

## Solar Based E-Uniform

Soumya Verma<sup>1</sup> Vishal Singh<sup>2</sup> Vivek Rathi<sup>3</sup> Dr. Rajendra V. Babar<sup>4</sup>

<sup>1,2,3,4</sup>Department of Electronics and Telecommunication Engineering

<sup>1,2,3,4</sup>Sinhgad Institute of Technology, Lonavala, Pune, India

**Abstract**— Both biting and scorching temperatures could be minacious to health. Imprudent subjection to heat is broached as heat stress and imprudent subjection to cold is broached as cold stress. In a scorching territory, the most key concern is heat stroke. At biting temperatures, the most key concern is the risk of hypothermia. Solar Based E-Uniform bestow better armour to the soldiers who are working in acute conditions. Solar Panels are used to power up the internal circuitry of the E-Uniform. A 12V DC lead acid rechargeable battery is used for keeping the energy. We are using conventional battery charging unit also for giving supply to the circuitry. A conventional battery can also be used as charging unit. LPC2148 micro controller controls all the functions. A voltage sampler is interfaced with the system using ADC to get the voltage generated from battery as a display on a 16X2 LCD.

**Keywords:** Solar Panel, Rechargeable Battery, LPC 2148, 16X2 LCD, Peltier Plate, Temperature Sensor, GPS

### I. INTRODUCTION

Soldiers are the Army's most important resource. They play a crucial role in protecting one's country. They are always responsible for exercising the duty in extreme conditions. While providing security to the nation they face troubles in extreme hot/cold weather. Both the temperatures could be harmful for health. In this paper we have made an attempt to design a "Solar Based E-Uniform" which give better protection to the soldiers. This system gives two modes Summer mode and Winter mode.

### II. EXISTING SYSTEM

Now-a-days, a suit is available in the market which provides controlled temperature inside it, but its cost is very high. It is because many parts of the suit are mechanical and gripping devices. The suit consists of pumps & radiators to provide warm and chilling effect. To cool the body, these pumps spray water on human body. Another tool is the Electric Blanket. The electric blanket uses carbon fibre wires to provide heat to the user. These wires are inserted into fabric that heats when it is plugged in. The temperature control unit is placed between the electrical outlet and the blanket, which manages the amount of current entering in the heat elements of the blanket. These blankets have a shut off mechanism to prevent the blanket from overheating or catching fire. But the main drawback of these blankets is there maintenance and they cannot be used while doing some work.

### III. PROPOSED SYSTEM

The specially designed Solar Based E-Uniform operates on the concept of peltier effect, to provide a sense of normal temperature inside the jacket in extreme weather conditions. The heart of this system is the LPC 2148. The temperature sensor (LM35) detects the temperature and sends the details

to the LPC2148. The LPC2148 send the signals to the DPDT relay which in turn drives the peltier heater/cooler. The GPS module is used to spot the location of the soldier. The GPS locates the position of the soldier and The LCD display is used to display the temperature and also location of the soldier.

