IJARCCE

ISSN (Online) 2278-1021
ISSN (Print) 2319-5940

International Journal of Advanced Research in Computer and Communication Engineering

Vol. 9, Issue 5, May 2020

Automatic Fever and Body Temperature Control without Medicine

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Abstract: The Main objective of the project we have designed is to remove or improve the old wet towel method that has been used for controlling the body temperature from earlier times because it may cause many allergic diseases. Automatic body temperature controller is revolutionary fever control system which can reduce temperature effectively without interrupting the function that fever can do with bacterial infection. This system controls the body temperature with the help of advanced cooling pads and it may have one or more advance cooling pads. This project contains temperature sensors, peltier module, cooling pads and intelligent circuit that can work cooperatively with other pads if we use more than one. It decreases human body temperature externally by the help of latest technology.

Keywords: Peltier Module, ATMEGA 328, Cooling Pads, LCD, Fever Control

I. INTRODUCTION

When your body temperature rises because of an infection, it's called a fever. Fevers are caused by chemicals called Pyrogens flowing in the bloodstream. Pyrogens make their way to the hypothalamus in the brain, which is in charge of regulating body temperature [6]. When pyrogens bind to certain receptors in the hypothalamus, body temperature rises. The hypothalamus is a small region of the brain. It's located at the base of the brain, near the. While it's very small, the hypothalamus plays a crucial role in many important functions, including:

• Releasing hormones
• Regulating body temperature
• Maintaining daily physiological cycles

Pyrogens are fever-inducing substances usually derived from microorganism when present systemically in sufficient quantity can lead to severe signs of inflammation, shock, multi organ failure, and sometimes even death in humans. One common pyrogen is called Interleukin-1 (IL-1).[2] IL-1 is produced by white blood cells called macrophages when they come into contact with certain bacteria and viruses. IL-1 has multiple purposes, one of which is to signal other white blood cells, called helper T cells, into action. One purpose of a fever is thought to be to raise the body's temperature enough to kill off certain bacteria and viruses sensitive to temperature changes.[3] One interesting debate right now, therefore, is, "Should you lower a fever?" Aspirin, for example, will reduce fever; but if the fever is actually helping rid the body of infection, then lowering it might not be a good idea. On the other hand, people sometimes die from fever. Right now the general medical consensus falls on the "reduce the fever" side of the fence. Sometimes medication for normal fever may harm the internal organs like liver. But access heat generated by fever may affect the brain functioning properly. It is physically control body temperature without interrupt fever functions. Internal control of fever by medicine like aspirin may cause harm to the children and have very serious problem. Sick person direct use it and once it started it does not need any type of monitoring it is fully automatic.[1]

II. METHEDOLOGY

The objective is clearer due to the data and information has been collected from the previous literature. As we discussed above this is the revolutionary automatic machine that control body temperature and fever without medicine. The design model shows the prototypes, elements, architecture and components of the system. However, in order to make this project successful all the elements and hardware components were well integrated and structured.
Following are the main components of the project.

- PELTIER MODULE:

Thermoelectric heaters and coolers are widespread – from the cooling of the CCD (Charge-Coupled Device) image sensors in telescopes and cameras to reduce thermal noise to the camping fridge that can be run from a car battery. A

IJARCCE
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discovery by French physicist, Jean Charles Peltier, was crucial for enabling these devices. The Peltier effect is a temperature difference created by applying a voltage between two electrodes connected to a sample of semiconductor material. This phenomenon can be useful when it is necessary to transfer heat from one medium to another on a small scale. Peltier devices in spacecraft and satellites absorb the heat of direct sunlight and then dissipate it from the shaded side. Peltier coolers can also be used to remove heat from vital parts within a PC without the danger of liquids damaging the electronics. The Peltier device is clamped to the top of the main processor to extract heat away from the billions of transistors beneath it. Other uses include dehumidifiers and sensors to measure the heat flow through walls of buildings.

Fig. 1 Peltier Module

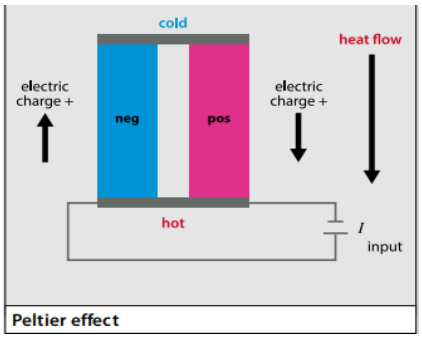

Fig. 2 Peltier Working

- ATMEGA 328

The ATmega328 is a single-chip microcontroller created by Atmel in the megaAVR family (later Microchip Technology acquired Atmel in 2016). It has a modified Harvard architecture 8-bit RISC processor core. As of 2013 the ATmega328 is commonly used in many projects and autonomous systems where a simple, low-powered, low-cost micro-controller is needed.

