



SMART ARMY VEST USING IOT

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Abstract:

The Indian Army serves as the primary land-based branch and represents the largest segment of the Indian Armed Forces. Ensuring the safety and effectiveness of our armed forces is of paramount importance. To achieve this, we must equip our soldiers with advanced technology and capabilities. In this project, we outline a comprehensive strategy for enhancing soldier performance and safety. We focus on utilizing GPS technology to track the precise location of each soldier, allowing for improved situational awareness and strategic planning. Additionally, we have devised a system to monitor vital health parameters such as pulse rate and body temperature in real time. One of the key features of our system is the establishment of seamless communication channels between soldiers through radio frequency (RF) channels. This ensures that soldiers can coordinate and communicate effectively during wartime and combat operations, enhancing their overall operational efficiency. In cases of injury, our system is designed to detect irregularities in vital signs, such as fluctuations in heartbeat and pulse rate. When such anomalies are detected, automatic alerts are sent to the military base station, providing critical information regarding the soldier's condition and location via GPS. This information serves as a valuable asset in shaping future war strategies and allows for the rapid deployment of medical assistance to injured soldiers, as their precise location is readily available. To further enhance emergency response capabilities, we have incorporated push buttons into the soldier's gear. These buttons can be activated in emergencies, triggering the immediate transmission of SMS alerts to military base officials. Our system encompasses wearable physiological equipment and transmission modules integrated into the soldier's attire, facilitating seamless communication between soldiers and base stations, as well as soldier-to-soldier communication.

Keywords: Indian Army, Radio Frequency,

1. INTRODUCTION

An embedded system is a computer system with a dedicated function within a larger mechanical or electrical system, often with real-time computing constraints. It is embedded as part of a complete device often including hardware and mechanical parts. Embedded systems control many devices in common use today. An embedded system is essentially a computer system with a dedicated purpose within a larger mechanical or electrical system. In the context of the Smart Army Vest, this embedded system is the brain that enables a wide array of intelligent functionalities while being seamlessly integrated into the soldier's gear. It is the embodiment of cutting-edge technology designed to meet the unique challenges and constraints faced by modern military forces.

The Smart Army Vest's embedded system is characterized by several key properties that set it apart from general-purpose computers. It is optimized for low power consumption, ensuring that soldiers can operate in the field for extended periods without worrying about frequent recharging. Its compact size ensures that it doesn't hinder mobility, a critical factor in military operations. Additionally, its rugged design allows it to withstand harsh environmental conditions and combat situations. One of the defining features of embedded systems within the Smart Army Vest is their ability to execute

tasks in real time. This capability is vital for swift decision-making and response in high-pressure situations. Whether it's monitoring vital signs, analysing environmental data, or providing situational awareness, the embedded system within the vest operates with split-second precision.

2. LITERATURE SURVEY

The most important step in the software development process is the literature review. This will describe some preliminary research that was carried out by several authors on this appropriate work and we are going to take some important articles into consideration and further extend our work.

IoT-Based Smart Wearables for Military Applications: This paper discusses the potential of IoT technology in enhancing the capabilities of military personnel through smart vests. It provides an overview of the key features and components of these vests, such as sensors, communication systems, and data analytics.

Wearable IoT for Soldier Health and Performance Monitoring: This study focuses on the health and performance monitoring aspects of smart vests for soldiers. It explores how IoT-enabled sensors embedded in the vest can monitor vital signs, body temperature, and fatigue levels to ensure the well-being of military personnel.

Wireless Communication Technologies for Military IoT Wearables: This review article delves into the wireless communication technologies that enable smart vests to transmit data in real-time. It covers aspects such as low-power communication protocols, secure data transmission, and network infrastructure for military IoT wearables.

Advanced Materials for Military Smart Vests: This research paper discusses the materials used in the construction of smart vests, including lightweight and durable textiles, as well as protective materials. It also explores how these materials can provide both comfort and protection to soldiers.

Energy-Efficient IoT Sensors for Military Applications: Focusing on the power requirements of IoT sensors in smart vests, this study examines energy-efficient designs and power sources, including energy harvesting, to ensure the longevity of wearable devices in the field.

IoT Data Analytics for Situational Awareness in Battlefield: This paper covers the data analytics and AI-driven aspects of IoT-enabled smart vests, emphasizing their role in providing situational awareness on the battlefield. It discusses real-time data processing, threat identification, and decision support systems.

