Temperature monitoring and controlling device.

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Abstract

This report shows a simple microcontroller based temperature monitoring and controlling device using a LM35 sensor. LM35 is a temperature sensor, its output voltage increases with temperature. Using this property of the sensor we can monitor and control temperature with the help of display LED and microcontroller.

Introduction

Temperature measurement and controlling is one of the very important parameters of any system. There is a optimum temperature for each and every system. As the system works and heat emits , temperature of the system increases. we need to monitor and control it.

Our device measures and monitor the temperature with microcontroller and LED display. It controls it through microcontroller and it is programmed in such a way that whenever the temperature reaches beyond the set level it starts the DC fan provided.

Equipments

1. Aurdino Uno R3.
2. LM35 sensor.
3. DC fan(5V).
4. LCD Disply(16*2).
5. LED lights.
6. Buzzer

Component details

Aurdino Uno R3

The Arduino Uno is a microcontroller board based on the ATmega328. 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. Revision 2 of the Uno board has a resistor pulling the 8U2 HWB line to ground, making it easier to put into DFU mode. Revision 3 of the board has the following new features:

- 1.0 pinout: 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 with both the board that uses the AVR, which operates with 5V and with the Arduino Due that operates 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.

LM35

- Calibrated directly in ° Celsius (Centigrade)
- Linear + 10.0 mV/°C scale factor
- 0.5°C accuracy guaranteeable (at +25°C)
- Rated for full −55° to +150°C range
- Suitable for remote applications
- Low cost due to wafer-level trimming
- Operates from 4 to 30 volts
- Less than 60 µA current drain
- Low self-heating, 0.08°C in still air
- Nonlinearity only ±1⁄4°C typical
- Low impedance output, 0.1 Ω for 1 mA load

LCD Display(16*2)

A **Liquid crystal display** (**LCD**) is a flat display that uses the light modulating properties of liquid display.They are common in consumer devices such as video players, gaming devices, clocks,telephones,computers,calculators etc.

A (16x2) LCD panel consists of 16 coulums and 2 rows.It can show upto 16 characters in 2 lines.

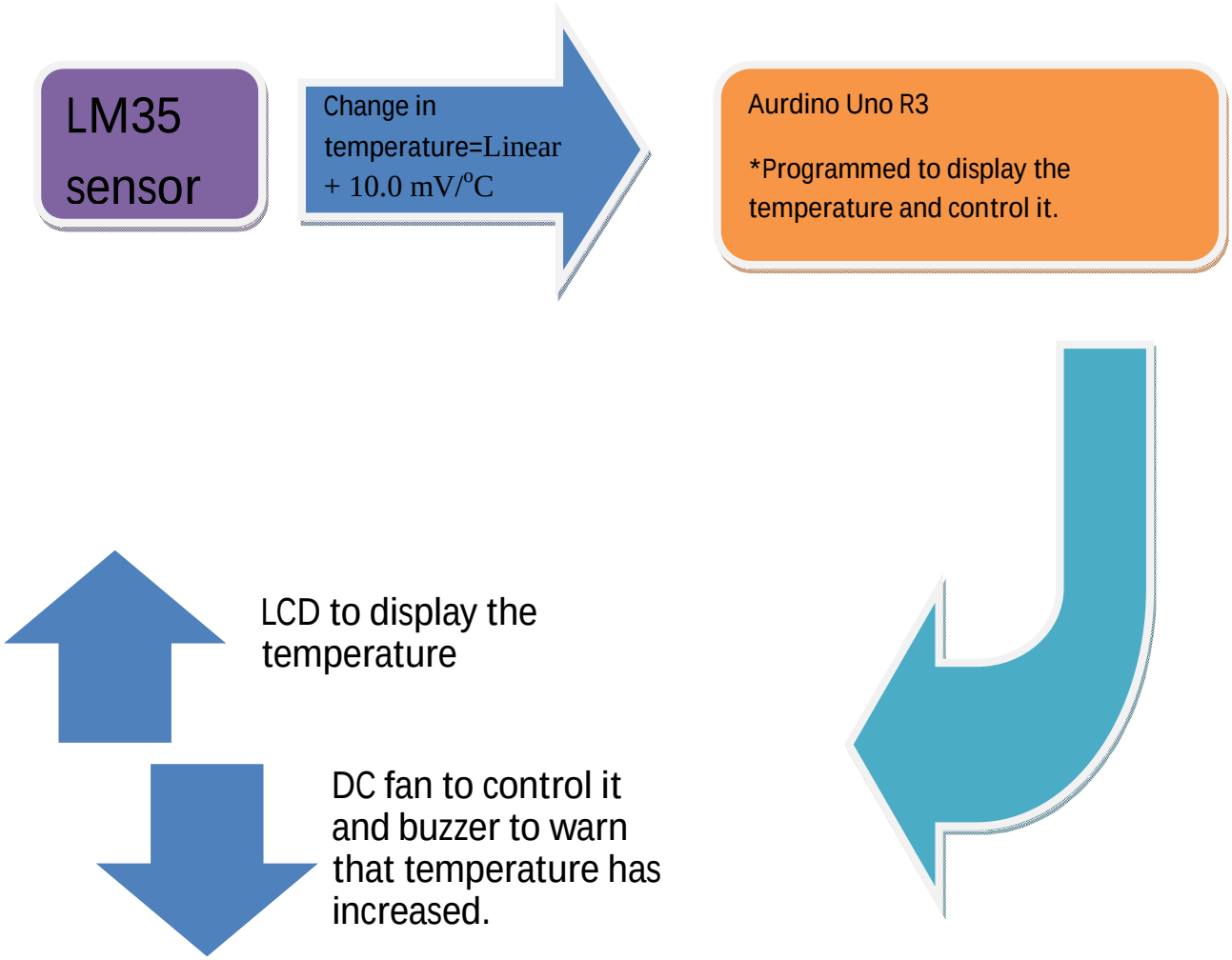
DC fan(5V)