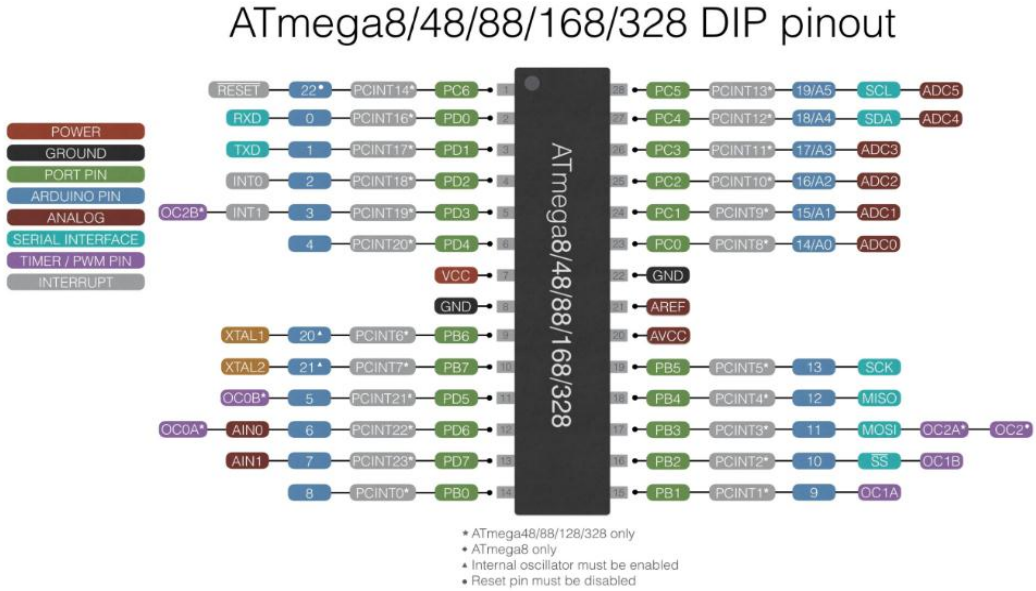

Fig. 3 Atmega328 pin configuration

- TEMPERATURE SENSOR

DS18B20 is 1-Wire digital temperature sensor from Maxim IC. It reports degrees in Celsius with 9 to 12-bit precision, from -55 to 125 (+/-0.5). Each sensor has a unique 64-Bit Serial number etched into it - allows for a huge number of sensors to be used on one data bus.

Features:

- Unique 1-Wire® interface requires only one port pin for communication
- Each device has a unique 64-bit serial code stored in an onboard ROM
- Multidrop capability simplifies distributed temperature sensing applications
- Requires no external components
- Can be powered from data line.
- Power supply range is 3.0V to 5.5V
- Measures temperatures from –55°C to +125°C (–67°F to +257°F)±0.5°C accuracy from –10°C to +85°C

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- Thermometer resolution is user-selectable from 9 to 12 bits
- Converts temperature to 12-bit digital word in 750ms (max.)
- User-definable nonvolatile (NV) alarm settings

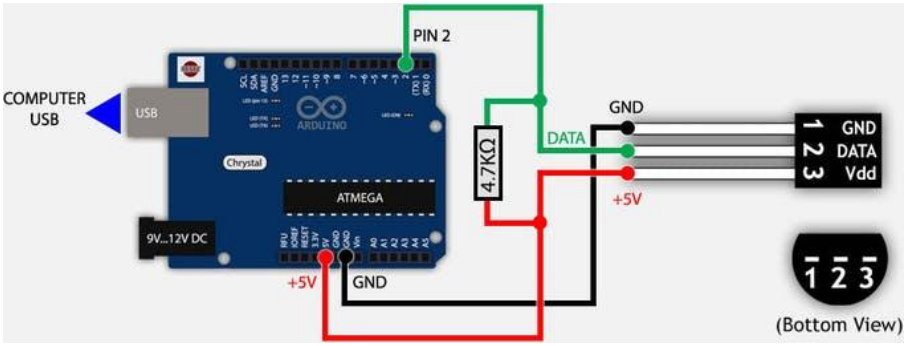

Fig. 4 DS18B20 temperature sensor connection with Arduino nano

- LCD DISPLAY

A liquid crystal display is a flat panel display or other electronically modulated optical device that uses the light modulating properties of crystal combined with polarizers. Liquid crystal do not emit light directly, instead using a backlight or reflector to produces images in colour .Here we use 16*2 LCD display

Fig. 5 LCD display

III.WORKING

As we discussed above, this system has one or more advanced cooling pads (Cooling gel sheets are designed to be single-use products that are placed on the forehead to provide cooling relief that can assist in reducing a fever, as well as providing relief in the event of headaches and migraines). Each pad is connected with motor which provide cold water that is cooled by the peltier module. Arduino Nano has a preset human body temperature limits (normal temperature).

