INTERNATIONAL JOURNAL OF PROGRESSIVE RESEARCH IN ENGINEERING MANAGEMENT AND SCIENCE (IJPREMS)

www.ijprems.com
editor@ijprems.com

Vol. 04, Issue 04, April 2024, pp: 1300-1301

e-ISSN : 2583-1062

Impact Factor: 5.725

SOLAR BASED E-UNIFORM FOR SOLDIERS

R. Appayaraj[1], M. J. Arunjunai Raja[2], Mrs. V. Jansirani[3]

[1,2]Student, Electrical and Electronics Engineering, Sree Sowdambika College of Engineering, Aruppukottai, Virudhunagar District,Tamil Nadu ,India.

[3]Assistant M. E Professor,Electrical and Electronics Engineering ,Sree Sowdambika College of Engineering, Aruppukottai, Virudhunagar District, Tamil Nadu, India.

DOI: https://www.doi.org/10.58257/IJPREMS33473

ABSTRACT

In an era where technology rapidly shapes the landscape of warfare and sustainability becomes increasingly paramount, the integration of solar-based electronic uniforms emerges as a groundbreaking solution. This paper explores the conceptualization, development, and potential impact of solar-powered e-uniforms designed specifically for soldiers. The proposed e-uniform incorporates photovoltaic cells seamlessly integrated into the fabric, harnessing solar energy to power a variety of electronic components. These components include communication devices, GPS systems, medical sensors, and climate control mechanisms, among others, all essential for enhancing soldiers' performance, survivability, and comfort in diverse operational environments.

1. INTRODUCTION

The Solar-Based E-Uniform for Soldiers project represents a pioneering endeavor at the intersection of military technology, renewable energy, and textile engineering. With the aim of enhancing soldiers' capabilities, survivability, and sustainability, this project endeavors to develop a cutting-edge electronic uniform powered by solar energy.

2. METHODOLOGY

We use solar panels to generate the need energy and rechargeable batteries to store the energy. In this project ,we design and develop an E-uniform for soldiers to avoid the problems they face due to extreme hot and cold weather conditions during their working time. We have designed two mode switching operations.Heat and cold operations. The heating and cooling effect is useful to provide a cool and warm effect inside the E-uniform. This makes it possible for the soldiers to endure all kinds of outdoor environments.

3. MODELLING OF PROJECT

3.1 Components Description

3.2.1 Node MCU: NodeMCU is an open-source development board based on the ESP8266 Wi-Fi module. It integrates a microcontroller unit with Wi-Fi capability, making it ideal for IoT (Internet of Things) projects. With its compact size and easy-to-use developm’ent environment, NodeMCU enables seamless connectivity and control over various sensors and devices. It supports the Arduino IDE and Lua scripting language, allowing for rapid prototyping and development of IoT applications ranging from home automation to industrial monitoring systems.

3.2.2 BATTERY- A battery is a portable energy storage device that converts chemical energy into electrical energy. It provides power to electronic devices when disconnected from a power source. In IoT projects, batteries are commonly used to provide power to wireless sensor nodes or portable devices like NodeMCU-based systems. Choosing the right battery involves considering factors such as capacity, voltage, size, and rechargeability, to ensure adequate power supply and longevity for the intended application.

.**3.2.3 SOLAR PANEL-** A solar panel is a device that converts sunlight into electrical energy through the photovoltaic effect. It consists of multiple solar cells interconnected to generate usable electrical power. Solar panels offer a sustainable and renewable energy source, making them ideal for powering remote or off-grid applications such as IoT devices. When paired with a battery, solar panels can provide continuous power to NodeMCU-based systems, even in locations without access to conventional power sources.

3.2.4 TEMPERATURE SENSOR- A temperature sensor is a device that measures ambient temperature and converts it into a readable electrical signal. Common types include thermistors, thermocouples, and semiconductor-based sensors.

