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SOLDIER HEALTH & POSITION TRACKING SYSTEM

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ABSTRACT
In hostile environments, soldiers face not only physical dangers but also stress and exhaustion from prolonged operations and sleep deprivation. To address this, we've developed a tool for remote monitoring of soldier performance and health. This system utilizes biosensors to track vital signs and health indicators. It's also equipped with GPS technology for real-time location tracking and a GSM modem for wireless connectivity. This comprehensive approach enhances security and ensures timely intervention when needed.

Keywords:
IoT, Biosensors, GPS, GSM.

I. Introduction

Our soldiers, crucial guardians of our nation, face immense challenges in the battlefield. Tracking their location and monitoring their health amidst the chaos is a formidable task for military bases. Thus, we've devised a solution employing various sensors to measure longitude and latitude, pinpointing the soldier's exact position. A GSM modem ensures seamless communication with the base station, relaying vital health and location data to registered mobile numbers.
The Soldier Health and Position Tracking System enables real-time monitoring of a soldier's GPS coordinates along with key health metrics such as body temperature and heart rate. Additionally, it includes a distress signal feature allowing soldiers to manually request assistance or alert the military in times of need.
Through GPS modems transmitting latitude and longitude coordinates, military personnel can precisely track soldier positions. This system significantly aids in promptly assessing a soldier's health status and providing necessary assistance.

INTERNET OF THINGS (IOT):

The Internet of Things (IoT) refers to the interconnected network of physical objects embedded with technology to communicate and interact with their environment. Coined by Kevin Ashton in 1999, this concept has evolved into a pivotal aspect of modern technology.

Components of IoT:

1. Sensors:
Sensors are electronic devices that capture data from physical conditions or events, converting it into useful information for decision-making by either intelligent devices or humans.

2. Networks:
Following data collection, the next step involves transmitting signals collected by sensors across various network components, including routers and bridges, in different topologies such as LAN, MAN, and WAN. Technologies like Wi-Fi, Bluetooth, and LTE facilitate connectivity between sensors and networks.

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Layers of IoT:

1. Sensor Layer:
This layer is responsible for sensing environmental factors like water pressure, river levels, and bridge loads.

2. Network Layer:
Responsible for transmitting sensor data to bridge monitoring systems.

3. Application Layer:
Facilitates the transmission of data from the bridge monitoring system to administrators or users, ensuring informed decision-making.

II. Literature

Thanga Dharsni, Hanifa Zakir, Pradeep Naik, Mallikarjuna, Raghu: Their proposed framework involves mounting on the warrior's body to track their health status and location via GPS. Data transmission occurs to the control room through cloud computing, utilizing small wearable physiological equipment, sensors, and transmission modules. Despite its efficacy in ensuring soldier safety at a low cost, drawbacks include the unnecessary use of GSM and an excessive sensor count.
Niket Patil: This paper presents an IoT-based health monitoring and tracking system for soldiers, deployable on their bodies. It tracks health and location via GPS, transmitting data to the control room through IoT. However, it solely relies on hardware, lacks software systems integration, and neglects cloud processing.
Patrik Kutilek, Petr Volf, Slavka Viteckova, Pavel Smrcka: They examine wearable monitoring systems in the military for physical and psychological state diagnostics. While serving as a guide for choosing suitable systems, it incurs higher costs and necessitates high-end simulation software.
Yallalinga, Nirmalkumar S. Benni: Their system transmits fall/collapse information wirelessly to a caregiver's mobile device using a belt-shaped wearable sensor with accelerometers and gyroscopes. However, the use of Zigbee for wireless communication poses limitations, and GSM is outdated.
Zeeshan Raza, Kamran Liaquat: Their smart device for soldier’s senses heart rate and body temperature, transmitting data to a base station for display and storage. However, it lacks software interfaces, cloud processing, and unnecessarily incorporates LCDs and secret codes.
Decho Surangsrirat, Songphon Dumnin, Supat Samphanyuth: Their study monitors heart rate, skin temperature, and humidity in soldiers during high-temperature training periods. Although insightful, it neglects tracking and focuses more on soldier frustration than health monitoring.

III. System Architecture

In the diagram, there is flow of our project.
1. Heartbeat and temperature sensors are attached to the soldier's body, continuously monitoring vital signs. Data is sent to the server, allowing military administrators to monitor and provide backup in case of abnormal readings indicating injury.

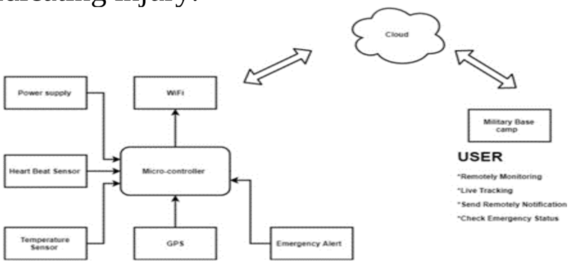

Figure No. 3.1 system Architecture

2. A GPS module is linked to the soldier, transmitting latitude and longitude coordinates to the server database. This enables easy soldier tracking, facilitated by ESP8266 and Arduino, leveraging IoT for remote monitoring.
3. The server collects real-time sensor data and maintains a history of values. Decision-making for emergency backup is based on current vital signs. GPS data aids in soldier tracking, empowering military administrators to monitor and track soldiers even during warfare.
4. The web application features an admin module requiring login credentials. Admins access real-time sensor data, manage datasets, monitor vital signs, and track soldiers. Alert mechanisms notify admins of emergencies, ensuring prompt action. Historical health data is accessible to admins, enabling comprehensive soldier monitoring and management.

IV. Algorithm

1. Naïve Bayes Algorithm
2. Decision Tree Algorithm

This systematic approach ensures efficient soldier health monitoring and tracking, enhancing military operations.

V. Conclusion

The paper outlines an IoT-based system designed for monitoring and tracking the health of soldiers. Biomedical sensors capture vital signs such as heartbeat, body temperature, and environmental conditions for each soldier, transmitting this data to a control room. This technology serves a crucial role in accurately locating missing soldiers in critical conditions, addressing the challenge of soldiers missing in action. Consequently, this system emerges as a lifeline for military personnel worldwide, enhancing their safety and well-being.

VI. Future Work

In the future, there is a possibility of developing a portable handheld sensor device equipped with a wider range of sensing capabilities to assist soldiers.

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