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Soldier tracking &health monitoring system using GSM and GPS System

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Abstract: Fighting is a significant figure in any country's security today. The military fighters conduct one of those most important and essential roles. Concerns about trooper security are widespread. So many instruments are installed on them for their protection in order to monitor both their continuous area and their state of health. Bio-sensor systems incorporate several types of small physiological sensors, transmission modules, handling capabilities, can therefore function with inexpensive wearable simple solutions for health monitoring. This duty gives the ability to continuously monitor the troopers' safety as they become detoured and enter a combat region. It helps to shorten the duration of searches and salvage operations of an army command post. This system enables the military command centre to track the whereabouts of troops and monitor their well-being using GPS and remote body region sensor networks (WBASNs), such as temperature sensors, air quality sensor and heart rate monitors. One more important security system added is bomb Detector. The base station will receive the data transmitted by the sensors and GPS receiver.

Keywords: Biomedical sensor, GSM, GPS, Tracking, low cost

I Introduction: National security is monitored and protected by the Army, Navy, and Air Force. The soldiers who sacrifice their life in defence of their nation play a vital and significant role. Regarding the soldier's safety, there are numerous worries. It is crucial for the army base station to be aware of the position and health status of every soldier since soldiers entering the enemy lines frequently perish owing to a lack of connectivity. Since there was no effective health backup and connectivity between the soldiers on the war fields and the officials at the army base stations, India has already lost a significant number of men in combat. The GPS is utilised to track soldiers, and GSM is employed to facilitate wireless communication. To keep track of the health indicators of We include biomedical sensors like heart rate and temperature sensors, soldiers. The MQ135 gas sensor measures and detects a wide range of gases that are present in the environment. Use the metal detector sensor to improve the soldiers' safety while conducting missions. It was challenging to integrate these distinct components into a small unit that could produce the desired outcome without being excessively weighed down, bulky, or power-intensive. The main challenges in military operations are communicating with the base
(control room) station and proper navigation between the military organisations. Both are crucial for careful planning and coordination. The purpose of the article is to track a soldier's location utilising GPS, which helps the control room station determine the soldier's precise location and act accordingly.

II Implementation: This project's primary goal is to discover the injured soldier's precise location on the battlefield. This GSM-based military health and position tracking system returns the precise longitude and latitude of a soldier. The Arduino receives this data and interfaces with a GSM modem using it. The Arduino gathers all sensor data, including accurate location information from the GPS, and utilises a GSM modem to send SMS to the appropriate authority. The Arduino is attached to an LCD display, which will cross the data received before it is transferred over

GSM. The proposed system is utilised to track and monitor soldiers not just during combat but also when they are moving from one location to another. Even in places with different weather from other places.

GPS Tracking: For the purpose of defining the soldier's location, the GPS device continuously collects satellite signals. The Arduino gets GPS data and employs a GSM module to send command centre real-time location updates.

Gas Level Monitoring: The MQ135 gas sensor determines the amount of gases present in the soldier's environment. The Arduino reads the sensor data and then compares it to pre-set thresholds. If the gas levels exceed the safe limits, the device can sound alarms or send messages to the command centre for quick action.

Metal Detection: The metal detector sensor examines for any metallic objects in the area around the soldier. Signals arise when metal objects are discovered. The Arduino processes these signals and can then activate the necessary responses, such as warnings or visual indicators to alert the soldier to impending danger.

Panic Button Activation: The Arduino recognises the soldier pressing the panic button and sends out an emergency alert. The soldier is in a grave situation, and the GSM module sends a distress signal to the command centre asking for help right away.

Communication with the Command Centre: A cellular connection is established between the GSM module and the server or command centre. It transmits position updates, gas readings, metal detecting events and emergency alarms using AT instructions. By receiving and processing this data, the command centre can react quickly and take the necessary steps to protect the soldier.

