Real Time Based Solider Health Monitoring System Using GPS and GSM

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***Abstract*— Today's world, The nation's security is dependent on the enemy's war, thus the security of the army is also crucial. The nation's armed forces have Three services: army, army and army. Considering the safety of soldiers, many tools can check the health and ammunition of soldiers. To overcome security issues, we developed this project to include temperature, heart rate sensors, etc. that can monitor soldiers' health when necessary. We created it utilizing a network of wireless body area sensors. We can use GPS to track the exact position of soldiers when necessary. These gadgets were mounted to rifles, weapons, and soldiers. For example, the Israeli Army is studying the concept of installing GPS trackers on soldiers' blouses and uniforms so that commanders in the region can instantly follow the army's movements. Quick transmission, limited range, and efficient military-to-military Wireless communication will be required to send information relating to surveillance-related situational awareness, decision-making, and data protection during special investigations and other activities. By using all these tools, we are trying to use simple defense systems for the army with low-cost, light, easy-to-carry, and sensitive equipment. In today's world, war is a crucial part of any nation's security. The army serves a vital and significant function.. In our study, we unveiled the concept of tracking troops and guaranteeing their health throughout wartime, which allows soldiers to plan their battle plans. The base station may use the GPS modem's position to determine the troop's location.**

Keywords— **Arduino Nano, temperature sensor, GSM, GPS, LCD, buzzer, pulse rate sensor, temperature sensor, Arduino IDE, onboard C**

I. INTRODUCTION

The most important objective of this mission is to discover the precise position of the wounded soldiers on the battlefield. The GSM-based military health and location monitoring system saves the army's position based on latitude and longitude [1,2,3]. The LCD is linked to the Arduino to capture the received prior data sending it via GSM [4]. The military must work with medical monitoring, continuous GPS (Global Positioning System), and data exchange to send and receive data to control facilities [5, 6, 7]. It may be needed not only for soldiers to communicate remotely with the control center, but also for the control room of other soldiers. In addition to national security, the military also needs to ensure their health by ensuring the military's ability to perform well, and the organization must maintain checks on the authorities who manage military medicine [8, 9, 10].

To meet this need, bio-therapeutic sensors, and analysis tools are integrated into the operator in this paper. The composite material should be lightweight and provide the desired results without requiring too much energy. One of the main problems in the army is the unpreparedness of officers in talking to commanders [11, 12]. More importantly, the military's strategic approach plays a key role in careful planning and coordination. Therefore, operational plans focus on monitoring combat zones, which will be useful for the station control room to know the officer's watchful area and guide them if necessary yes. The control center uses GPS to locate the battle location [13, 14, 15]. When a soldier falls on the battlefield, the base station needs to point him in the right direction. This article will be beneficial for warriors participating in particular events or task. This jacket can detect heart rate sensors, temperature and humidity sensors, vibration sensors, explosives, etc.

It is equipped with a good electronic rear including [16, 17, 18]. These are deployed in the military for full portability. The framework will use remote connections to access the stations' servers. Data obtained from the base station can be used for more predictions [19, 20]. This allows the administration to take into account the conditions of the mandate. The security of the country is tracked and maintained by the Land, Navy and Air Forces. Soldiers who sacrifice their lives for their country perform the most important and important duty. There are various concerns about the safety of soldiers. Soldiers that

breach enemy lines frequently perish due to a lack of contact, and the military base station must know where each man is and what he is doing [21, 22]. India lost a large number of troops throughout the conflict owing to a lack of health assistance and communication among soldiers on the battlefield and the commanders of their son's fat base station.

Hardware description:

Arduino Nano: The Arduino Nano is a compact and versatile microcontroller board based on the ATmega328P processor. It features a USB interface for easy programming and communication, making it suitable for various DIY projects and prototyping. With its small size, extensive community support, and diverse I/O capabilities, the Arduino Nano is a popular choice for electronics enthusiasts and hobbyists. [23].

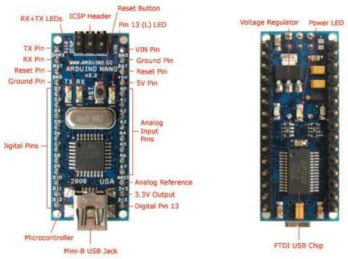

Fig.1:Arduino Nano

Flat Panel display :

Liquid Crystal Display (LCD) is a flat-panel technology that uses liquid crystals to modulate light, producing images on screens. Commonly used in monitors, TVs, and electronic devices [24].

