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Solar Based E-Battledress for Soldiers

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ABSTRACT: Indian army is the largest armed force, where soldiers play a vital role in protecting the country. Soldiers are the most responsible people holding the duty in extreme weather condition causing health related problems. This proposed method aim is to provide protection for soldiers from extreme climatic condition by using solar power and rechargeable batteries to power the e-battledress. It even makes use of peltier plate, helping the soldiers by providing warmth and chillness according to the climatic condition. This will make sure that the soldiers could work in any kind of environment.

KEYWORDS: lily pad microcontroller, solar panel, temperature sensor, piezoelectric plates, peltier plate.

I. INTRODUCTION

Officers are the military's most significant asset. Officers assume an urgent job in ensuring one's nation. The term warriors incorporate military, aviation based armed forces, naval force and marines. They are constantly at risk for practicing the obligation in extraordinary climate consistently. While giving security to the state, they'll confront inconveniences in outrageous sweltering/chilly climate. Both incredibly mainstream and cold temperatures may be perilous to wellbeing along these lines decreasing their effectiveness. Rightnow have made an endeavour to plan an e-uniform which gives better security to the warriors who are working in outrageous climate conditions. Mugginess sensor is utilized for checking the temperature whenever. The lm35 is an accuracy circuit temperature sensor, whose yield voltage is directly relative to the Celsius temperature. Sensor gives the simple voltage which is changed over into computerized by utilizing adc in the arduino. These computerized qualities are checked with the warmth and cold edge level of temperature. On the off chance that the temperature is more than the warmth limit, cooler and fan will be actuated. On the off chance that the temperature is not exactly the chilly limit, radiator and fan will be actuated and estimations of temperature are shown in lcd. Sunlight based boards and piezoelectric plates are utilized to give supply to inward circuit. The accompanying segments we will introduce the square outline, depiction use followed by end.

II.LITERATURE SURVEY

[2]Proposed an e-uniform which gives better assurance to the troopers in outrageous climatic condition. Temperature sensor is utilized to check the temperature which gives simple voltage which is changed over to computerize by utilizing ADC in the PIC microcontroller (PIC16F877A). The advanced qualities are checked with the warmth and cold limit level of temperature. In the event that the temperature is more than the edge cooler and fan will be initiated. Clock begins and the status of the framework is appeared on the LCD show.

[5] Proposed gadget uses the idea of solar and IoT primarily based tracking, controlling and monitoring device for soldiers who working severe climatic circumstance. The PIC18F452 microcontroller receives the statistics from the GPS, GPS and heartbeat detector. The heart price of the soldier is sensed via the heart beat sensor. If the heart fee is ordinary the alert message are despatched to the military manage unit through GSM module.

III. ARCHITECTURE

The Module is a mix of hardware and programming. Where Lily cushion controls the general segments. Here the force sources are sunlight based board and the piezoelectric plates which are associated with battery-powered battery through the charging circuit. Sensors, for example, temperature sensor with ADC, stickiness sensor are associated straightforwardly with the lipo battery. The yield sources are Peltier plate and the LCD show.

