

IOT Based Military Assistance and Surveillance (MASS)

Prof. Priya Patil¹, Ambika², Aparajita³, Priyanka⁴, Shreya⁵

¹Assistant Professor, Department of Electrical & Electronics Engineering, PDA College of Engineering, Kalaburagi, India

^{2,3,4,5}Under Graduate Scholar, Department of Electrical & Electronics Engineering, PDA College of Engineering, Kalaburagi, India

***Corresponding Author**

E-Mail Id:- jamagipriyanka@gmail.com

ABSTRACT

The Indian Army is the largest part of the Indian Armed Forces. To keep soldiers safe, it is important to use modern equipment. This project explains a special jacket made for soldiers. The jacket can find a soldier's location using GPS and check health details like heartbeat, pulse, and body temperature. All this information is sent to the control room through Wi-Fi or GSM. If a soldier is injured or if there is a sudden change in health, the system sends a message along with the soldier's location so that help can reach quickly. This system helps in better planning, quick medical support, and saving lives through real-time monitoring.

Keywords: - Monitoring, Security, Military communication, Wi-Fi module, Surveillance.

INTRODUCTION

Soldiers are the most valuable part of a nation's defence forces. They protect the country by staying alert, taking risks, and living far from their families. The word "soldiers" includes both men and women serving in the Army, Navy, Air Force, and Marines. They are always ready to take responsibility and guard the country, even during uncertain times when war or conflict can happen at any moment.

While performing their duties, soldiers often face extreme weather conditions such as very high or very low temperatures. These conditions can be harmful to their health. To improve their safety and comfort, a system called the Military Assistance and Surveillance System (MASS) has been designed. It is a wearable system that helps soldiers in many ways.

This system allows soldiers to know their location, check their health condition such as heartbeat and body temperature, be aware of surrounding conditions, and send emergency messages to the base station. It also sends alerts if a soldier is injured or in danger.

The uniform includes a heating and cooling feature that helps maintain a comfortable temperature. It keeps soldiers warm in extremely cold weather and cool in very hot weather, helping them work efficiently without suffering from cold stress or heat stress.

Although there are many jackets available that provide heating and cooling, they do not offer health monitoring or emergency support. Therefore, the smart army jacket is a better solution. It helps check health, body temperature, and can send emergency messages, making it useful for soldiers, especially in extreme weather conditions.

Component Specifications

Sl. No	Component Name	Specifications	Purpose
1	Arduino Leonardo / Uno	Operating Voltage: 5V DC; Microcontroller: ATmega32u4 / ATmega328P; 14 Digital Pins, 6 Analog Pins	Main controller to process sensor data and control modules.
2	MAX30100 SPO2 Sensor	Measures SPO2 and Pulse Rate; I2C communication; Supply Voltage: 1.8V-5V	Measures blood oxygen and heart rate.
3	DHT11 Sensor	Temperature: 0–50°C ($\pm 2^\circ\text{C}$); Humidity: 20–90% RH ($\pm 5\%$); Voltage: 3.3–5V	Measures temperature and humidity.
4	GPS Module (NEO-6M)	Power: 3.3–5V; UART; Accuracy: $\sim 2.5\text{m}$	Provides GPS location.
5	GSM SIM900A Module	Quad Band 850/900/1800/1900MHz; Voltage: 5V–12V; UART	Sends SMS alerts.
6	I2C LCD Display (16x2)	16x2 lines; Operating Voltage: 5V; Address: 0x27 / 0x3F	Displays readings and messages.
7	Relay Module (2-Channel)	Operating Voltage: 5V; Load: 250VAC/10A or 30VDC/10A	Controls fan and Peltier module.
8	TEC1-12706 Peltier	Voltage: 12V DC; Current: 6A; Power: 60W	Provides heating/cooling.
9	DC Cooling Fan	Voltage: 12V DC; Speed: 1500–3500 RPM; Power: 2–5W	Provides cooling.
10	Li-ion Battery Pack (2S)	Voltage: 7.4V; Capacity: 2200–5000mAh	Power source for system.
11	Solar Panel	Voltage: 6V–12V; Power: 3W–10W	Recharges battery using sunlight.
12	TP4056/BMS Module	Input: 5V–8V; Auto Cutoff Protection	Safely charges battery.
13	Buck/Boost Converter	Input: 3–30V; Output: 5V regulated	Provides stable power supply.
14	Buzzer	Voltage: 5V; Sound: $\sim 85\text{dB}$	Alerts user.
15	Panic Switch	SPST Switch	Sends emergency SMS when pressed.
16	Switch 1 (Display SPO2)	SPST	Displays SPO2 & BPM.

