

# SOLDIER HEALTH AND POSITION MONITORING SYSTEM

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## I. ABSTRACT

The protection of soldiers' health and safety is of utmost importance in contemporary warfare. Rapid technological breakthroughs have made it possible to create cutting-edge systems that track and monitor soldiers' whereabouts and health on the battlefield. The literature on military health and position tracking systems is thoroughly reviewed in this research. The study seeks to give a broad overview of the most cutting-edge methods currently available, their difficulties, and potential applications in the future.

## II. INTRODUCTION

For soldiers to be safe on the battlefield, it is essential to monitor their health and wellbeing. The technology continuously monitors vital indications like heart rate, blood pressure, and body temperature in order to quickly identify any anomalies or health problems that could endanger the soldier's safety. This makes it possible for early intervention and medical help, potentially preventing serious health effects. Soldiers frequently participate in physically taxing exercises and run the danger of getting hurt. Using a monitoring system, commanders and medical staff can take action before an injury occurs by identifying indicators of exhaustion, stress, and overexertion. Additionally, the system can assist in identifying risky behaviour or inappropriate procedures that may result in injuries by assessing movement patterns and forces applied to the body.

specific instruction and injury avoidance. tactics for injury prevention and focused training. By combining position and health monitoring, commanders will have real-time situational information of the whereabouts and health of their troops. Effective decision-making, resource allocation, and tactical planning all benefit greatly from this knowledge. It gives commanders the ability to tactically deploy forces, spot soldiers who are hurt or disturbed and need help right away, and maximise the unit's overall operational effectiveness. Systems for tracking soldier position and health provide chances to assess and improve both individual and group performance. The device can offer insights into the physical and mental state of soldiers during training exercises and actual missions by gathering data on physiological factors, tiredness levels, and geographical information. With the help of this data, training programmes can be tailored, flaws may be found, and mission planning can be made to be as effective as possible. The strength of the Position Monitoring System rests in its capacity to increase military safety, raise operational effectiveness, boost output, and promote well-informed decision-making. These systems can support the success and well-being of military troops in difficult and complicated circumstances by utilising cutting-edge technologies and real-time data analysis. The purpose of this study is to introduce a system that can track a soldier's vital signs, including heart rate, body temperature, blood pressure, and breathing rate. It might go into how this data is gathered and sent in real-time via wearable technology, biosensors, or other non-invasive technologies. It focuses

on a system that tracks the positions and movements of soldiers using GPS, inertial sensors, or other location-tracking technology. It might go over the advantages of precise positional information for situational awareness and command choices. proposes algorithms or techniques based on the physiological data gathered to identify aberrant health conditions or probable damage. It might go over how these signals can be sent to the command centre or medical staff to allow for quick interventions. deals with the communication

### III. PROPOSED SYSTEM

SOLDIER HEALTH AND POSITION MONITORING SYSTEM

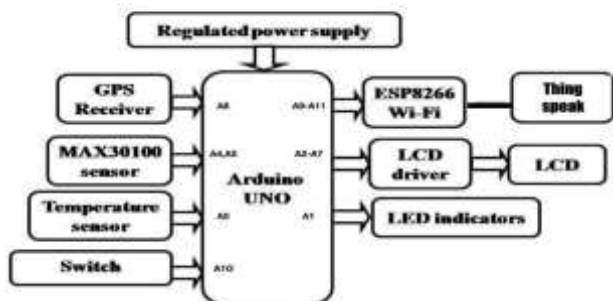


Fig 1 : BLOCK DIAGRAM

Soldiers must constantly monitor their heart rates in order to assess their cardiovascular fitness and look for any indications of stress or exercise. During drills or war situations, heart rate can be continuously monitored with portable devices like wrist-worn fitness trackers or chest strap heart rate monitors. The MAX30100 is a biosensor module that includes a heart rate monitor and pulse oximeter[1]. An infrared LED, a red LED, a photo detector, optical components, and ambient light suppression are all included in its low-noise electrical circuitry. - The MAX30100 includes a 1.8V power supply and a separate 5.0V power supply for internal LEDs for heart rate and blood oxygen acquisition, making it suitable for wearable devices worn on the fingers, earlobe, and wrist.



Fig 2: MAX30100

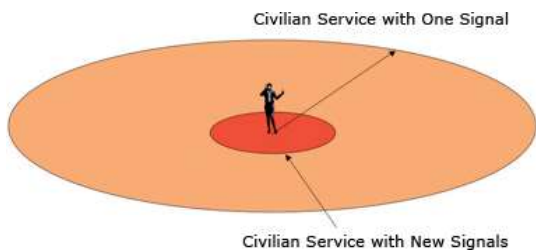
Monitoring body temperature is vital for identifying fever, heat stroke, or hypothermia in soldiers. Infrared thermometers, wearable temperature sensors, or tympanic (ear) thermometers can be used to measure body temperature accurately and quickly in the field [2]. Precision integrated-circuit temperature sensors of the LM35 sensor series have an output voltage that is linearly proportional to the temperature in Celsius (Centigrade). Temperature sensors are used to measure the heat generated during a fire.