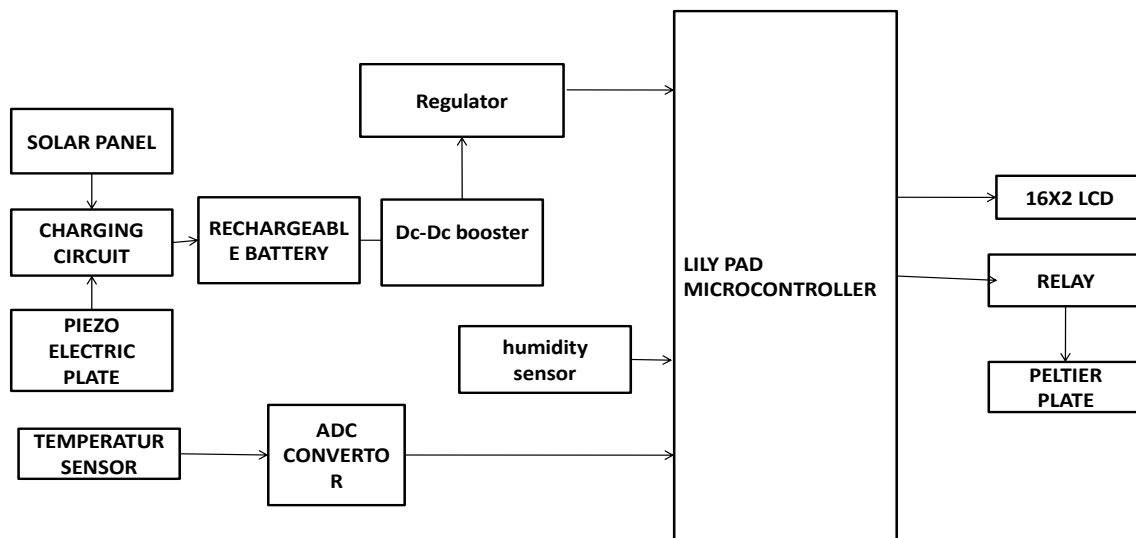


Fig. 1 Block Diagram

IV. MATERIAL USED

A. SOLAR PANEL:

The way toward making power starts when the silicon particles ingest some light. The light vitality takes a few electrons out of the molecules. The electrons stream between the two layers. The stream makes an electric flow. Practically all the sun based boards have transformation proficiency as under 15%. A sun based cluster, which is evaluated at 17 volts will put out its appraised power. At the point when used in a charging battery framework, that is on the grounds that the working voltage will be between 12 - 15 volts. A solitary straightforward photovoltaic cell makes just a touch power. For most purposes more is required. Consequently, cells are frequently connected together in bunches alluded to as sunlight based modules. A sun powered module includes a casing that holds the cells. A few modules are a few feet in length and wide. They normally can create up to a few hundred watts of power. In the event that more force is required, modules are frequently consolidated to make an outsized sunlight based battery. Modules are called as sun powered boards.

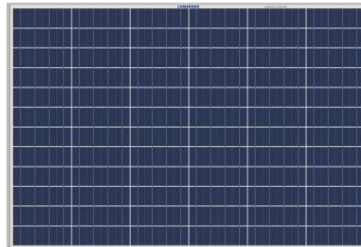


Fig.2 Solar panel

B. LIPO BATTERY:

A lithium polymer battery, or all the more accurately lithium-polymer battery (shortened as Li Po , LIP, Li-poly, lithium-poly and others), might be an a chargeable battery of lithium-particle innovation utilizing a polymer electrolyte rather than a fluid electrolyte. It chips away at the standard of intercalation and de-intercalation of lithium particles from positive and negative cathode material, with the fluid electrolyte giving a conductive medium. To keep the terminals from contacting each other a smaller scale permeable division is utilized, which permits just the particles and not the cathode particles. The voltage differs from 2.7-3.0V to about 4.2V.



Fig.3Lipo battery

C. CHARGING CIRCUIT:

Test circuit of a Li-Ion charger will have the ability to charge any 3.7V Li-Ion battery utilizing a 5VDC (USB, Solar Panel...) power supply. At the guts of the circuit is one microchip MCP73831, accessible in SOT-23-5 bundle. MCP73831 might be an exceptionally progressed straight charge the executive's controller to be utilized in space-limited, cost-delicate applications. This IC utilizes a proceeding with current/consistent voltage accuse calculation of selectable. The accusing circuit is associated of the DC-DC sponzor which helps in multiplying the voltage which it picked up from the source.