### IV. BLOCK DIAGRAM

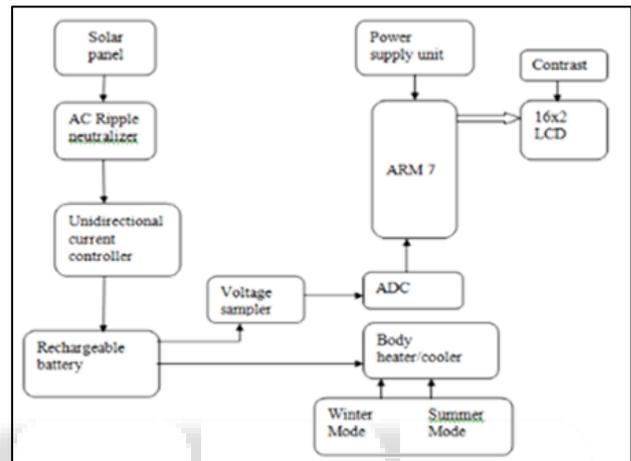


Fig. 1: Solar Based E-Uniform

### V. HARDWARE AND SOFTWARE

#### A. Temperature Sensor

The LM35 series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Celsius (Centigrade) temperature. The LM35 thus has an advantage over linear temperature sensors calibrated in Kelvin, as the user is not required to subtract a large constant voltage from its output to obtain convenient Centigrade scaling. The LM35 does not require any external calibration or trimming to provide typical accuracy of  $\pm 1/4^\circ\text{C}$  at room temperature and  $\pm 3/4^\circ\text{C}$  over a full  $-55$  to  $+150^\circ\text{C}$  temperature range. Low cost is assured by trimming and calibration at the wafer level. The LM35's low output impedance, linear output, and precise inherent calibration make interfacing to read out or control circuitry especially easy. It can be used with single power supplies, or with plus and minus supplies. As it draws only  $60\mu\text{A}$  from its supply, it has very low self-heating, less than  $0.1^\circ\text{C}$  in still air. The LM35 is rated to operate over a  $-55^\circ$  to  $+150^\circ\text{C}$  temperature range, while the LM35C is rated for a  $-40^\circ$  to  $+110^\circ\text{C}$  range ( $-10^\circ$  with improved accuracy).

#### B. Peltier Plate

In a Peltier-effect device, the electrodes are typically made up of a metal with excellent electrical conductivity. The semiconductor material between the electrodes creates two junctions between dissimilar materials, which in turn, create a pair of thermo-couple. Voltages applied to the electrodes

to pass electrical current through the semiconductor, thermal energy flows in the direction of the charge carriers.

### C. Solar Panel

Solar Panel is designed to absorb sun's rays as a source of energy for generating electricity or heating. The amount of electricity produced by solar panel depends on the number of photovoltaic cells embedded in the panel. Photons in sunlight hit the solar panel and are absorbed by semi conducting material, such as silicon.

### D. GPS

GPS (Global Positioning System) is a worldwide radio-navigation system formed from a constellation of 24 satellites and their ground stations. The outcome of a typical GPS survey includes geocentric position accurate to 10 m and relative positions between receiver locations to centimeter level or better. The GPS receiver is capable of receiving signals from up to 65 GPS satellite and transferring them into the precise position and timing information that can be read over either UART port or RS232 serial port. In this E-Jacket the GPS parallax PAM-7QM is used. It is used to trace the location of the soldier.

### E. LCD

A 16x2 LCD module is used in this project to display the temperature and also the current location (longitude & latitude) of the soldier. It consists of 16 columns and 2 rows.

### F. LPC 2148 (ARM 7)

LPC2148 Microcontroller Architecture. The ARM7TDMI-S is a general purpose 32-bit microprocessor, which offers high performance and very low power consumption. The ARM architecture is based on Reduced Instruction Set Computer (RISC) principles, and the instruction set and related decode mechanism are much simpler than those of micro programmed Complex Instruction Set Computers (CISC). This simplicity results in a high instruction throughput and impressive realtime interrupt response from a small and cost-effective processor core.

## VI. RESULT

The output of the Solar Based E-Uniform is the jacket or the uniform will be warmed up or cooled down as per the present environment in which the soldier is. He/She will be able to find out the altitude or the latitude of the particular place as well as will be able to know his/her body temperature so that if there is any scope of emergency they can contact their neighbour soldiers so that, that soldier can be saved from the heat stroke or hypothermia. The solar panel will keep on charging whenever there will be sun. And then the uniform will be perfectly functioning. Due to its ease of use any soldier can wear it comfortably and can serve the country with first by protecting themselves from the scorching heat and the biting cold.

## VII. ADVANTAGES

- Fit and Forget System
- Cost Efficient
- Power Efficient

- Easy to Operate
- Reliable
- Low Maintenance
- Compact Size
- Protection from extremely low temperature such as 0/Minus Degree in hilly regions
- Easy to Monitor

## VIII. CONCLUSION

Officers are one of the imperative components in a nation. Since they are the strengths who secure our nation day and night living behind rest and rest. In this manner it is our obligation to ensure them. Same is the centrality of this undertaking. So here outline an E Uniform which gives better insurance to the warriors who are working in compelling climate conditions. This venture is worked in two modes summer mode and winter mode. In the event that the climate condition is excessively hot then the cooling framework will worked and in the event that it is excessively cool then the warming framework will worked.

We have been concentrating on a system for saving time and utilizing it for a good purpose. There are many advantages from the solar based e-uniform. There is a need of this uniform so that people who are working in so dangerous environment can save themselves from getting into trouble like if they are lost then with the help of the GSM we can track their position and if there is any medical emergency then the person himself can alert the head that he is need of medical supervision.

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