**Fig 3: LM35 Sensor**

In industrial automation, the most often measured process variable is temperature. A temperature sensor is most frequently used to translate temperature values into electrical values. In industrial applications, temperature sensors are essential for accurate temperature readings and temperature control [3]. GPS satellites are available for usage by both civilian and military users. All users have continuous, unrestricted, and cost-free access to the civil service. The United States military, its allies, and authorized government agencies are all eligible to join the military. There are many GPS augmentation technologies and techniques available to enhance system functionality and meet specific user needs. These improve the accuracy, accessibility, and integrity of the signal, providing even higher performance than is possible when using the standard.

#### **The Future of GPS:**



**Fig 4: GPS DEPICTION**

Horizontal Performance of a Stand-Alone GPS System with New Signals. The development of a second and third civil signal on GPS satellites is part of the vast modernization programme the US is committed to. The second civil signal will increase service accuracy and enable various applications for personal safety. The third signal, which is primarily intended for applications that ensure human safety, such as aviation, will further improve civilian capability. RFID technology uses radio waves to identify and track objects or individuals. Soldiers can be equipped with RFID tags or badges, and RFID readers can be placed in the surrounding environment. This enables the automatic identification and tracking of soldiers as they move within the range of the readers. Soldier equipment can be equipped with wireless communication capabilities, allowing continuous transmission of location data to a central command center or other soldiers in the vicinity. This facilitates effective coordination, enables quick response in case of emergencies, and enhances overall situational awareness. AR technology can be integrated into soldier equipment, providing soldiers with real-time visual overlays of their surroundings. This can include the display of friendly and enemy positions, waypoints, and other relevant information. By combining AR with position monitoring, soldiers can have an enhanced understanding of their own position in relation to the battlefield. The integration of position monitoring with soldier equipment has the potential to significantly improve soldier safety, situational awareness, and operational effectiveness.

#### **IV. INTEGRATED SOLDIER HEALTH AND POSITION MONITORING SYSTEM**

Vital indicators such as heart rate, body temperature, blood pressure, and respiration rate are tracked by sensors and other devices in the system. These sensors might be built into accessories that soldiers can wear or incorporated into their gear. The precise location of each soldier is tracked in real-time using GPS technology. In order to effectively coordinate and react in combat scenarios, commanders are able to accurately identify the whereabouts of their forces [5]. To find trends, abnormalities, and potential health risks, collected data is processed and analyzed. To monitor the general health state of individual soldiers and make educated judgements, commanders and medical staff can access visual dashboards or specialized software tools. The system has the ability to automatically create alerts and alarms in response to abnormal conditions or predetermined criteria. Integrating position and health monitoring systems has many advantages in the healthcare, fitness, sports, and elder care industries. When establishing such systems, there are a number of issues and factors that must be taken into mind. Health and position monitoring systems produce a lot of private information about individuals, including private health information and location data. Privacy protection and preventing unauthorized access to sensitive data are of the utmost significance. Companies must follow strict security guidelines and abide by data protection laws like the General Data Protection Regulation (GDPR). Integrating health and position monitoring systems frequently requires a number of hardware, software, and sensor components. Obtaining compatibility between these many components is essential.

#### **V. APPLICATIONS**

There are many significant uses for a Soldier Health and Position Monitoring System (SHAPMS) in military operations. Here are some crucial applications for it. SHAPMS can track a soldier's heart rate, blood pressure, body temperature, oxygen saturation, and respiration rate in addition to other physiological indicators. A central command post or medical staff can get this real-time data to keep track of the health of soldiers on the front lines. Any anomaly or injury can be quickly treated if discovered, potentially saving lives. GPS technology is used by SHAPMS to track the positions and movements of soldiers. Command and control, situational awareness, and troop safety are all possible uses for this data [6]. SHAPMS can send immediate notifications to the command center in the case of an emergency, such as a combat casualty or a medical emergency. This enables quick response and evacuation of hurt

soldiers, ensuring that they receive care as soon as possible. Locating and rescuing soldiers who are in crisis or danger more rapidly is another benefit of location tracking. SHAPMS can be used to track and assess troops' performance during training activities. The device can monitor parameters like movement patterns, physiological responses, and physical activity, providing useful information for evaluating both individual and group performance. This data can be utilized to improve training, pinpoint problem areas, and increase overall operational performance. After missions, SHAPMS data can be gathered and analyzed to learn more about the physical demands and stressors that soldiers must deal with. Future mission planning, equipment advancements, and training initiatives can benefit from this information. It aids in comprehending how operational circumstances affect troops' health and wellbeing and directs the creation of risk-mitigation tactics.