D. TEMPERATURE SENSOR:



Fig.4Thermistor

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The LM35 temperature sensor are precision consolidated circuit temperature devices with a yield voltage legitimately comparative with the Centigrade temperature. The low-yield impedance, straight yield, and appropriate natural arrangement of the LM35contraption makes interfacing to readout or control hardware particularly essential. The LM35 temperature sensor is used to recognize precise centigrade temperature. The yield of this sensor changes delineates the linearity. The output voltage of this IC sensor is somewhat comparative with the Celsius temperature. The working voltage extent of this LM35 ranges from -55° to +150°C and it has low-self warming. This is worked under 4 to 130 volts. Temperature sensor circuit has terminals for instance, two wellsprings of data like non-upsetting (+) and changing (-) and only a solitary yield pin. This LM35 temperature sensor circuit upgrade the difference between its data terminals. The advantages of temperature sensor fuse. It has no effect on the medium, increasingly precise, it has a successfully formed yield and It responds in a brief instant. While the temperature sensor is associated with the fitting pins of the AVR controller.

E. LCD DISPLAY:



Fig.5 LCD Display

A LCD, or Liquid Crystal Display, is a sort of screen that is used in various PCs, TVs, automated cameras, tablets, and PDAs. LCDs are dainty yet are truly made out of a couple of layers. Those layers consolidate two entranced sheets, with a liquid pearl game plan between them. Light is foreseen through the layer of liquid valuable stones and is colorized, which makes the perceptible picture. The LCD which is interfaced to the microcontroller. It works under +5V supply. The Panel of this LCD has 2 lines and 16 fragments.

F. PIEZOELECTRIC PLATE:

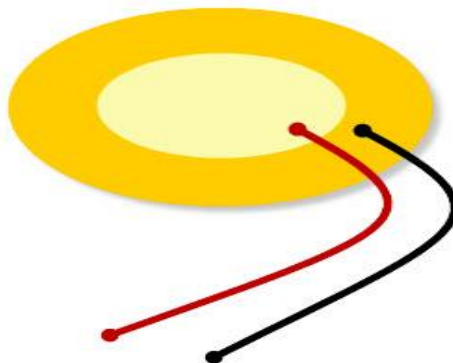


Fig.6 Piezoelectric plate

A piezoelectric sensor might be a gadget that utilizes the piezoelectricity, to live changes in pressure, speeding up, temperature, strain, or power by changing over them to an electrical charge. The prefix piezo-is Greek for

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'press' or 'crush'. Piezoelectric sensors are flexible apparatuses for the estimation of fluctuated forms. They are utilized for quality affirmation, process control, and for innovative work in numerous enterprises. They have been effectively used in different applications, as in therapeutic, aviation, atomic instrumentation, and as a tilt sensor in purchaser electronic or a weight sensor inside the touch stack of cell phones. The regularly estimated physical amounts are:

- Weight
- Speeding up

Both weight and speeding up sensors chips away at a proportionate standard of piezoelectricity however the most contrast between them is, how power is applied to their detecting components. A portion of the applications are:

- Shockdetection
- Microphones
- Accelerometer

F. REGULATOR:

A transformer generates a hard and fast output voltage of a gift magnitude that is still constant no matter changes to its input voltage or load conditions. There are two types of voltage regulators which are linear and switching. Some applications of voltage regulators are it is used in all power supplies to electronic gadgets to regulate voltage and save the device from damage and used for electronic circuits to supply a precise amount of voltage.

G. LILYPAD MICROCONTROLLER:

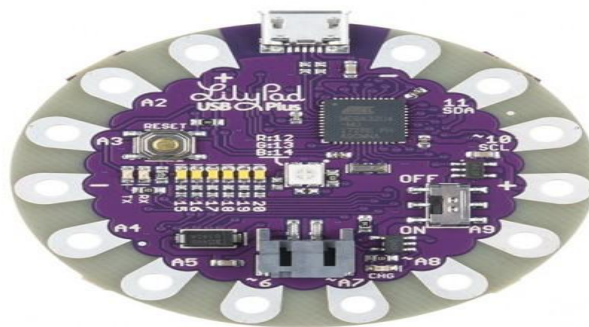


Fig.7 Lilypad

The lilypad arduino might be a microcontroller board intended for wearables and e-materials. The board depends on ATmega168V or ATmega328V. It very well may be powered by means of the USB association or with the outside force supply. In the event that an outside force supply is utilized, it ought to give somewhere in the range of 2.7 and 5.5volts. This can either gave by an AC to DC connector. The lily pad microcontroller is same of the other microcontroller.

