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SOLAR BASED E-UNIFORM FOR SOLDIERS WHO WORK AT EXTREME HIGH TEMPERATURE OR EXTREME LOW TEMPERATURE

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Abstract - Solar-based E-Uniform furnished with better protection to the soldiers who are working in extreme weather. Solar Panels are wont to power up the interior circuitry of the E-uniform. A 12 V DC lead-acid rechargeable battery is employed for storing the energy. We are using a conventional battery charging unit also for giving supply to the circuitry. ATmega328p microcontroller is the heart of the circuit as it controls all the functions. The project is operated in two modes like summer mode and winter mode. By selecting the mode of operation, we are operating the system such it can drive the body temperature according to heater/cooler. The heater/cooler in turn will help us to provide a chilling or warming effect inside the uniform which helps the soldier to bear to any kind of external environment. The metal sensor will detect the metal-like bomb, any other planted weapon inground and intimate the soldier with a buzzer indication. The wifi is interfaced with the microcontroller and dht11 is additionally interfaced such the tracking of the whole soldier is observed.

I.INTRODUCTION

Soldiers are the Army's most important resource. Soldiers play a vital role to protect one's country. The term soldiers include service men and women from the Army, Air Force, Navy and Marines. They will always be the one responsible for taking and holding the duty in extreme weather conditions throughout the year. While providing security to the nation, they may face troubles in extreme hot/cold weather conditions. Both very cold and very hot temperatures could be dangerous to health. Excessive exposure to heat is referred to as heat stress and excessive exposure to cold is referred to as cold stress. In a very hot environment, the most serious concern is heat stroke. At very cold temperatures, the most serious concern is the risk of hypothermia or dangerous overcooling of the body.

In this project we are going to design an E-Uniform which gives better protection to the soldiers who are working in extreme weather conditions. This Uniform will make the soldier to work in any kind of environment. Here we are using Solar Panels to power up the internal circuitry of the E-uniform.

A 12 V DC lead acid rechargeable battery is used for storing the energy. We are using conventional battery charging unit also for giving supply to the circuitry. AT89S52 micro controller is the heart of the circuit as it controls all the functions. A voltage sampler is interfaced with the system using ADC 0808 to get the voltage generated from battery as a display on a 16X2 LCD. The project is operated in two modes summer mode and winter mode. By selecting the mode of operation, we are operating the H-Bridge IC such that it can drive body heater/cooler. The heater/cooler in turn will help us to provide chilling or

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warming effect inside the uniform which helps the soldier to bear to any kind of external environment and he can work efficiently without heat stress or cold stress.

Warriors are the Army's most imperative asset. Warriors assume an important part to make sure one's nation. The term warriors incorporate administration men and ladies from the military, Air Force, Navy, and Marine. While giving security to the country, they could challenge inconveniences in hot/frosty climate conditions. Both exceptionally hot and icy temperatures might be unsafe for well-being. This venture may be a solution for this circumstance. during this venture, an E-Uniform is planned which provides better security to the officers who are working in great climate conditions. A temperature sensor is employed to see the temperature whenever. The LM35 is a circuit temperature sensor, whose yield voltage is directly relative to the Celsius (Centigrade) temperature. In this undertaking, we are getting to plan an EUniform which provides better assurance to the fighters who are working in amazing weather. This Uniform will make the trooper figure in any kind of environment. Here we are utilizing Solar Panels to regulate up the within the hardware of the E-uniform. A 12 V DC lead corrosive rechargeable battery is employed for putting away the vitality. We are utilizing a routine battery charging unit additionally to offer supply to the hardware. A temperature sensor and heartbeat sensor utilized for checking the wellbeing of the trooper in any circumstance. ATmega16a miniaturized scale controller is that the heart of the circuit because it controls all of the capacities.