#### **VI. BENEFITS**

The safety, wellbeing, and effectiveness of military personnel can all be improved with the help of a soldier health and position monitoring system. Here are a few of the main advantages:

1. A monitoring system gives commanders and medical staff access to real-time information about the whereabouts

and health state of soldiers in the field, which improves situational awareness. This enhances situational awareness, allowing for improved resource allocation and decision-making during operations.

2. Improved Soldier Safety: The technology can aid in identifying potential risks and hazards, like as friendly fire or closeness to hostile forces, by continuously tracking the position of the soldiers. It makes it possible for the command Centre to issue

prompt alerts or implement preventative steps to guarantee the safety of individual soldiers and the entire unit.

3. Rapid medical intervention: Soldier health monitoring devices can gather biometric data and vital signs like blood pressure, body temperature, and heart rate. Medical staff can access this data in real-time and use it to evaluate a soldier's health from a distance [7]. A quick medical reaction can be started in the event of an accident or medical emergency, potentially saving lives and reducing long-term health effects. Monitoring vital signs and other health indicators continuously can help spot early symptoms of disease or weariness [8]. The technology can notify medical personnel of potential health issues before they worsen by analyzing patterns and changes in the data. Early detection and treatment can reduce the impact on the mission and stop a soldier's health from declining.

## VII. CHALLENGES

In order to improve the safety, situational awareness, and general performance of soldiers in the field, soldier monitoring equipment, such as wearable sensors or communication systems, are used. Soldiers rely on these gadgets for extended periods of time without easy access to charging infrastructure, hence battery life and power efficiency are essential considerations with these devices [9]. However, depending on a number of variables, such as the device's design, functionality, and the technologies utilized, the precise battery life and power efficiency of troop monitoring devices can change. To maximize battery life, complex power management technologies are frequently used in soldier monitoring equipment. These systems might have capabilities like dynamic power scaling, sleep modes, and low-power sensors that only turn on when necessary. These gadgets can increase battery life by carefully controlling energy use. Depending on the particular item and its intended usage, the battery capacity of soldier monitoring equipment can vary. Manufacturers try to balance battery size, weight, and capacity to give the best power source while taking into account the physical limitations of soldiers' equipment. Wireless communication technologies, such as Bluetooth or Wi-Fi, are frequently used by troop monitoring equipment to convey data to command posts or other soldiers. Optimized radio frequency (RF) modules and effective data transmission protocols can reduce the amount of power used during communication, increasing total power efficiency [10]. Different sensors, including GPS, heart rate monitors, motion sensors, and environmental sensors, may be used in soldier monitoring equipment. These sensors are tuned by the manufacturers to use less energy while maintaining accuracy and responsiveness. Longer battery life may be achieved by the use of clever data sampling methods and low-power sensor designs.

## VIII. RESULTS

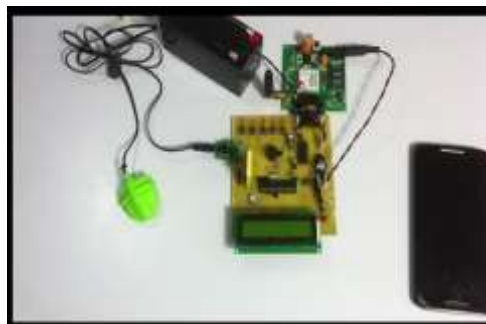


Fig 5: RESULT

So this is the result of our research using GPS and Wi-Fi module we have been able to find the temperature of a

particular soldier and their location in remote areas.

## IX. CONCLUSION AND FUTURE

### SCOPE

Integrating features of all the hardware components used have been developed in it. Presence of every module has been reasoned out and placed carefully, thus contributing to the best working of the unit. Secondly, using highly advanced IC's with the help of growing technology, the project has been successfully implemented. Thus the project has been successfully designed and tested. The project can be extended by adding blood pressure measuring. We can add solar panel to this project. The Soldier Health and Position Monitoring System is a cutting-edge tool created to increase the field soldiers' safety and efficiency. Provides real-time tracking and assessment of a soldier's health status and whereabouts by integrating a variety of sensors and monitoring devices, enabling prompt intervention and support when necessary.

## XI. ACKNOWLEDGEMENT

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