17	Switch 2 (Display Temp)	SPST	Displays Temperature & Battery.
18	Voltage Sensor Module	Measures 0-25V via analog output	Displays battery level.

METHODOLOGY

Block Diagram

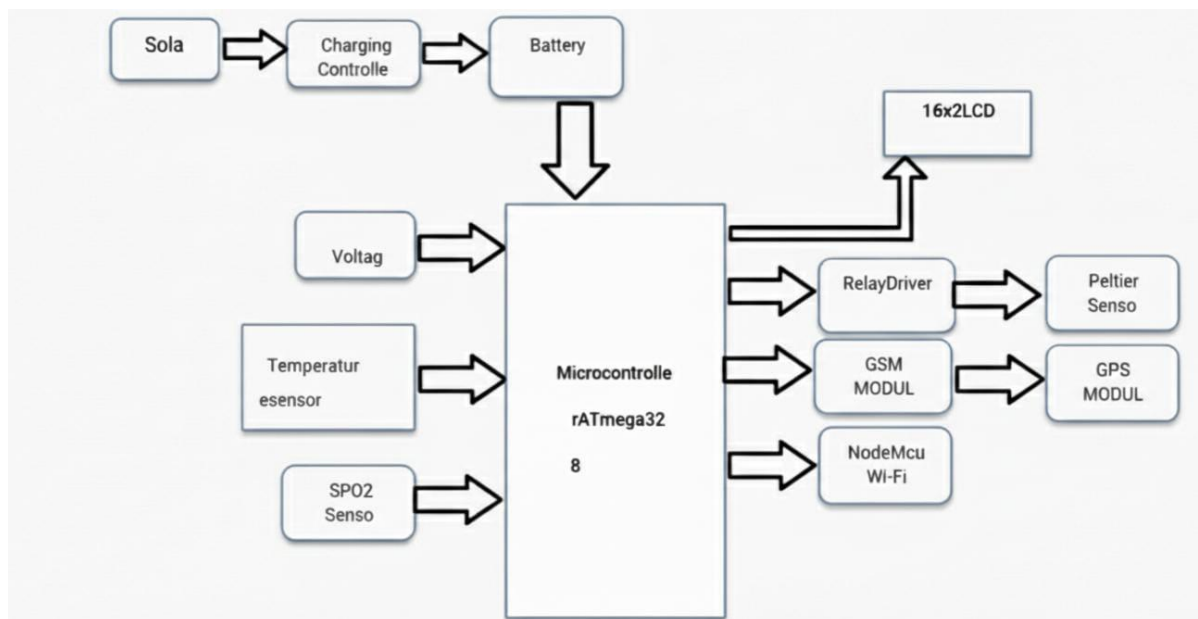


Fig. 1: Block Diagram.

Fig 1. shows the block diagram of the Military Assistance and Surveillance System (MASS).

The solar panel generates electrical power, which is stored in the battery. A diode is used to let current flow in only one direction and stops it from going back to the solar panel when the battery is fully charged and Piezoelectric material is used to convert mechanical energy to electrical energy. It Provide supplemental charging from vibrations, pressure, or motion to extend battery life in wearable devices.

The microcontroller is the main control unit of the system. It checks the voltage level, body temperature, and heart rate using different sensors. The collected data is shown on an LCD screen. Based on the surrounding temperature, the Peltier module provides heating or cooling inside. A relay is used to control electrical and electronic components. A small current energizes its coil, which activates contacts that switch a higher-power circuit.

The GPS module provides location, navigation, and tracking. The GSM module enables communication through mobile networks, such as sending messages, location, and data. The NodeMCU Wi-Fi module is used for wireless communication and sends the data from the microcontroller to the receiver. An emergency switch is included for use in urgent situations. the jacket.

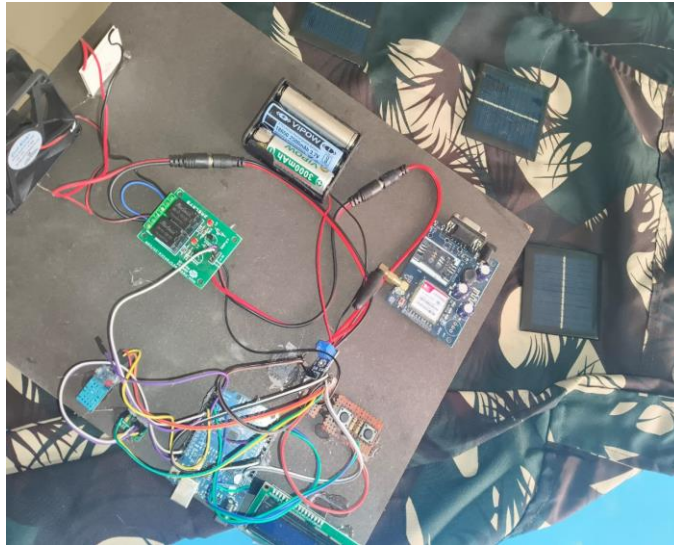


Fig. 2: Experimental setup.