Challenges in Securing Military IoT Wearables: Addressing the critical issue of security, this study identifies the challenges and solutions related to securing the data and communication of IoT-enabled smart vests used by the military.

User Experience and Human Factors in Military Smart Vests: Exploring the human-computer interaction aspect, this research discusses user experience design and ergonomic considerations to ensure that smart vests are user-friendly and do not hinder soldiers' mobility.

IoT-Enhanced Search and Rescue Operations Using Smart Vests: This study examines how smart vests equipped with GPS, communication, and environmental sensors can aid in search and rescue missions, making them more efficient and responsive.

Field Trials and Deployment of IoT-Enabled Military Smart Vests: Providing insights from practical field trials and deployments, this paper highlights the real-world applications and performance of IoT-based smart vests in military scenarios.

3. EXISTING SYSTEM & ITS LIMITATIONS

The existing system of army vests in the market offers dual functionality, providing both cooling and heating options to adapt to varying climatic conditions. However, these vests have limitations in extreme temperatures, posing potential health risks such as hypothermia in cold environments. To address these concerns, a novel solution, the smart army vest, has been developed to enhance the safety and well-being of soldiers during extreme cold conditions. This

innovative vest not only monitors the wearer's health and internal temperature but also includes an emergency notification feature via short message service (SMS) for rapid response.

The following are the limitations of the Existing System.They are as follows:

- 1) Lack of soldier location awareness hinders troop coordination.
- 2) Inability to send timely assistance jeopardizes soldier safety.
- 3) Absence of secure communication compromises military information and personal data security.

4. PROPOSED SYSTEM & ITS ADVANTAGES

In response to evolving climatic challenges and the ever-demanding tasks faced by our soldiers, we have introduced an innovative and potentially life-saving solution: the Smart Army Vest. This groundbreaking piece of technology integrates a suite of sensors and communication devices, including GSM, GPS, and various environmental sensors, to address critical aspects of soldier well-being and safety. We developed a smart army Vest using control media devices such as GSM, GPS, and Sensors in the vest. The smart army vest aims to provide reliable health monitoring as well as position tracking of soldiers. Some climatic conditions have led to the unfortunate deaths of soldiers. This vest can automatically sense the temperature inside, and outside using temperature sensors. In emergencies, where rapid response can make all the difference, our Smart Army Vest is equipped with easily accessible push buttons. When activated, these buttons trigger an immediate SMS alert to designated officials or fellow soldiers. This feature enhances soldiers' safety and ensures swift assistance in critical moments. Hence for monitoring the health and the heart rate of the soldier, health monitoring equipment sensors have been established in the vest as well.

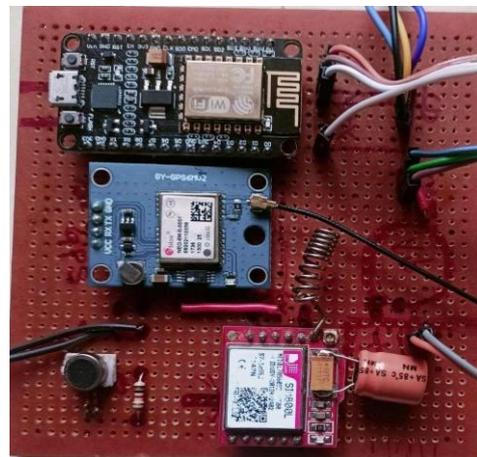
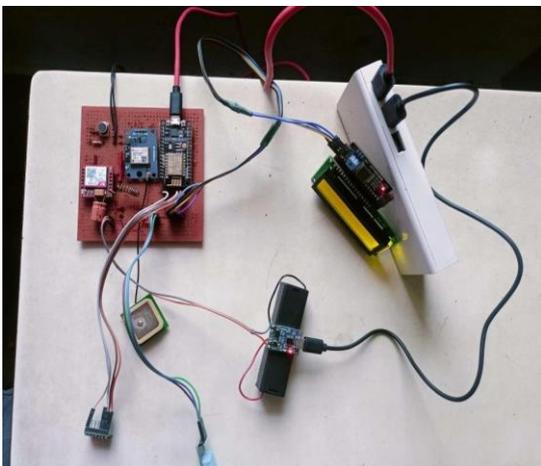
Principal features of the proposed work could include:

- 1) Temperature Sensing,
- 2) Health Monitoring,
- 3) Position Tracking,
- 4) Emergency Alert System,
- 5) Communication Modules, and
- 6) Future Potential.