Basically a 5volt dc motor.

Buzzer

It beeps when temperature reaches beyond level.

Working procedure



LM35 sensor senses temperature. With each degree change in temperature the voltage output increases by 10 mV. Microcontroller is programmed in such a way that it converts this change in voltage in temperature reading and sends the signal to the LCD display unit and it shows the temperature.

Circuit diagram

Code for microcontroller

- #include <LiquidCrystal.h>

  // initialize the library with the numbers of the interface pins LiquidCrystal lcd(10, 9, 5, 4, 3, 2);

  void setup()

  {

  // set up the LCD's number of columns and rows:

  lcd.begin(16, 2);

  pinMode (8,OUTPUT);

  pinMode (11,OUTPUT);

  }

  void loop()

  {

  float temp;

  temp = (4.2 * analogRead(A0) * 100.0) / 1024;

  lcd.setCursor(0,0);

  lcd.print("TEMP : ");

  lcd.setCursor(8,0);

  lcd.print(temp);

  if (temp>30)

  {digitalWrite (8,HIGH);

  digitalWrite (11,HIGH);

  delay (500);

```
digitalWrite (11,LOW);
 delay (500);
}
else {digitalWrite (8,LOW);
digitalWrite (11,LOW);}
 }
```

Output

When LM35 senses the temperature by any means, say if we put a finger on it senses the temperature of our body and increases the voltage output. Microcontroller converts this voltage output in readable temperature reading and the LCD monitor just shows it. For controlling the temperature when the temperature reaches beyond our given level , microcontroller just increases the voltage for the dc fan . So the fan starts and controls the temperature. Meanwhile it increases the voltage of the buzzer to, so it beeps and warns.

Our future plan with this project

In our daily life increasing heat has become uncomfortable. Here we are using our project to control temperature of a small system using a small dc fan. But we can use this type of circuit to control temperature over a huge system, where we can trigger a huge temperature controlling or decreasing device instead of a dc fan. We can cut of the power if the temperature further increases.

Project images

Conclusion

We described a temperature monitoring and controlling device for small system above. It can be used in a personal computer as an automatic cooler fan. Or it can be used as a exhaust fan of kitchen. A lot more use can be introduced.