A 12 V DC lead acid rechargeable battery is used for storing the energy. We are using conventional battery charging unit also for giving supply to the circuitry. This Conventional power source uses regulated 5V, 500mA power supply. 7805 three terminal voltage regulators are used for voltage regulation. Bridge type full wave rectifier is used to rectify the ac output of secondary of 230/12V step down transformer.

PROBLEM STATEMENT

1. The man/military in ice land or in snow they work 24 hours and 7 days so their temp. is below zero degree centigrade. They have to survive their and also in desert their tem. Is above 40 degrees centigrade, and their also we have to maintain body temp. 27 degree centigrade. So we have need to prepare the heating and cooling jacket. 2. In this project we are going to design an E-Uniform which gives better protection to the soldiers who are working in extreme weather conditions.

OBJECTIVES

1. Design and develop the E-UNIFORM fir extreme cool and hot using solar system.

2. To develop a prototype model of the same which will show the working of E-UNIFORM for extreme cool and hot using solar system set up with respect to the position.

3. To propose a low cost e-uniform system using solar system

4. To fabricate the design with the knowledg

II.LITERETURE SURVEY

The AT89S52 is a low-power, high-performance CMOS 8-bit microcontroller with 8K bytes of insystem programmable

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Flash memory. The device is manufactured using Atmel's high-density nonvolatile memory technology and is compatible with the industry- standard 80C51 instruction set and pinout. The on-chip Flash allows the program memory to be reprogrammed in-system or by a conventional nonvolatile memory programmer. By combining a versatile 8-bit CPU with in-system programmable Flash on a monolithic chip, the Atmel AT89S52 is a powerful microcontroller which provides a highly-flexible and cost-effective solution to many embedded control applications. The AT89S52 provides the following standard features: 8K bytes of Flash, 256 bytes of RAM, 32 I/O lines, Watchdog timer, two data pointers, three 16-bit timer/counters, a six-vector two-level interrupt architecture, a full duplex serial port, on-chip oscillator, and clock circuitry. In addition, the AT89S52 is designed with static logic for operation down to zero frequency and supports two software selectable power saving modes. The Idle Mode stops the CPU while allowing the RAM, timer/counters, serial port, and interrupt system to continue functioning. The Power-down mode saves the RAM contents but freezes the oscillator, disabling all other chip functions until the next interrupt or hardware reset.

Existing system applications are limited as it provides body temperature regulation only, but nothing more than that. It does not provide any means of Security, Navigation, Monitoring at a remote place.

III.HARDWARE DISCRIPTION

This chapter briefly explains about the Hardware. It discusses the circuit diagram of each module in detail.

ARDUINO UNO

The Arduino Uno is a microcontroller board based on the ATmega328 (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial converter. Uno board has a resistor pulling the 8U2 HWB line to ground, making it easier to put into DFU mode. Arduino board has the following new features:

- 1.0 pin out: added SDA and SCL pins that are near to the AREF pin and two other new pins placed near to the RESET pin, the IOREF that allow the shields to adapt to the voltage provided from the board. In future, shields will be compatible both with the board that use the AVR, which operate with 5V and with the Arduino Due that operate with 3.3V. The second one is a not connected pin, that is reserved for future purposes.
- Stronger RESET circuit.
- Atmega 16U2 replace the 8U2.

"Uno" means one in Italian and is named to mark the upcoming release of Arduino 1.0. The Uno and version 1.0 will be the reference versions of Arduino, moving forward. The Uno is the latest in a series of USB Arduino boards, and the reference model for the Arduino platform; for a

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comparison with previous versions, see the index of Arduino boards.

Fig: ARDUINO UNO

POWER SUPPLY:

The power supplies are designed to convert high voltage AC mains electricity to a suitable low voltage supply for electronic circuits and other devices. A power supply can by broken down into a series of blocks, each of which performs a particular function. A d.c power supply which maintains the output voltage constant irrespective of a.c mains fluctuations or load variations is known as "Regulated D.C Power Supply".