Fig.2: Liquid crystal display

GPS NEO6M:

The GPS NEO-6M module is a compact and affordable Global Positioning System (GPS) receiver. Powered by the u-blox NEO-6M chipset, it accurately determines location, altitude, and time. With a serial interface, it interfaces easily with microcontrollers. Widely used in navigation, tracking, and IoT applications, it efficiently provides reliable positioning data, making it popular for diverse electronic projects [25].

Fig.3: GPS NEO6M

GSM Module SIM 800L:

The Sim800L module is a low-cost, small GSM module built on Simcom's Sim800L chipset. This low cost is ideal for starting your next IoT project. You almost make it a phone with this mod. The main disadvantage of this module is that It runs on 3.7 to 4.2 volts, hence it cannot be powered directly. from Arduino or Raspberry Pi. Additionally, sim800L GSM and GPRS modules need up to two amps of Current, therefore design your power supply accordingly [26].

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Fig.4: GSM Module SIM 800L

Pulse sensor:

The Pulse Sensor is a small and versatile device designed to measure heart rate by detecting pulsatile blood flow through a fingertip. It typically integrates a photodetector to monitor changes in light absorption caused by blood volume variations, providing a convenient and non-invasive solution for heart rate monitoring in various applications, including wearable devices and health trackers [27].

LM-35 Temperature Sensor:

The LM35 temperature sensor may be used to monitor temperature by comparing the fire exit temperature in degrees Celsius. It is more capable of measuring temperatures than the thermistor. This sensor delivers a greater output than a thermocouple and does not require an increase in output voltage. The scale factor is .01V/°

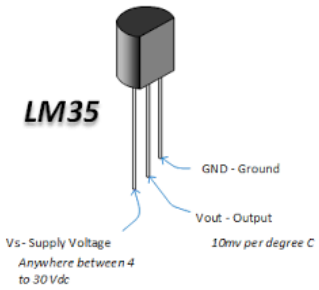

Fig.5: LM-35 Temperature Sensor

II. METHODOLOGY

Working process:

The primary goal of this operation is to determine the exact position of injured soldiers on the battlefield. The GSM-based military health and location tracking system maintains the army's

latitude and longitude coordinates. This data is sent into the Arduino, which communicates with the GSM modem. Arduino gathers accurate position information from GPS and sends an SMS to the relevant organization using a GSM modem.

Block Diagram:

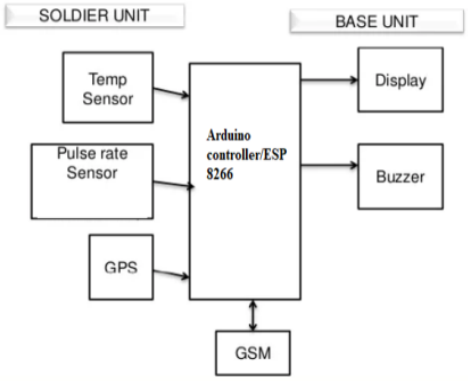

Fig.6: Representation of block diagram parts

1. Soldier's Health Monitoring Device: The Soldier's Health Monitoring Device is a wearable technology designed for military personnel. It tracks vital signs like heart rate, body temperature, and location, providing real-time health data to enhance situational awareness and ensure the well-being of soldiers in challenging operational environments.

2. Data Collection: The health monitoring device continuously collects the soldier's vital signs and GPS coordinates. It stores this information in its internal memory for further processing.

3. Data Transmission via GSM: At regular intervals or in real-time, the device establishes a connection with the GSM network. It uses the GSM module to transmit the collected data to a central server.

4. Central Server: The central server receives the transmitted data from multiple soldiers. It acts as a central hub for processing and analyzing the received information.

5. Data Processing and Analysis: The server employs sophisticated algorithms to process and analyze the received data. It identifies any abnormal readings or potential health risks based on predefined thresholds and medical guidelines.

6. Alert Generation: If the server detects any critical health issues or anomalies, it generates an alert. This alert is sent to authorized personnel, such as medical professionals or commanding officers, through various means like text messages, emails, or notifications on dedicated applications.

7. Visualization and Monitoring: The server provides a user-friendly interface that displays real-time health status and location information of individual soldiers. This allows authorized personnel to monitor the soldiers' well-being and make informed decisions.

8. Emergency Response: In case of emergencies or critical health situations, the system triggers an immediate response. This can involve dispatching medical teams to the soldier's location or providing necessary instructions to the soldier or nearby personnel.

The proposed system also incorporates a mobile application for soldiers, allowing them to view their health status and receive immediate feedback. This fosters individual health awareness and empowers soldiers to take preventive measures.

In conclusion, the real-time soldier health monitoring system with GPS and GSM integration offers a comprehensive solution for military operations. By leveraging wearable sensors, GPS technology, and real-time communication, this system ensures the well-being of soldiers is continuously monitored, providing critical information for timely decision-making and ultimately enhancing mission success.