III Block Diagram: The block diagram of the suggested framework is shown in figure. The Soldier Wellbeing and Position Global Positioning Framework enables the military to track a trooper's current GPS location while also monitoring their general health, including their internal temperature and pulse rate. Further checks the trooper's immediate environment for gas concentrations and uses a metal detector to look for any potential dangers. The framework also includes other components that enable a fighter to physically request aid or to alert military personnel to his need for assistance through the use of pain signals. The GPS modem transmits the scope position with interface design so that the military can track the trooper's current location. The framework is quite helpful for gathering information about a warrior's health situation and providing them with immediate assistance.

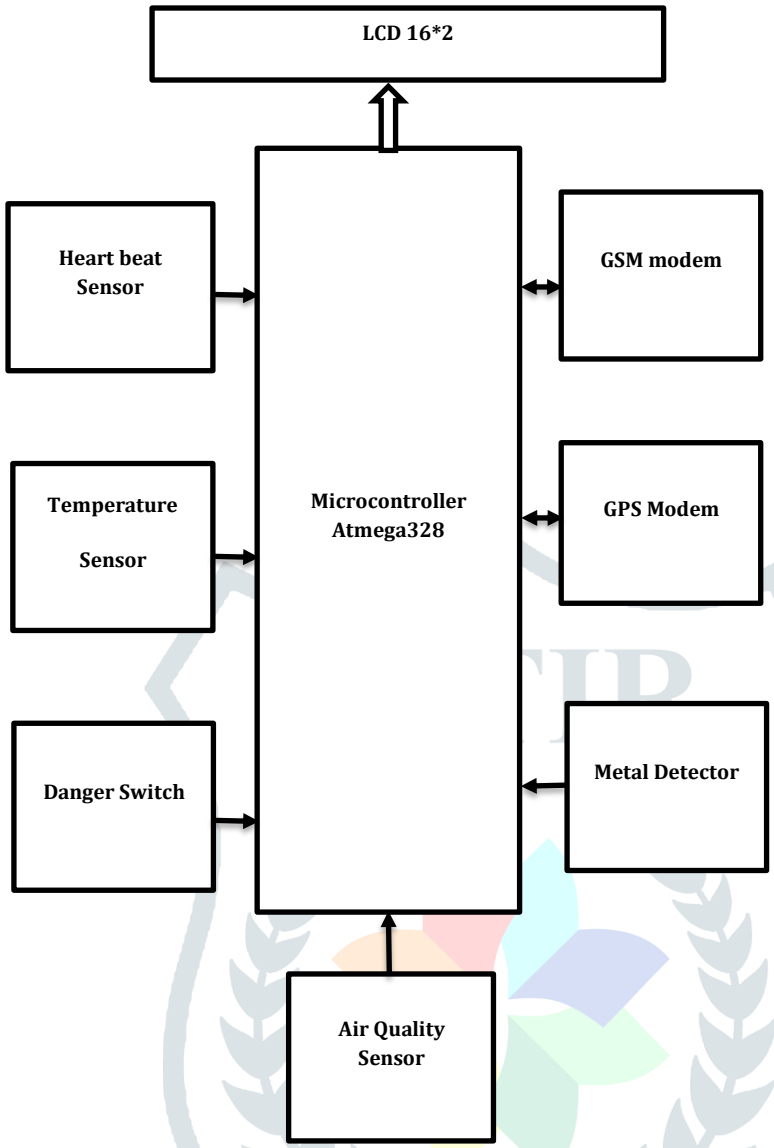

Figure 1: Block Diagram of system

Flowchart: The figure represents the flowchart of the system. It is first necessary to launch, activate, and setup the GSM and GPS systems. A GPS system, biological sensor, and MQ135 gas sensor are fixed to the soldier's torso, while a metal detector is attached to the soldier's foot. Send the soldier's location to the army base station through GSM, and they will check the data to see if the soldier has a body temperature greater than or equal to 100, a heartbeat between 50 and 120, and a gas detector reading that is higher than the threshold number. The metal detector sensor detects any metallic threats, such as landmines or IEDs, and then generates a signal and transmits an alert message to the receiver via GSM. If the danger switch is depressed during an insured situation, a message is transmitted to the base station; otherwise, the loop will continue.