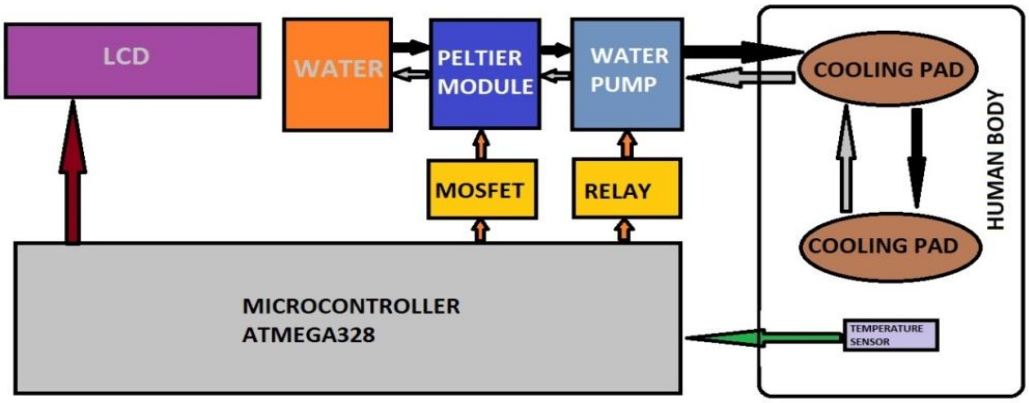

Fig. 6 Block Diagram

It is physically control body temperature without interrupt fever functions. First of all we have to put cooling pad to our desired location on body like hands, feet, head etc then the temperature sensors is placed near the cooling pad to record the temperature which is directly connected to the body, the cooling pad is connected to circuit and start cooling by the help of peltier module which provide cold water to the to the pads. Process is continued till body temperature is reduced

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to the normal then peltier module is automatically stop. The intelligent circuitary contains combination of sensors, microcontroller, relays, regulators and other electronic devices. We use distilled water because normal water can block the peltier module. When the cooling pads are placed on body then they detect the body temperature and the temperature is displayed by LCD. If the temperature is high then the set range of normal temperature then the system starts working and it starts cooling and keeps cooling till the temperature is lowered down to the normal temperature.

IV. RESULTS AND DISCUSSION

The objectives being taken are fulfilled successfully and we have designed a prototype which successfully reduces body temperature and control fever automatically. We place cooling pad on any desired locations of body like palm, forehead etc. The temperature sensor is placed near the cooling pad so it gives accurate response and the body temperature is displayed on LCD. We have set ranges of temperature signifying conditions of body temperature-

- Body Temperature < 35°C: Hypothermia
- Body Temperature 35°C to 38°C: No fever
- Body Temperature 38°C to 40°C: Fever
- Body Temperature > 40°C: Hyperthermia

When the body temperature is detected to be lower than 35°C then in this situation the Hypothermia is displayed on the LCD which signifies that the person needs to contact doctor as the body temperature is very low. When the body temperature is found to be above 40°C then the Hyperthermia is displayed on LCD and buzzer rings as this is the critical situation of the person in which the person needs to consult doctor immediately to prevent damage to body as the body temperature is increased alot and person is at risk. Temperature range 35°C to 38°C is considered of normal body temperature and in this condition No Fever is displayed on LCD. When the body temperature is found in between 38°C to 40°C then this situation is considered of the fever and the LCD displays Fever along with temperature as shown in Fig. 7 and Fig. 8. In this situation, the peltier module starts cooling the body with the help of cooling pads and this lowers down the body temperature slowly. When the body temperature reaches to normal body temperature range i.e. below 38°C then the peltier module stops working automatically and a message is displayed on LCD as shown in Fig. 9. The complete set up of this project is shown in Fig. 10. The project takes some minutes to reduce temperature but the peltier module cools water very fast.

