INTRODUCTION:

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. The proposed system is a battery power heating and cooling jacket, in which the user can regulate the temperature of the jacket through his mobile. After initialization temperature sensor measures the wearable coat temperature according to person’s surroundings. The jacket to a mobile app via Wi-Fi. The mobile app will display the current body temperature and has tools to vary the temperature of the jacket according to user’s need. We can perform both heating and cooling operations as per the requirement. The jacket can work both in manual or automated mode. In automatic mode the jacket reads the temperature via temperature sensor, sends the data to the raspberry pi, the logical operation is performed by the raspberry, while signals out the peltier to either heat or cool.

EXISTING SYSTEM:

Existing system is a heating/cooling jacket, in which the user can control the temperature through controls and thermo-electric devices that are embedded in the suit. The functionality of the suit is, once turned on, the device displays the temperature of the inside of the suit in an LCD displays. Initiating the hot or cold functions are as simple as pushing a button, and a rotary knob allows the user to control the internal temperature of the suit.

The thermoelectric cooler is a solid state heat pump made of thermocouples of high-efficiency semiconductor material that creates a difference in temperature of its two sides when a voltage is applied and current runs through it. None of the current system contains IoT. Connectivity, Transfer of heat or cold is either through cooper tubes, through thermo conductive fluid. Existing system are all manual, either the jacket is controlled through knobs or on and off switch.
PROPOSED SYSTEM:

The proposed system is a battery power heating and cooling jacket, in which the user can regulate the temperature of the jacket through his mobile. After initialization temperature sensor measures the wearable coat temperature according to person’s surroundings. The jacket to a mobile app via Wi-Fi. The mobile app will display the current body temperature and humidity, we can vary the temperature of the jacket according to user’s need.

OBJECTIVE:

1. The usefulness and practicality of such a suit is the motivating factor of embarking on this project.
2. Ultimately, we set out to achieve a body suit that is easy to wear, comfortable, and provides simple and adequate controls that allow for any user to utilize it to their needs.
3. Its functionalities can be used to prevent the unfortunate condition that are caused by heat stroke, hypothermia, and other thermally induced maladies.

METHODOLOGY:

REQUIREMENTS ANALYSIS:

Hardware Requirements:

1. Raspberry pi
2. Peltier Plate
3. DHT11 Temperature sensor
4. Lithium-ion Polymer Battery
5. Relay
6. Jacket
7. Android Phone

Software Requirements:

1. Apache server
2. Python
3. C
4. PHP

RASPBERRY PI

Raspberry Pi is a series of credit card–sized single-board computers developed in the United Kingdom by the Raspberry Pi Foundation with the intent to promote the teaching of basic computer science in schools and developing countries. The original Raspberry Pi and Raspberry Pi 2 are manufactured in several board configurations.

All models feature a Broadcom system on a chip (SOC) which includes an ARM
compatible CPU and an on chip graphics processing unit GPU (a VideoCore IV). CPU speed range from 700 MHz to 1.2 GHz for the Pi 3 and on board memory range from 256 MB to 1 GB RAMS.

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Secure Digital SD cards are used to store the operating system and program memory in either the SDHC or Micro SDHC sizes. Most boards have between one and four USB slots, HDMI and composite video output, and a 3.5 mm phono jack for audio. Lower level output is provided by a number of GPIO pins which support common protocols like I2C. Some models have an RJ45 Ethernet port and the Pi 3 has on board WiFi 802.11n and Bluetooth.

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PELTIER PLATE

Thermoelectric cooling uses the Peltier effect to create a heat flux between the junctions of two different types of materials. A Peltier cooler, heater, or thermoelectric heat pump is a solid-state active heat pump which transfers heat from one side of the device to the other, with consumption of electrical energy, depending on the direction of the current. Such an instrument is also called a Peltier device, Peltier heat pump, solid state refrigerator, or thermoelectric cooler (TEC). It can be used either for heating or for cooling, although in practice the main application is cooling. It can also be used as a temperature controller that either heats or cools.

A Peltier cooler can also be used as a thermoelectric generator. When operated as a cooler, a voltage is applied across the device, and as a result, a difference in temperature will build up between the two sides. When operated as a generator, one side of the device is heated to a temperature greater than the other side, and as a result, a difference in voltage will build up
between the two sides (the Seebeck effect). However, a well-designed Peltier cooler will be a mediocre thermoelectric generator and vice versa, due to different design and packaging requirements.

**DHT 11 TEMPERATURE SENSOR**

This is a multifunctional sensor that gives you temperature and relative humidity information at the same time. It utilizes a DHT11 sensor that can meet measurement needs of general purposes. It provides reliable readings when environment humidity condition in between 20% RH and 90% RH, and temperature condition in between 0°C and 50°C, covering needs in most home and daily applications that don't contain extreme conditions.

**LITHIUM-ION POLYMER BATTERY**

A lithium polymer battery, or more correctly lithium-ion polymer battery (abbreviated variously as LiPo, LIP, Li-poly and others), is a rechargeable battery of lithium-ion technology in a pouch format. Unlike cylindrical and prismatic cells, LiPos come in a soft package or pouch, which makes them lighter but also less rigid.

The designation "lithium polymer" has caused confusion among battery users because it can be interpreted in two ways.

Originally, "lithium polymer" represented a developing technology using a polymer electrolyte instead of the more common liquid electrolyte. The result is a "plastic" cell, which theoretically could be thin, flexible, and manufactured in different shapes, without risk of electrolyte leakage. The technology has not been fully developed and commercialized and research is ongoing.