III. Results

Result and Discussion:

The system starts with wearable health sensors attached to each soldier. These sensors continuously measure Vital indicators including heart rate, body temperature, and activity levels. Linked to every soldier, the GPS module monitors and logs the exact whereabouts of each individual soldier in real-time. The GPS data is a crucial aspect of the monitoring system, providing dynamic positioning information. The health sensors and GPS modules are linked to GSM communication modules. These modules enable wireless communication and data transmission using the GSM network. The GSM network facilitates communication with a mobile application on each soldier's device. The application serves as an interface, allowing soldiers to view their real-time health status and receive immediate feedback. The GSM network connects the soldier's wearable sensors, GPS modules, and mobile applications to a centralized command and control center. This central hub acts as a receiver for all incoming data from the soldiers in the field. The centralized command center is linked to a backend server. The server manages the storage, processing, and analysis of the incoming health and location data from all soldiers. Visualization tools are connected to the backend server, presenting processed data in an

understandable format. Commanders Can check the health and locations of soldiers through these tools. An alert system is integrated into the backend server. In the event of emergencies or abnormal health conditions, the system triggers alerts to notify commanders for immediate attention.

The final result is as follows: A confirmation message, verifying GSM and GPS settings, is sent to the designated phone number. Subsequently, if there is a deviation in the standard bodily parameters, an alert message, along with the soldier's exact location, is sent to the central base station..
The following conclusions may be derived from the above implementations:

- Soldiers' Security and safety: GPS records soldiers' positions anywhere on the planet, and a health system analyzes soldiers' key health factors as well as the surroundings, providing soldiers with protection and safety.
- Achieving a simpler circuit and lowering power consumption involves employing a PIC CPU and energy-efficient peripherals to minimize the overall system power usage. The utilized modules are compact and lightweight, enhancing portability.
- Hence, the idea of tracking and navigation devices holds immense value for soldiers in the midst of wartime combat and for base stations. This enables them to obtain real-time updates on the positions of soldiers.

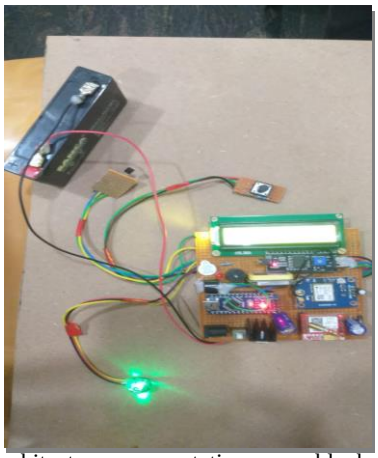

Fig.7: Architecture representation as per block diagram

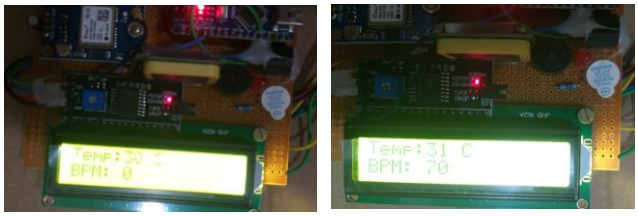

Fig.8:Displaying various results

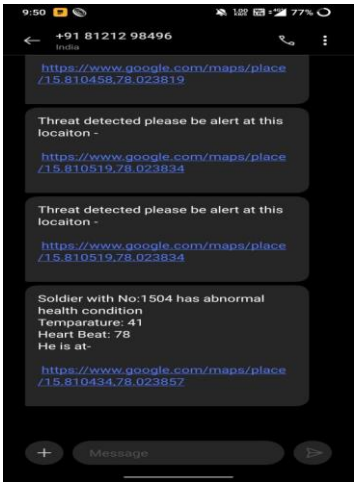

Fig.9: Displaying final output in mobile through text message

IV. Conclusion

The Army Healthcare and Location Tracking GPS program is a key safety and protection feature that combines electronic and wireless automation. We conclude that the aforesaid system is utilized for monitoring the physical health of troops utilizing the heart rate, temperature, pressure, and oxygen sensors. This method is also useful for soldiers in war because if they think they are in a critical situation, they can ask for help from the base station by pressing the button on the base station. Our scheme also sends Details about the location and intent of the SMS to the base station. Our plan will provide greater security for our warriors by connecting the gas detector to the appropriate sensor station. Interconnecting a camera to the controller might also help in this procedure. Upon completion of the mentioned procedure, it will assist in assessing the well-being of troops by monitoring their heart rate and temperature. Additionally, it will facilitate location tracking through a GPS Modem, with the capability to transmit all collected data to the base station for further analysis.

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