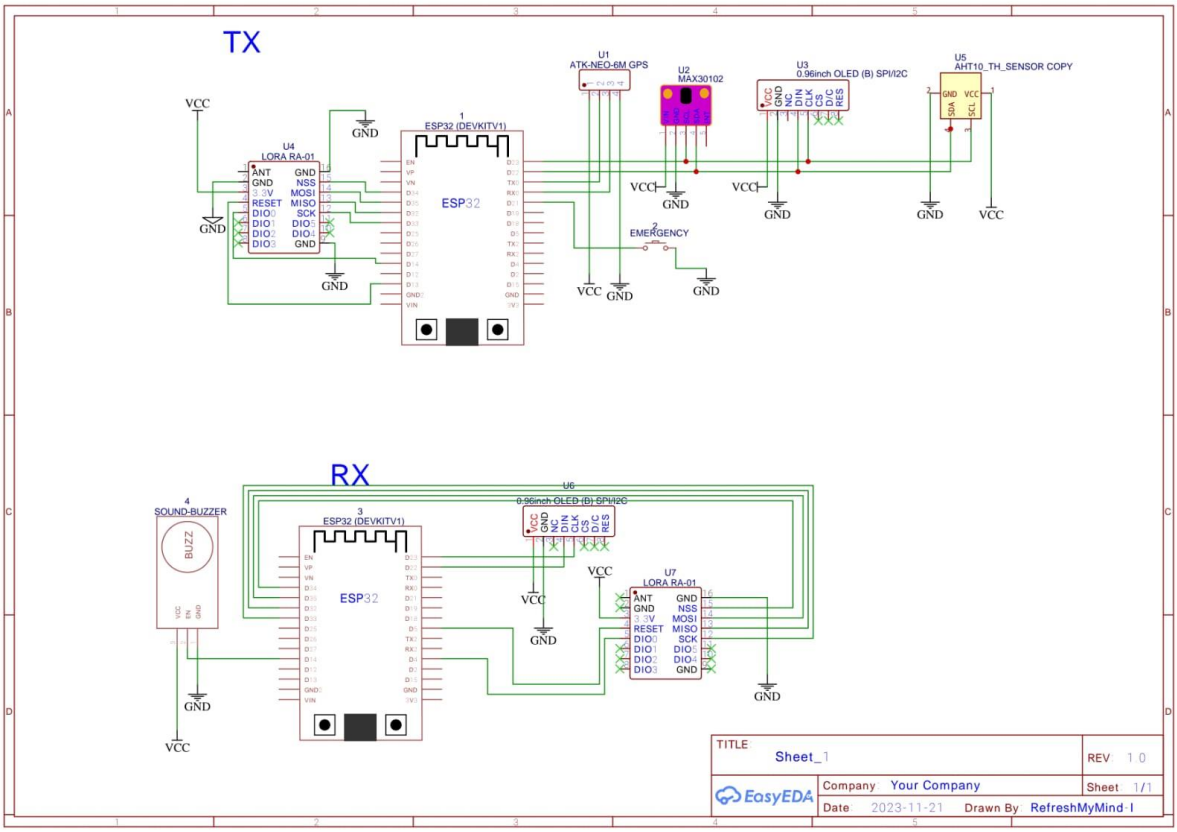
If you need heavy buttons, this metal push button switch is your best choice! These metal buttons are very power ful small panel mount switches with bright red LED rings. It is SPDT with 12 mm thread and 1 mm pitch. Adds a nice look to your dashboard or control panel with an LED light ring around the press of a button. These switches are available in a variety of LED light colors, so you can choose according to your desired application.

IV. Block Diagram: Depicting the System Flow



Soldier Health and Position Tracking System : This project provides a GPS and Wireless communication based health detection and position tracking system for soldier health and safety. When soldier in an emergency situation by using hardware which consisting of the sensor such as temperature sensor, heart beat sensor and wireless LORA module which communicates to the control room for help. The heart beat sensor measures the change in volume of blood through any organ of the body which causes a change in the light intensity through that organ so any changes occur soldier can get help from control room.

V. CIRCUIT DIAGRAM



This project aims to enhance soldier safety in emergency scenarios by employing GPS technology and Wireless LORA module for communication and location tracking.The sensor components are securely mounted on the soldier tasked with monitoring vital body parameters such as heart rate and temperature sensor .These sensors track parameters such temperature ,heart rate of body and data displayed on LED screen . The block diagram consist the components of ESP32, Heart beat sensor ,Temperature sensor, GPS Modem, danger switch ,power supply , LED display. Power supply is connected to ESP32 Microcontroller device. The heart beat sensor ,temperature sensor is connected to ESP32 . The sensor provides signal to esp32 and by modifying some instruction in ESP32 it transmitted data by using transmitter side LORA module which is wireless communication to the receiver side LORA module. After Receiving data on LORA module and it gives to esp32 and it displayed on LED screen. When soldier in danger situation facing some difficulty or temperature of soldier exceeds above limit then soldier activate the danger switch and send signals to control room. The control room receives automatic transmission of the soldier's precise latitude and longitude coordinates ,facilitating swift assistance. Similarly ,if the soldier's heart beat rate surpasses the normal range ,the dedicated heartbeat sensor triggers an alert. In case of a sudden temperature spike ,a message alert including soldier's temperature ,heartbeat, longitude, latitude all details displayed on LED screen of control room , ensuring immediate response and aid coordination.

VI. DESIGN METHODOLOGY

This project provides health check and location tracking based on GPS and wireless communication for the health and safety of soldiers. When soldiers face a crisis, they can use devices with wireless LORA modules with temperature sensors, heart rate sensors and other sensors to communicate with the control room to find help.

The heart rate sensor creates a change in light in the body by measuring the change in blood volume in each orga n of the body, so that in case of a change, the soldier can get help from the control room.

VII. CONCLUSUION

The biggest problem in the military is the lack of proper communication between the soldier and the command room. From the proposed system, we can conclude that various biomedical sensors detect body parameters in real time and transmit the data to the control room, where it checks the current location of the soldier using LoRa and GPS technology. It also enables spontaneous communication with the control room and other soldiers in a panic situation for help.The goal is to secure the lives of soldiers using various sensors to assess health and track location very precisely. Therefore, the system is implemented in a cost-effective manner and the implementation of this system is also very easy

VIII. FUTURE SCOPE

The future of military health monitoring and location tracking with ESP32 is vast and promising. This opens up opportunities to monitor more accurate health metrics, such as stress levels, hydration and fatigue, and provides a more comprehensive view of a soldier's health. With advances in precomputing and machine learning algorithms, these systems can analyze data in real time and predict potential health problems before they become critical. This would be a significant step forward in preventive healthcare for military operations. The system could also be integrated with other military equipment such as body armor and helmets, enabling seamless data collection and potentially providing additional capabilities such as collision detection. This integration would improve the functionality and efficiency of the system.

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