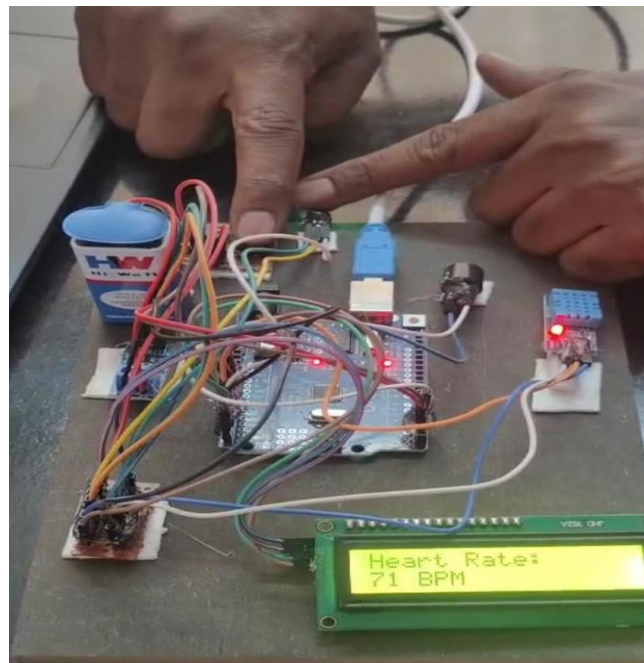


Fig. 3: Working module of IOT based Based Military Assistance and Surveillance.

FUTURE SCOPE

Sensitive personal or mission-critical data (health, location, mission status) being transmitted or stored may leak, either accidentally or due to a breach. So morse code technique can be used. Running multiple sensors, wireless communication, GPS etc. drains battery quickly. Repairing or replacing sensors, batteries, electronics. Spare parts etc. costs more.

CONCLUSION

A temperature sensor measures the soldier's body temperature and sends the reading to the base station. This data can also be used to activate systems that help control the body temperature during extreme conditions. The SpO_2 sensor measures the pulse rate or heartbeat of the soldier.

The soldier's location is tracked using GPS, which provides real-time latitude and longitude coordinates. A piezoelectric sensor placed in the shoes can generate about 13V when pressure is applied by a person weighing.

REFERENCES

1. P.Raja, Swapnil Bagwari, IOT based military assistance and surveillance on International Conference on Intelligent circuits and system (ICICS) in 2018. DOI :10.1109/ICICS.2018.00076.
2. Partani Abhishek R1, Gaikwad Girija S2, Benade Vaishali S3 Smart Army Jacket on International Research Journal of Engineering and Technology (IRJET) , Volume: 06 Issue: 03 | Mar 2019.
3. 1Mrs. Uzma I Satteekar , 2Ms. Salma Hussain naik, 3Ms. Amena Farhat, 4Ms. Ayesha begum 1,2Assistant Professor, SMART JACKET FOR SOLDIERS on International Journal of Creative Research Thoughts (IJCRT) Volume 6, Issue 2 April 2018 | ISSN: 2320-2882.
4. M.Vasanthi1, M.Suganya2, S.Anitha3, S.Ashma4, K.Janani5, M.Kavijasree6 E-Smart Army Jacket Based On Climate Condition Using Arm Microcontroller International Journal of Innovative Research in Science, Engineering and Technology (IJIRSET) | e-ISSN: 2319-8753, p-ISSN: 2320-6710| www.ijirset.com | Impact Factor: 7.512||Volume 9, Issue 5, May 2020|| IJIRSET © 2020 | An ISO 9001:2008 Certified Journal | 2690.
5. Ms. Samiksha Kajrolkar, Mr. Himanshu Patil, Mr. Paras Barmaiyya Design and Fabrication of E-Military Smart Jacket using Peltier Module on International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056 Volume: 10 Issue: 08 | Aug 2023.

Cite as:

Prof. Priya Patil, Ambika, Aparajita, Priyanka, Shreya. **IOT Based Military Assistance and Surveillance.**