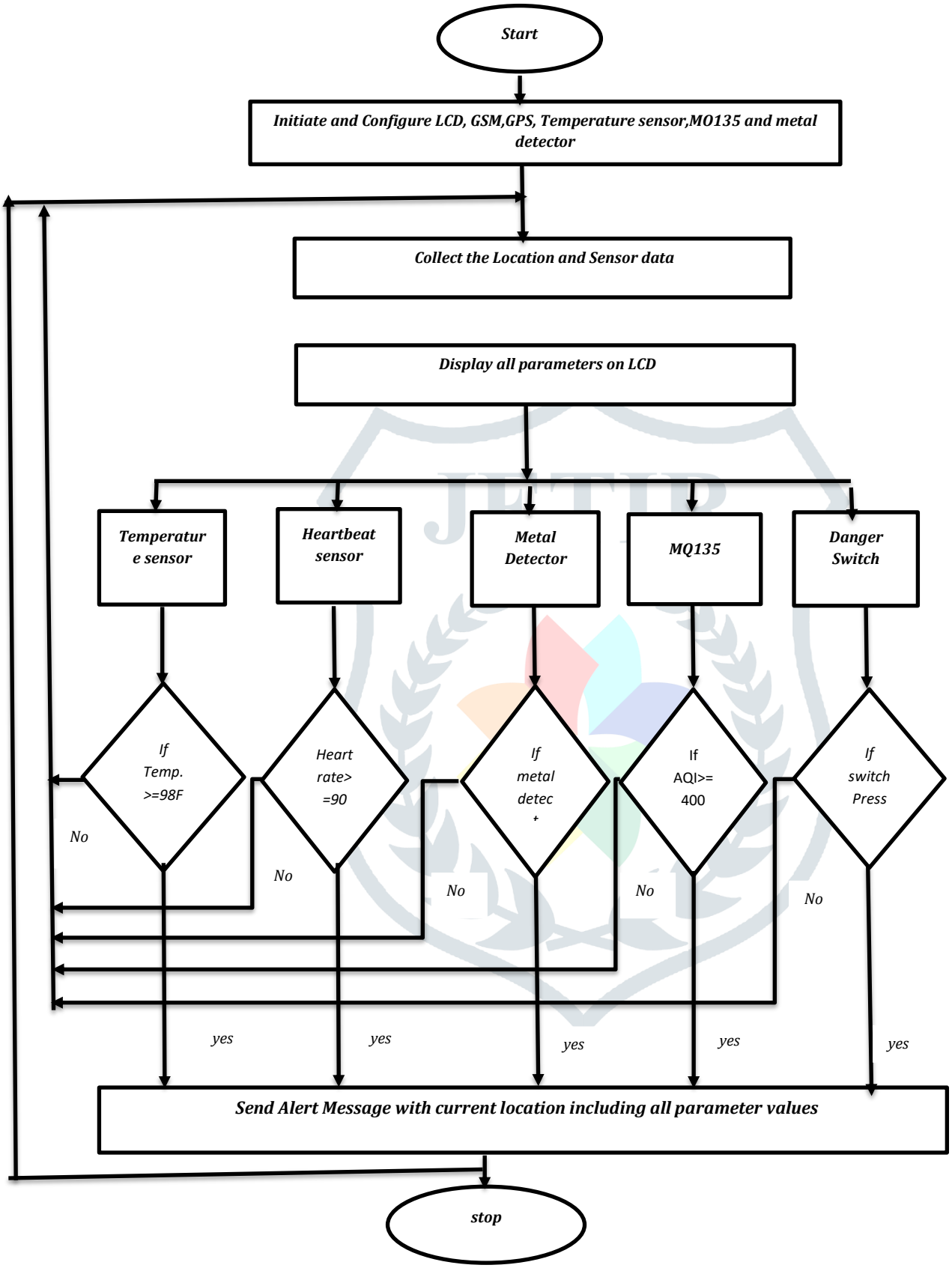

Figure 2: Flowchart of the system

IV Result and Discussion: A message confirming the GSM and GPS settings is sent to the registered number. An alert message is sent to the base station along with the soldier's precise location as soon as the body parameters (temperature and heartbeat) depart from the predetermined threshold levels or if any landmines or IEDs are found. Figure 3 depicts the soldier's state of health.

