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Battery Powered Heating and Cooling Suite

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***Abstract*: Now-a-days, people experienced uncommon climate condition which changes over place to place. The climate condition is uncontrollable and uncomfortable to many living bodies. For an instance, we have observed the use of umbrella both for summer and spring season. In this project, we have made an attempt to resolve the issue of controlling temperature which affects our body. If this issue is unaddressed, that would result rashes in body, heat stroke, during summer and Frostbite, physiological condition during spring and stormy seasons. This battery-operated special temperature suite can be placed over the suit, it is an overcoat which is put over suit. The temperature can be adjusted based on requirement; this would enable cooling part or warming part. Temperature can be lowered using radiator if user feel warm likewise for warming the body.**

***Keywords*: Battery, Heating, Cooling.**

1. Introduction

Embedded systems play important role in current world. It has numerous applications in various fields of computing from toys to complex system. Embedded device may be a standalone device or used with another device. There is some problem is there by implementing this jacket such as using this type of jacket, it supposed to be provided better results to user when user wants to access it. There are two major problems may arise during user accessing temperature control through his mobile, first one is it requires more battery resource and suit, next thing is it perform slow cooling action when user wants to change its state. The heating/cooling suite is type of existing system. In which thermoelectric devices are fixed inside the suite/jacket to control the temperature of the jacket. Once device turned on, device displays surrounding temperature data in LCD's. Heat or cold function were controlled in mobile application by choosing the options in application. If user select any one option in the application, then based on the users need jacket start the functioning. The proposed system is operated by Battery powered heating and cooling suit. The user can use this jacket by manual or automatic mode. In automatic mode, temperature sensor sends the data to raspberry pi and the microcontroller controls temperature based on user requirement. The main feature of proposed heating or cooling suit, is to make usage of mobile phones. Through mobile user first check the temperature of suit then control the internal temperature of suit. On initialization, sensor measure the temperature of the suit based on the person's surrounding. Suit is connected to mobile through Wi-Fi unit and surrounding temperature data will be displayed in LCD. Finally, user can change the temperature of suit through application based on his requirement.

2. Literature Survey

One of the most advanced heated motor cycle jackets in the market is Garbing EX-Jacket. It is used in winter riding season. This jacket will keep you warmer, safer and comfortable. In a winter riding season, EX-Jacket will keep body to be safe and protects for health issues. EX-Jacket is mainly used by the bike riders because it is suitable for any climatic condition. The jacket it consists of removable core heat thermo velocity protection, shoulder and elbow impact protectors. [1]

This project E-Uniform mainly used in extreme weather condition. A lithium ion rechargeable battery used for storing the battery power and also use micro controller to control all the functions. Peltier plates operates in two modes, namely summer mode and winter mode. By selecting the mode of operation, it cools or warm up. It uses conventional battery charging unit for given supply to the circuitry. Three terminal voltage regulators are used for voltage regulation. [2]

The E-Jacket operates on the concept of Peltier effect to sense of normal temperature. The heart of the system is the Arduno lillypad board. It has a temperature sensor (LM35) detect the temperature and send details to the Arduino board. The Ardunio send signal to the DPDT relay which in term drives the peltier heater/cooler. The GPS and GSM modular are used to spot the location of soldier. The advantage of this jacket is providing protection from extremely cold temperature such as subzero temperature [3].

At the present time, there are novel methods for the controlled deposition, layer by layer, of multi-phase systems, for example by molecular beam epitaxy, and theoretical treatments of the thermoelectric properties of one- and two-dimensional conductors. There are also reported developments in so-called vacuum thermo elements. So, there the need for refrigeration system that do not depend on CFC's or other undesirable gases. It seems, then, that the time is right for us to expect significant advances in the field of Peltier cooling [3].