H. PELTIERPLATE:

A few uses of voltage controllers are it is utilized in all force supplies to electronic devices to direct voltage and spare the gadget from harm and utilized for electronic circuits to supply an exact measure of voltage. The peltier plate takes a shot at the standard of peltier impact, which is the impact that makes a temperature contrast by moving warmth between two electrical intersections. The voltage is applied across joined conveyors to make an electric flow. At the point when the present courses through the intersections of the 2 conductors, heat is expelled at one intersection and cooling happens. Peltier impact gadgets are utilized for thermoelectric cooling in electronic types of gear and PCs when progressively regular cooling strategies are unfeasible.



Fig.8 Peltier plate

I. RELAY:



Fig.9 Relay

A transfer is an electrically worked switch. Current moving through the curl of the hand-off makes an attractive field which draws in a switch and changes the switch contacts. The loop current can be on or off so transfers have two switch positions and they are twofold toss (changeover) switches. Transfers permit one circuit to switch a second circuit which can be totally discrete from the first. For instance a low voltage battery circuit can utilize a transfer to switch a 230V AC mains circuit. There is no electrical association inside the hand-off between the two circuits, the connection is attractive and mechanical.

V. WORKING TECHNIQUE

The proposed framework deals with the idea of peltier impact. The force source are given by utilizing the sun powered board and the piezoelectric plates. These charge are put away in the chargeable battery upto 5v. The 5v force will be multiplied utilizing the DC-DC promoter which gives up to 12v. The temperature sensor detects the surrounding temperature. Lily pad microcontroller controls the general capacity. Hand-off enacts the peltier plate by utilizing the limit level fixed in the temperature sensor. On the off chance that the temperature goes past the edge level summer mode is enacted in turn gives chillness in the peltier plate. All the while as the temperature goes underneath the edge level the winter mode is enacted in turn giving the warm impact.

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VI.CONCLUSION

The undertaking "Solar based e-Battledress for soldiers" help the officers who work at extraordinary high temperature or outrageous low temperature is effectively tried and actualized. By utilizing this undertaking continuously applications we can help warriors to work even in outrageous climatic applications. It is an exceptionally solid and self-fixing sun powered innovation.

REFERENCES

- [1]. Adarsh K S, Arun Dinesh, JyothyElizebeth D: " Solar Based E-Uniform For Soldier's Who Work At Extreme Temperature Regions", International Journal of Engineering Research and General Science Volume 3, Issue 3, May-June, 2015.
- [2]. S Annapurana Devi, P Rameshkumar: "Adaptable Jacket Based on Climate Conditions Using ARM Microcontroller", International Journal of Engineering and Techniques Volume 2, Issue 5, Sep-Oct, 2016.
- [3]. M. Sivalingamaiah, E.Satheesh Kumar, M.Vijaya Lakshmi: "Solar Based E-Uniform For Temperature Control And Tracking", International Journal of Engineering Research and Development, Volume 12, Issue 5, May 2016.
- [4]. SonaliKavitake, Onkar Jallapelli: "E-Jacket", IJARIE-ISSN(O) Volume 3, Issue 2, 2017.
- [5]. Dr.S.N.Kannan, R.krishnavenisri:"Solar and Iot Based Health Monitoring, Controlling and Tracking System for Soldiers", SSRG International Journal of Electrical and Electronics Engineering, Volume 5, Issue 8, Aug 2018.
- [6]. KawadPranali, DahiwalGayatri:"E-UNIFORM", International Journal of Advance Engineering and Research Development, Volume 5, Issue 5, May 2018.