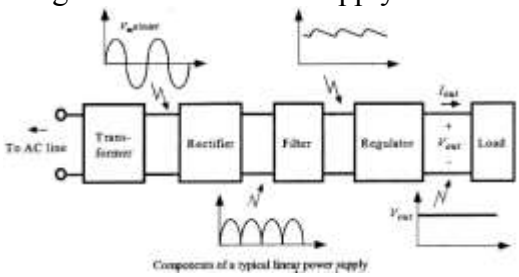

Fig: Block Diagram of Power Supply

LCD DISPLAY

A model described here is for its low price and great possibilities most frequently used in practice. It is based on the HD44780 microcontroller (Hitachi) and can display messages in two lines with 16 characters each. It displays all the alphabets, Greek letters, punctuation marks, mathematical symbols etc. In addition, it is possible to display symbols that user makes up on its own. Automatic shifting message on display (shift left and right), appearance of the pointer, backlight etc. are considered as useful characteristics.

Fig: LCD

WIFI MODULE:

The **ESP8266** is a low-cost Wi-Fi microchip with full TCP/IP stack and microcontroller capability produced by Shanghai-based Chinese manufacturer, Espressif Systems.[1]

The chip first came to the attention of western makers in August 2014 with the **ESP-01** module, made by a third-party manufacturer, Ai-Thinker. This small module allows microcontrollers to connect to a Wi-Fi network and make simple TCP/IP connections using Hayes-style commands. However, at the time there was almost no English-language documentation on the chip and the commands it accepted.[2] The very low price and the fact that there were very few external components on the module which suggested that it could eventually be very inexpensive in volume, attracted many hackers to explore the module, chip, and the software on it, as well as to translate the Chinese documentation.[3]

The **ESP8285** is an ESP8266 with 1 MiB of built-in flash, allowing for single-chip devices capable of connecting to Wi-Fi.[4]

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The successor to these microcontroller chips is the ESP32.

PHOTOVOLTAIC INVERTER

Introduction to PV system

The basic block diagram of grid connected PV power generation system is shown in Fig. 3.1.

The PV power generation system consists of following major blocks:

1. PV unit
2. Inverter
3. Grid
4. MPPT

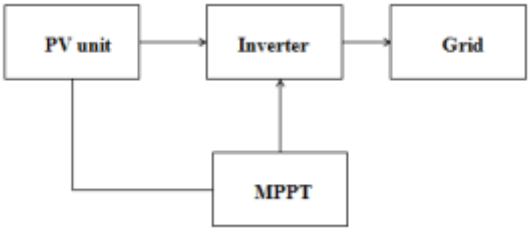

Fig. Schematic diagram of PV system

Photovoltaic cell and array modeling

A PV cell is a simple p-n junction diode that converts the irradiation into electricity. Fig.3.2 illustrates a simple equivalent circuit diagram of a PV cell. This model consists of a current source which represents the generated current from PV cell, a diode in parallel with the current source, a shunt resistance, and a series resistance.

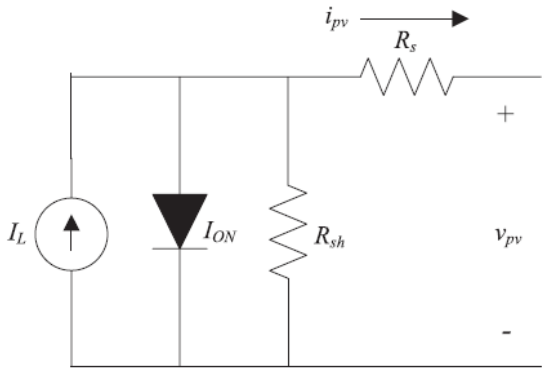

Fig. Equivalent circuit diagram of the PV cell

TEMPERATURE SENSOR (LM35):

in order to monitor the temperature continuously and compare this with the set temperature preprogrammed in the microcontroller, initially this temperature value has to be read and fed to the microcontroller. This temperature value has to be sensed. Thus a sensor has to be used and the sensor used in this project is LM35. It converts temperature value into electrical signals.