The environment temperature changes over varying climatic conditions, in this system, user can vary temperature of jacket through any mobile App. After regulating the temperature of the jacket, first it will initialize then temperature sensor

measures the surrounding temperature. The jacket is connected to mobile app via Wi-Fi. Module. After reading the surrounding temperature data android app display the surrounding temperature data and humidity. Then user can change the temperature of jacket according to the user need. This gadget runs on lithium-ion battery and it is easy to use. The main disadvantage of this project is slow cooling action. [5]

3. Overview

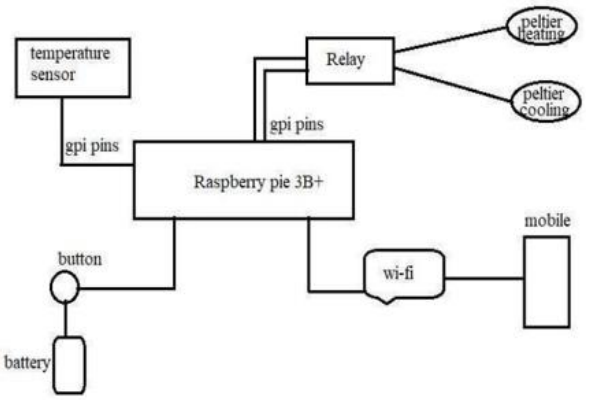

Fig. 1. System architecture of battery powered heating and cooling suit

Fig. 1, shows the system architecture of battery powered heating and cooling process. In this LCD display is used to display the surrounding temperature. Peltier plates are used for generating the heating and cooling process to jacket. Raspberry is used for connection between all requirement kits temperature sensor is used to receive the temperature data and send to raspberry pie connected with GPI pins.

4. Implementation

A. *Raspberry Pi*

Raspberry pi kits are developed by Raspberry System. These boards come with one or two have between one or four USB slots, HDMI, composite video output, and a 3.5 mm audio the kit support I2C protocol. I-squared-C, is a synchronous, multiple-master, multiple-slave, packet switched, single-ended, serial bus protocol. It uses Secure Digital SD cards to store the operating system and program.

B. *Peltier plate*

Peltier effects create a heat flux between the junctions of two different types of materials. A Peltier cooler/heater, or thermoelectric heat pump. Based on current direction it heats from one side of the device to the other. These types of instrument are also called a Peltier device, it can be used either for heating or for cooling.

C. *DHT 11 Temperature Sensor*

DHT 11 Temperature sensors is a multipurpose sensor. It can be used to sense both temperature and relative humidity information. It gives perfect outputs when environment humidity condition ranges from 20- 90% RH.

D. *Lithium-ion polymer battery*

A Lithium-Ion polymer battery, is also abbreviated as LiPo, LIP, Li-poly**.** It is a rechargeable battery of lithium ion technology uses polymer electrolyte. It is developed in different size and shapes, without loss of electrolyte leakage.

E. *Python*

Python is a widely used high-level, general-purpose, interpreted, dynamic programming language. Python emphasizes code readability. The syntax of the python allows programmers to express concepts hardly in few lines of code. Python supports multiple programming paradigms, including object-oriented, imperative and procedure oriented.

F. *C Programing Language*

C is a general-purpose, structured computer programming language, which also designed to provide low-level access to memory. The C language constructs map efficiently to machine instructions, and all with minimal run time support. Despite its low-level capabilities, the language was designed to encourage cross-platform programming.

5. Conclusion

This paper presented an overview on battery powered heating and cooling suite.

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References

[1] Gregory Paul and Edward Gim, David Westeerfeld “Battery Powered Cooling and Heating System with EX-jacket”, 5th edition March 2014, IEEE Long Island.
[2] Goldsmid.H. J “Timeliness in the development of the thermoelectric cooling.” IEEE Explorer N P, 3rd edition, Dec 2013.
[3] Felix Felgner, Lukas Excel, Macro Nesarajah, and Georgfrey,” Component-Oriented Modeling of Thermo-Electric Devices for Energy System Design” IEEE Industrial Electronics, 2nd Edition, March 2014.
[4] Sieben, Vincent, “A High-Power H bridge.” IEEE Explorer G.S 6th Edition, Dec.2013.
[5] McManis, Chuck,” H-Bridge Theory & Practice” Chuck’s Robotics notebook., n.d 4th Edition, June 2013.
[6] Rowe, D.M,” Thermoelectric Handbook: Macro to Nano” New York, Taylor & Francis., 2nd Edition, Jan. 2005.