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Real Time Soldier Health and Position Tracking System

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Abstract: Protecting the soldiers is now a top concern in modern military operations. In harsh environments such as hot temperatures and on the active battlefield, continuous communication and health tracking can be hard to keep up. Failure to diagnose medical problems in a timely manner could have severe ramifications. This paper presents a real-time soldier health and position tracking system based on IoT technology with an embedded wireless communication solution. Lightweight, wearable sensors that do not add to the burden of movement on warfighters provide real-time data in a readily accessible and straightforward manner because the system continuously collects key health information such as heart rate, body temperature and blood oxygen levels. An ESP32 microcontroller analyses this data for Wi-Fi and Bluetooth-based communication and is equipped with a GPS module to provide up-to-date location details.

Keywords: Soldier health monitoring, IoT, ESP32, GPS, wireless communication, wearable sensors.

1. INTRODUCTION

In today's military environments, soldiers work in conditions that are extreme and in remote areas where constant monitoring of their health can be impractical. In such cases, delayed diagnoses can result in disastrous outcomes, as they necessitate continuous monitoring of the military personnel's health.

The project suggests the development of a Real-Time Soldier Health and Position Tracking System, which tracks and monitors the health parameters like heart rate, body temperature, and blood oxygen levels using wearable biomedical sensors. The acquired data is further processed by the ESP32 microcontroller, which supports wireless communication through Wi-Fi and Bluetooth connectivity. Additionally, the use of the GPS module will help track the position, and GSM communication will send the information to the command control centre. In case of unusual health situations, alert messages are produced instantly.

2. Body of Paper

The system model comprises the combination of wearable sensors, processing, and wireless communication in an integrated unit. Biomedical sensors record data regarding heart rate, body temperature, and blood oxygen levels. This data is processed using the ESP32 microcontroller.

The ESP32 is used to interpret the sensor information by comparing it against the defined thresholds and removing noise so as to provide accurate information. The GPS module enables the real-time location of the individual, which is then coupled with the health information and sent remotely to the command centre via wireless communication.

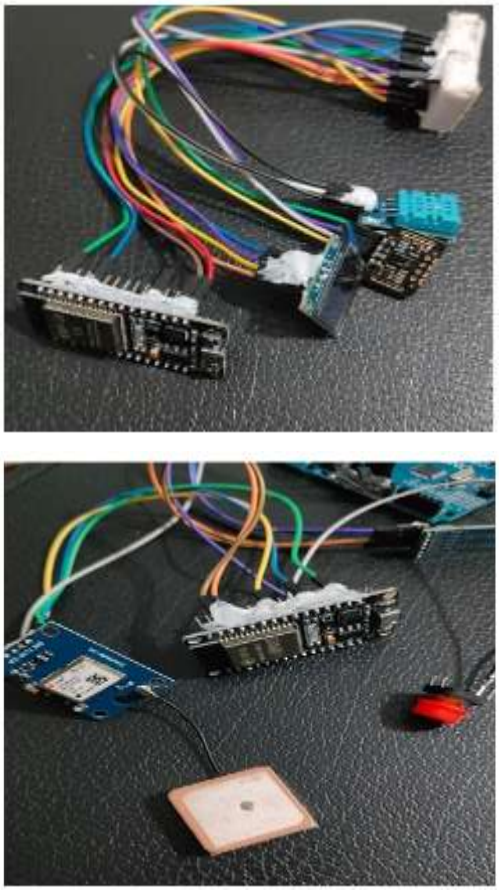


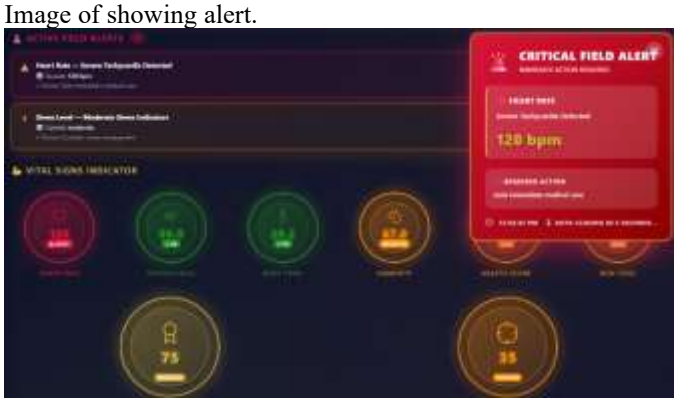
Figure 1: Arduino Uno with Passive Buzzer Module Connected on a Breadboard

Sensed data is monitored and stored in a spreadsheet.

A	B	C	D	E	F
/11/2025	19:58:40	heartRate	spo2	temperature	humidity
/15/2025	7:43:11	0	0	27.4	38
/15/2025	7:43:16	0	0	27.4	38
/15/2025	7:43:23	72	97	27.4	38
/15/2025	7:43:25	65	96	27.4	39
/15/2025	7:43:30	70	97	27.4	39
/15/2025	7:43:34	74	96	27.4	39
/15/2025	7:43:39	68	97	27.4	39
/15/2025	7:43:43	65	96	27.4	39
/15/2025	7:43:47	73	97	27.4	39
/15/2025	7:43:53	71	96	27.5	39
/15/2025	7:43:56	65	97	27.4	39
/15/2025	7:44:01	69	96	28.7	40
/15/2025	7:44:06	74	97	28.7	47
/15/2025	7:44:10	68	96	28.7	55
/15/2025	7:44:14	65	97	28.7	63
/15/2025	7:44:19	73	96	28.8	71
/15/2025	7:44:23	71	97	32.8	72
/15/2025	7:44:28	65	96	32.2	77

Image of showing all normal.

Image of showing alert.



3. CONCLUSIONS

Real-time soldier health and position monitoring system successfully verifies the implementation of wearable biomedical sensors, ESP32 microcontroller, and wireless communication for monitoring soldiers in the field environment. It monitors important health-related parameters as well as the position of the soldier in real time, so this system helps in finding any health-related problems at an earlier stage and reacting appropriately in an emergency.

The system worked efficiently and was reliable and robust enough to withstand harsh environments. The capability of providing alerts enables effective decision-making and thus facilitates effective medical assistance. In conclusion, the proposed system improves the safety and efficiency of soldiers.

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