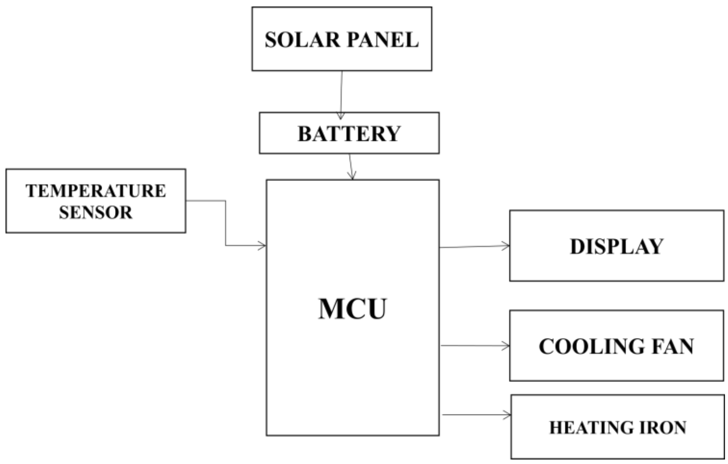
These sensors are essential for monitoring environmental conditions in various applications, including weather forecasting, HVAC systems, and industrial processes. In combination with microcontrollers like NodeMCU, temperature sensors enable real-time monitoring and control of temperature-sensitive systems, ensuring optimal performance and safety.

3.2.5 COOLING FAN- A cooling fan is a mechanical device that circulates air to dissipate heat from electronic components or systems. In IoT applications, cooling fans are used to prevent overheating and ensure the reliable operation of devices like NodeMCU. By maintaining optimal operating temperatures, cooling fans enhance system performance and longevity, especially in environments with high ambient temperatures or prolonged usage.

3.2.6 HEATING IRON- A heating iron, also known as a soldering iron, is a tool used for soldering electronic components together. It consists of a heated metal tip connected to a power source, typically via a temperature-controlled base station. Heating irons are essential for assembling and repairing electronic circuits, including those used in Node MCU-based projects. By providing a precise and controlled heat source, heating irons facilitate the soldering of components onto PCBs, ensuring reliable electrical connections and functionality.

.**3.2.7 DISPLAY-** A battery is a portable energy storage device that converts chemical energy into electrical energy. It provides power to electronic devices when disconnected from a power source. In IoT projects, batteries are commonly used to provide power to wireless sensor nodes or portable devices like NodeMCU-based systems. Choosin g the right battery involves considering factors such as capacity, voltage, size, and rechargeability, to ensure adequate power supply and longevity for the intended application.

BLOCK DIAGRAM



4. CONCLUSION

In conclusion, the development and implementation of a solar-based e-uniform for soldiers present a promising advancement in military technology. This innovative uniform offers numerous benefits, including enhanced sustainability, reduced reliance on traditional power sources, and increased operational efficiency. In conclusion, it can be said that the systems have no significant difference in between them while considering all the factors what affect the output power of solar panel. According to comparison, the electrical output is quite little of single-axis sun tracking solar panel system and has no significance over dual-axis sun tracking solar panel system's electrical output. In terms of cost effectiveness

ACKNOWLEDGEMENT

I am extremely grateful thank to our Head of the Department Dr.R.SIVASANGARI.,M.E.,Ph.D, professor of EEE forherable guidance, continuous encouragement and moral support throughout the project work.

I wish to express my deep sense of gratitude to my internal Project Guide Mrs.V.Jansirani M.E.,AP Professor, Department of EEE for his able guidance continuous encouragement and moral support throughout the project work.

5. REFERENCES

[1] Alcântara, J., & Borém, A. (2016). Solar-powered wearable devices for soldiers: A review. Renewable and Sustainable Energy Reviews, 65, 639-652.

[2] Basu, A., & Ganguly, A. (2018). Development of solar-powered wearable e-textiles for military applications. Defence Technology, 14(6), 759-770.

[3] Buonomano, A., & Scarselli, E. F. (2017). Energy harvesting solutions for wearable and portable electronics in military applications: A review. Renewable and Sustainable Energy Reviews, 75, 534-548.

[4] Chaudhary, K., & Wani, M. F. (2020). Solar energy harvesting techniques for wearable electronics: A review. Solar Energy, 195, 279-296.

[5] Rahman, M. H., & Srinivasan, R. (2020). Flexible and stretchable solar cells for wearable electronics: A review. Journal of Materials Science: Materials in Electronics, 31(18), 15515-15538.