LM35 series sensors are precision integrated-circuit temperature sensors whose output voltage is linearly proportional to the Celsius temperature. The LM35 requires no external calibration since it is internally calibrated. . The LM35 does not require any external calibration or trimming to provide typical accuracies of ±1⁄4°C at room temperature and ±3⁄4°C over a full −55 to +150°C temperature range.

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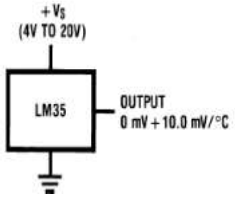


The characteristic of this LM35 sensor is:

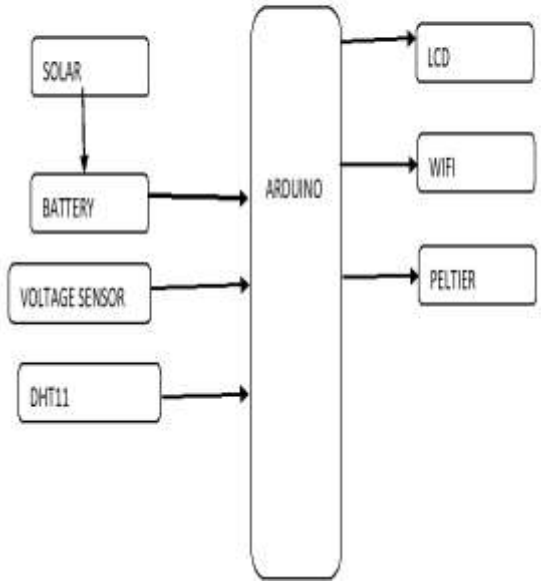
For each degree of centigrade temperature it outputs 10milli volts.

ROLE OF LM35:

In this project, the temperature is to be monitored continuously and if the temperature exceeds the set value preprogrammed in the microcontroller, a buzzer indication is provided in the circuit to alert the people in the industry to stop the process immediately. Thus the temperature sensor LM35 has to read the temperature continuously and the microcontroller has to compare this temperature value with the set temperature preprogrammed in it. When this temperature exceeds the set value, the microcontroller sends an indication to the buzzer which gives a loud noise.

IV.PROJECT DISCRIPTION

BLOCK DIAGRAM OF PROJECT



HARDWARE REQUIRED

- ARDUINO microcontroller
- LCD
- Solar panel
- Voltage sampler
- ADC

SOFTWARE REQUIRED

- Embedded C
- ARDUINO IDE

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Working of setup consist following:

In this project we are using Solar Panels to power up the internal circuitry of the E-uniform. A 12 V DC lead acid rechargeable battery is used for storing the energy. We are using conventional battery charging unit also for giving supply to the circuitry. 2. ARDUINO UNO as a microcontroller is the heart of the circuit as it controls all the functions. The project is operated based on temperature experienced. If there is raise in temperature, then our jacket gets cooled and if the temperature is normal then it remains hot. The heater/cooler in turn will help us to provide chilling or warming effect inside the uniform which helps the soldier to bear to any kind of external environment and he can work efficiently without heat stress or cold stress. 3. The temperature sensor is to sense the surrounding temperature. We are using the LCD display for displaying the values of surrounding temperature and modes in which we operate. 4. Peltier Plate is connected to digital pins of Arduino when the temperature is above threshold value then the summer mode is activated and Peltier plate provides chilling effect inside the Jacket. 5. If the temperature reading is below the threshold level, then the winter mode is activated and provides Heating effect

V.CONCLUSION

The project "Solar based E-Uniform for soldiers who work at extreme high temperature or extreme low temperature with tracking" is successfully tested and implemented. By using this project in real time applications we can help soldiers to work even in extreme climatic applications. It is a highly durable and selfrepairing solar technology, ideally suited for mobile applications.

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