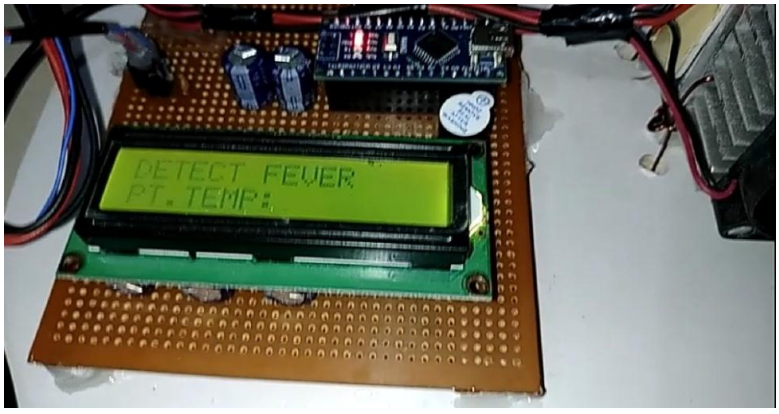

Fig. 7 Detecting fever

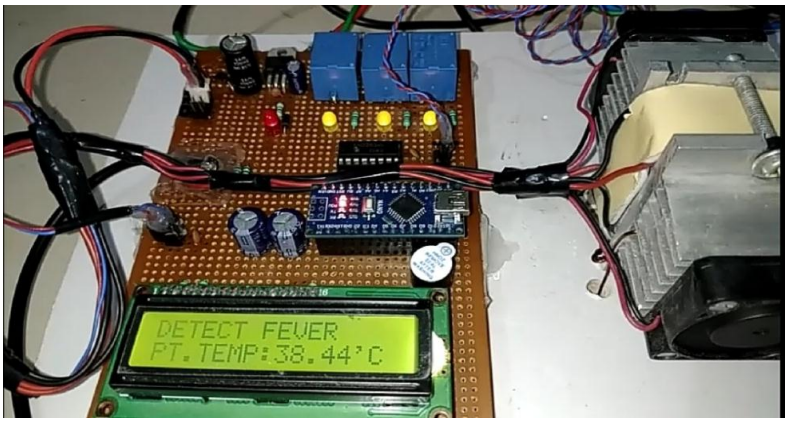

Fig. 8 Displaying Temperature of the body

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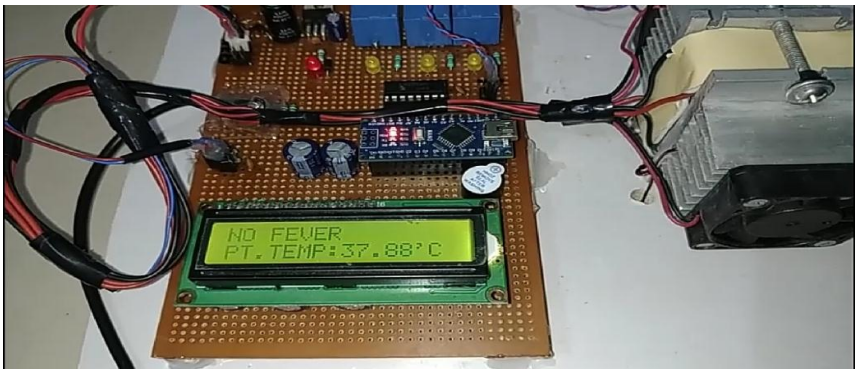

Fig. 9 Peltier module at the average temperature

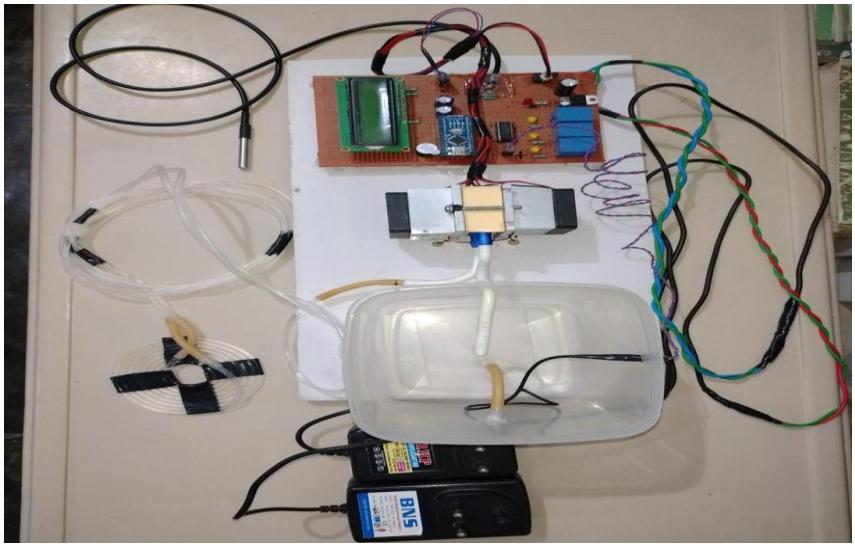

Fig. 10 Prototype of the Project

V. CONCLUSION

Advanced automatic fever and body temperature control machine is designed to make the procedure of cooling down the body temperature easier without taking too much medicines that usually harm the body organs if it is overdosed and the main purpose of making this machine is to replace the old wet towel method that we used because sometimes if we use this method too much to the babies, it causes many allergic diseases ,viral infection such as flu or chickenpox using and the child feels uncomfortable, all the time one person is required to carried out this process. So to overcome all these drawbacks we made research to lower the fever and made a system which lowers the fever without creating any irritation with help of cooling pads, temperature sensors and other circuitry used for its working.

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