5. EXPERIMENTAL RESULTS

From the below two figures it can be seen that proposed model is more accurate in order to prove our proposed system.

IOT KIT



Explanation: From the above pictures, we can clearly identify the proposed Smart Army Vest Using IOT. The above 2 figures clearly explain the proposed model is giving best accurate result.

6. CONCLUSION

Overall, the future of combat soldiers holds remarkable promise with the development of high-tech uniforms and smart vests. These advancements aim to enhance soldiers' protection, survivability, and overall capabilities. The integration of nanomaterials, smart structures, and cutting-edge electronics into their attire empowers them with superhuman strength, bio-weapon protection, and covert communication abilities. Additionally, these innovations lighten the soldiers' load, making them more agile and efficient on the battlefield. The seamless integration of electronics and optical technologies into textiles offers a revolutionary improvement in battlefield communications. However, the challenge lies in ensuring that these technologies are not only effective but also comfortable, safe, and discreet for the soldiers who rely on them. As we continue to push the boundaries of innovation, our future warriors are poised to excel in the most demanding and dynamic of combat environments.

Declaration

1. All authors do not have any conflict of interest.
2. This article does not contain any studies with human participants or animals performed by any of the authors.

References

- [1] "Soldier Security and Health Monitoring", Thanga Dharsni, Hanifa Zakir, Pradeep Naik, Mallikarjun, Raghu. IERJ2018.
- [2] "Design and Testing of Cooling Jacket using Peltier Plate", Muhammad Jahangir, M. Atiq Ur Rehman, Abdul Basit Awan, Raja Hamza Ali, IEEE 2019,
- [3] "Health monitoring system using internet of things", Vaishnavi Patil, Sanjay Singh Thakur, VaibhavKshirsagar, Proceeding of the Second International Conference on Intelligent Computing and Control System (ICICCS 2018).
- [4] Mohammad. Tarek "Using ultrasonic and infrared sensors for distance measurement." World Academy of Science, Engineering and Technology 51 (2009): 293-299).
- [5] Scott C. Sheridan and Cameron C. Lee, "Temporal Trends in Absolute and Relative Extreme Temperature Events Across North America", Journal of Geophysical Research: Atmospheres, 2018.
- [6] W. C. White, "Some experiments with peltier effect", Electrical Engineering, vol. 70, no. 7, pp. 589-591, 1951.
- [7] M. N. Akram, H.R. Nirmani and N. D. Jayasundere, "A Study on Thermal and Electrical Characteristics of Thermoelectric Cooler TECI-127 Series", 2016 7th International Conference on Intelligent Systems Modelling and Simulation (ISMS), 2016.
- [8] Mudavath Baburam, Mini compressor-less battery powered refrigerator, Masab tank, Hyderabad:Government polytechnic college, 2016.
- [9] N. Aditya, Sharmi Soha, G. Sourdeep and C. Sharmistha, "A project on atmospheric water generation with the concept of peltier effect", International journal of advance computer research 2014, vol. 4, pp. 481-486, 2014.
- [10] Prashant G. Sonkhede and A.K. Pathrikar, "Portable thermoelectric refrigeration system for medical application", IJIRCCE conference, pp. 3190-3195.
- [11] P. Attavane, G. B. Arjun, R. Radhakrishna and S. R. Jadav, "Solar powered portable food warmer and cooler based on peltier effect", 2017 2nd IEEE International Conference on Recent Trends in Electronics Information & Communication Technology (RTEICT), 2017.

- [12] R. Kshitij, P. Mitali and K. Tushar, "Peltier based eco-friendly smart refrigerator for rural areas", IJARCSSE conference, vol. 7, pp. 718-721, 2017.
- [13] N. H. Ranchagoda, M. N. Akram, C. P. K. Vithanage and N. D. Jayasundere, "Implementation of an external intelligent cooling system for laptops using TECs", 2016 IEEE 6th International Conference on Consumer Electronics - Berlin (ICCE-Berlin), 2016.
- [14]F. A. Silva, "Power Electronics Handbook" in [Book News]. IEEE Industrial Electronics Magazine, vol. 5, no. 2, pp. 54-55, 2011.