**APACHE SERVER**

Tomcat is a Java servlet container and web server from the Jakarta project of the Apache Software Foundation (http://jakarta.apache.org). A web server is, of course, the program that dishes out web pages in response to requests from a user sitting at a web
browser. But web servers aren’t limited to serving up static HTML pages; they can also run programs in response to user requests and return the dynamic results to the user’s browser. This is an aspect of the web that Apache’s Tomcat is very good at because Tomcat provides both Java servlet and Java Server Pages (JSP) technologies (in addition to traditional static pages and external CGI programming). The result is that Tomcat is a good choice for use as a web server for many applications. And it’s a very good choice if you want a free, open source (http://opensource.org/) servlet and JSP engine.

Tomcat can be used stand-alone, but it is often used “behind” traditional web servers such as Apache http, with the traditional server serving static pages and Tomcat serving dynamic servlet and JSP requests.

**PYTHON**

Python is a widely used high-level, general-purpose, interpreted, dynamic programming language. Its design philosophy emphasizes code readability, and its syntax allows programmers to express concepts in fewer lines of code than would be possible in languages such as C++ or Java. The language provides constructs intended to enable clear programs on both a small and large scale. Python supports multiple programming paradigms, including object-oriented, imperative and functional programming or procedural styles. It features a dynamic type system and automatic memory management and has a large and comprehensive standard library.

Python interpreters are available for many operating systems, allowing Python code to run on a wide variety of systems. Using third-party tools, such as Py2exe or Pyinstaller, Python code can be packaged into stand-alone executable programs for some of the most popular operating systems, so Python-based software can be distributed to, and used on, those environments with no need to install a Python interpreter.

CPython, the reference implementation of Python, is free and open-source software and has a community-based development model, as do nearly all of its variant implementations. CPython is managed by the non-profit Python Software Foundation.

Most Python implementations (including CPython) can function as a command line interpreter, for which the user enters statements sequentially and receives the results immediately (read–eval–print loop (REPL)). In short, Python acts as a command-line interface or shell.

Other shells add abilities beyond those in the basic interpreter, including IDLE and IPython. While generally following the visual style of the Python shell, they implement features like auto-completion, session state retention, and syntax highlighting.

**C PROGRAMMING LANGUAGE**

C (/ˈsiː/, as in the letter c) is a general-purpose, imperative computer programming language, supporting structured programming, lexical variable scope and recursion, while a static type system prevents many unintended operations. By design, C provides constructs that map efficiently to typical machine instructions, and therefore it has found lasting use in applications
that had formerly been coded in assembly language, including operating systems, as well as various application software for computers ranging from supercomputers to embedded systems.

C is an imperative (procedural) language. It was designed to be compiled using a relatively straightforward compiler, to provide low-level access to memory, to provide language constructs that map efficiently to machine instructions, and to require minimal run-time support. C was therefore useful for many applications that had formerly been coded in assembly language, such as in system programming.

Despite its low-level capabilities, the language was designed to encourage cross-platform programming. A standards-compliant and portably written C program can be compiled for a very wide variety of computer platforms and operating systems with few changes to its source code. The language has become available on a very wide range of platforms, from embedded microcontrollers to supercomputers.

**PHP**

PHP is a server-side scripting language designed for web development but also used as a general-purpose programming language. Originally created by Rasmus Lerdorf in 1994, the PHP reference implementation is now produced by The PHP Group. PHP originally stood for Personal Home Page, but it now stands for the recursive backronym PHP: Hypertext Preprocessor.

PHP code may be embedded into HTML code, or it can be used in combination with various web template systems, web content management system and web frameworks. PHP code is usually processed by a PHP interpreter implemented as a module in the web server or as a Common Gateway Interface (CGI) executable. The web server combines the results of the interpreted and executed PHP code, which may be any type of data, including images, with the generated web page. PHP code may also be executed with a command-line interface (CLI) and can be used to implement standalone graphical applications.

**PROPOSED ARCHITECTURE:**

As shown in below figure, powers the raspberry and the suit which can be controlled by button. Mobile is connected to Raspberry via Wi-Fi module. Temperature sensor DHT11 is used to assess the body temperature. The heating and cooling functionality of the peltier plate can be controlled through replays.
RESULT AND DISCUSSION:
The above figure represents the electronic part of the suit, where the mobile app operates the heating and cooling operation.

The above figure represents the modeling of the peltier plate inside the suit, LDPE is used as an thermal insulator and copper sheet is used for transfer of heat across the body.

The above figure represents cooling unit of the suit, the peltier plate is cooled using cpu cooler.
The above figure represents user interface, were the user can control the heating and cooling functionality of the suit. The user can see the temperature and humidity of the suit.

ADVANTAGES:

- The jacket can be easily controlled by a mobile app.
- As our electronic gadget runs on battery, it is a portable and easy to use.
- The jacket is easy to wash, as the electrical parts detachable.
- It can be used to people who are exposed to the scorching summer sun like the policeman or the industrial worker whose work environment is often a high-temperature one.
- Portable jacket will help us to have an optimal Temperature all the time.
- Suit can be used to monitor the temperature, humidity of the patients in hospitals.
- Suit can also be used to for the old people who are susceptible to temperature change.
- Soldiers generally face extreme Cold and Hot conditions, the suit can be used to comfort the soldiers in these regions.

DISADVANTAGES:

- Limited battery resource.
- Slow cooling action.
- Jacket in operation for two hours.
CONCLUSION:

In this paper gadget with multi features for different applications describes the integration of new technologies, offering ease of maintenance. By implementing this project the wearable, washable and portable jacket is used to monitor and maintain the body temperature conditions of user according to surrounding environments of that user. And also we can enhance this project in future for medical applications and to track the person with the help GPS.

FUTURE SCOPE:

The future scope of our project is to make it washable, light weight. Decrease the weight of the equipment’s and jackets much further adding pulse monitoring system and GPS location system to the implement. Decreasing the cost of equipment used and make it affordable to the common users.