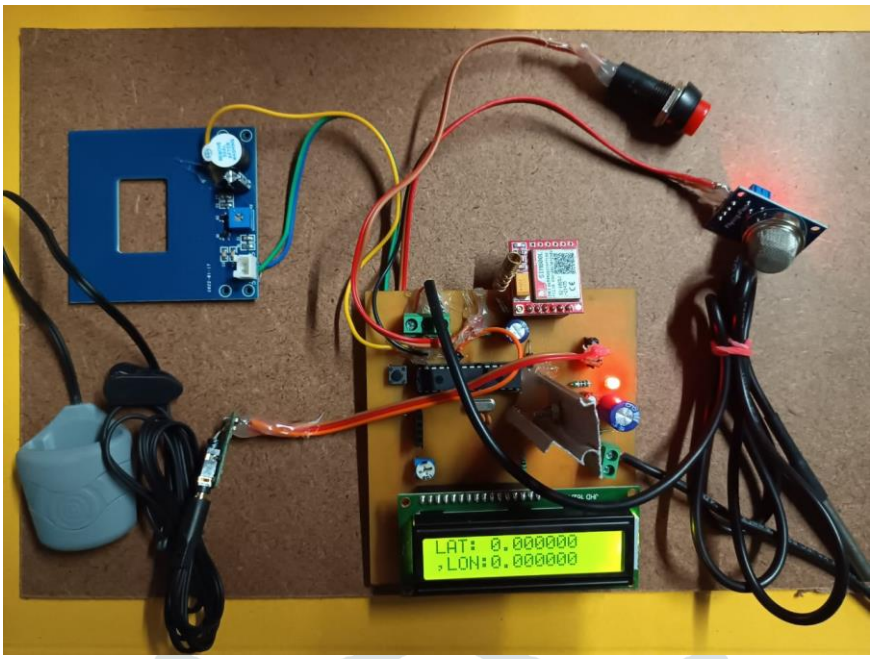

Figure 3: The proposed system's experimental setup

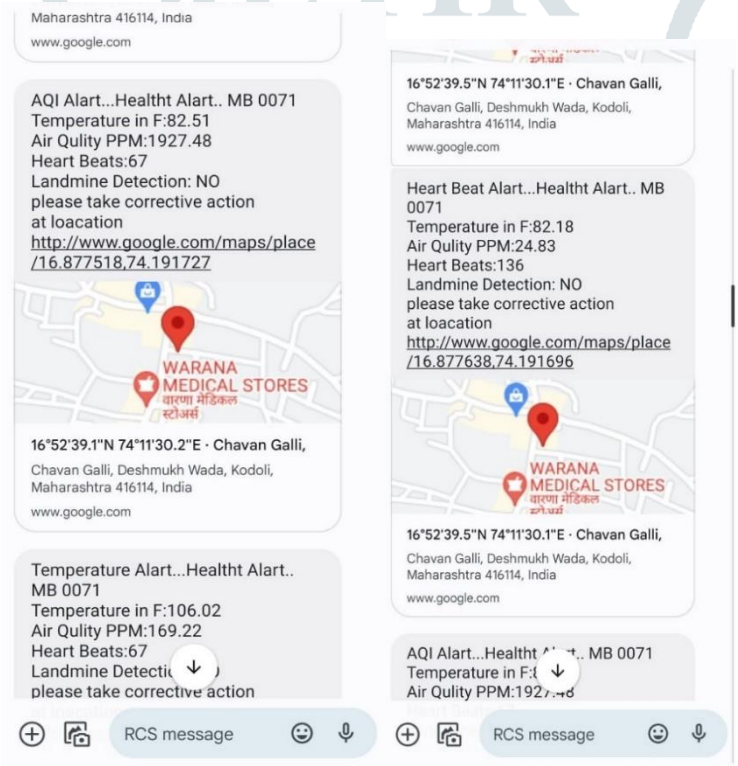

Fig (a) **Fig (b)**

Graphic (Fig. a) Illustrates how the MQ135 gas sensor locates and calculates the concentration of different gases in the surrounding air. It offers an analog output that the Arduino can use to read data. The device will warn that the area is unsafe for soldier health if the air quality is higher than 400PPM and will also identify any toxic or hazardous gases that may be present.

According to Fig. (b), if the heartbeat sensor's output is greater than 120 BPM and lower than the threshold value of 50 BPM, the health is bad.

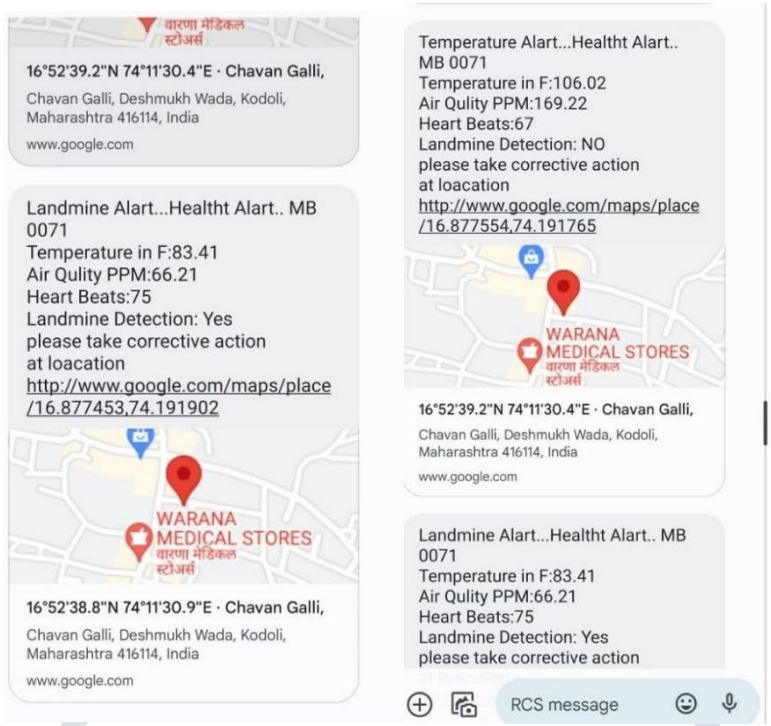

Fig (c) **Fig (d)**

The output of the metal detector sensor is shown in Fig. (c). To read the output signals from the metal detector sensor, the Arduino connects with it. The device can detect the existence of metallic dangers like landmines or IEDs by studying the signals.

Figure (d) illustrates how the GSM module will immediately notify the base station if the temperature rises above 100F and won't wait for the heartbeats to become abnormally high or low.

V Conclusion: From the above implementation, we have deduced that GSM is used to overcome communication barriers between the soldiers and base unit authorities, that GPS and wireless body area sensor networks (WBASNs) are used to determine the precise location and health parameters, respectively, and that the GSM modem is used to transmit all information to the base station so that the field commander can take appropriate action. If a soldier's health metrics exceed a certain threshold or their coordinates depart from a predetermined path, we can use enhanced versions of the GSM module to place an emergency call in order to provide real-time solutions for the issue soldiers are experiencing in battlefield areas.

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