INDUSTRIAL TRAINING PROJECT REPORT

Project Title: Automatic switching of the fan based on room temperature read the temperature. If the temperature is >30C then switch on the fan (motor).

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

NATIONAL INSTITUTE OF TECHNOLOGY SRINAGAR

Hazratbal, Srinagar Jammu and Kashmir, 190006, India

Name Of The Organisaation

Acmegrade

TRAING AND INTERNSHIP DONE ON IOT (ARDUINO) UNDR THE GUIDANCE OF

Trainer`s Name: Swathi Chitta and Challa Rohit

CERTIFICATE OF ORIGINALIT

The project report titled "**TEMPERATURE BASED FAN SPEED CONTROLLER** " prepared by **Sudhir Kumar Singh , Roll No: 2021BECE073**; is hereby approved and certified as a creditable study in technological subjects performed in a way sufficient for its acceptance for partial fulfilment of the degree for which it is submitted. It is to be understood that by this approval, the undersigned do not, necessarily endorse or approve any statement made, opinion expressed or conclusion drawn therein but approve the project only for the purpose for which it is submitted. Mrs. Swathi

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NO: NIT/T&P/INTP/2023-24/BECE/053
Date: 30-10-2023

TO WHOM IT MAY CONCERN

Subject: **Permission of Internship online/offline for student of NIT Srinagar.**

In – Plant/on–the –project internship/Practical Training is an important part of our engineering curriculum. This internship/training is regarded as a vital component of engineering education and is an indicator of extent of field experience, which is very essential for attaining excellence in the technical education. In this context, **Mr. /Ms. Sudhir Kumar,** Enrolment No: **2021BECE073** pursuing B. Tech in ELECTRONICS & COMMUNICATIONS ENGINEERING DEPARTMENT (2021-2025) in this Institute has completed his/her 4th semester of the degree (pursuing 5thsemester) and is interested in 45 days internship in your esteemed organization.

It will be highly appreciated if your organization provides him/her a chance to get an exposure to some project related to him/her branch of engineering online/offline that is being carried out by your organization during winter vacation from 20th December 2023 to 15th February 2024.

We fervently hope that you will accede to our request and allow him/her to pursue him/her internship in your esteemed organization. The student has been advised to abide by the rules and regulation of your organization. Also, the student has to submit completion report and certificate in the training & placement department after completion of the internship, failing this his/her internship will be deemed incomplete.

Associate TPO (Internships)
Training and Placement
NIT Srinagar

Associate TPO (Internships)
Training & Placement Department
National Institute of Technology
Srinagar, J&K

RECOMMENDATION

I hereby recommend that the project report titled "**TEMPERATURE BASED FAN SPEED CONTROLLER ”** prepared by **Sudhir Kumar Singh, Roll No: 2021BECE073**, be accepted in partial fulfillment of the requirement for the Degree of Bachelor of Technology in Electronics and Communication Engineering, National Institute of Technology.Srinagar.

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ACKNOWLEDGEMENT

It is a great privilege for us to express our profound gratitude to our respected Swathi Chitta, **Acmegrade**, for his constant guidance, valuable suggestions, supervision and inspiration throughout the course work without which it would have been difficult to complete the work within scheduled time. We would like to express our gratitude towards Mrs Swathi Chitta for his/her kind co-operation and encouragement which helped me in completion of this project. We are also indebted to the Head of the Department, Acmegrade for permitting us to pursue the project. We would like to take this opportunity to thank all the respected teachers of this department for being a perennial source of inspiration and showing the right path at the time of necessity.

1 ABSTRACT

This project is a standalone automatic switching of the fan based on room temperature of an electric fan according to our requirement. Use of embedded technology makes this closed loop feedback control system efficient and reliable. Microcontroller (ATMega8 / 168 / 328) allows dynamic and faster control. Liquid crystal display (LCD) makes the system user-friendly. The sensed temperature and fan speed level values are simultaneously displayed on the LCD panel. It is very compact using few components and can be implemented for several applications including air-conditioners, water heaters, snow-melters, ovens, heat-exchangers, mixers, furnaces, incubators, thermal baths and veterinary operating tables. ARDUINO micro controller is the heart of the circuit as it controls all the functions. The temperature sensor LM35 senses the temperature and converts it into an electrical (analog) signal, which is applied to the microcontroller. The sensed and set values of the temperature are displayed on the 16x2-line LCD. The micro controller drives Transistor to control the fan speed. This project uses regulated 12V, 2A power supply. This project is useful in process industries for maintenance and controlling of Boilers temperature

2 INTRODUCTION

With the advancement in technology, intelligent systems introduced every day. Everything is getting more sophisticated and intelligible.There is an increase in the demand of cutting edge technology and smart electronic systems. Microcontrollers play a very important role in the development of the smart systems as brain is given to the system. Microcontrollers have become the heart of the new technologies that are being introduced daily. A microcontroller is mainly a single chip microprocessor suited for control and automation of machines and processes. Today, microcontrollers are used in many disciplines of life for carrying out automated tasks in a more accurate manner. Almost every modern day device including air conditioners, power tools, toys, office machines employ microcontrollers for their operation. Microcontroller essentially consists of Central Processing Unit (CPU), timers and counters, interrupts, memory, input/output ports, analog to digital converters (ADC) on a single chip. With this single chip integrated circuit design of the microcontroller the size of control board is reduced and power consumption is low. This project presents the design and simulation of the fan speed control system using PWM technique based on the room temperature. A temperature sensor has been used to measure the temperature of the room and the speed of the fan is varied according to the room temperature using PWM technique. The duty cycle is varied from 0 to 100 to control the fan speed depending upon the room temperature, which is displayed on Liquid Crystal Display.

3 TECHNICAL SKILLS

Introduction:

Overview

Scope & Application

Production concept

Challenges

Concepts in Microcontroller

Layer of IOT

What is microcontroller?

ATMega 328p

Architecture and block

Arduino

What is Arduino and working of Arduino?

Integration of scensors and actuators

DC motors , servo and stepper motors

Arduino IDE

Variables,Keywords and structures

Operators and functions

Wireless Communications

I2C SPI Bluetooth Wi-Fi Zigbee Introduction of TCP & UDP Difference B/W TCP/UDP Transport layer protocal

Cloud

Data acquisition from sensors

Establish HTTPS

Send Data to ThingSpeak rest API over http

Create rules in ThingSpeak

Other Platforms

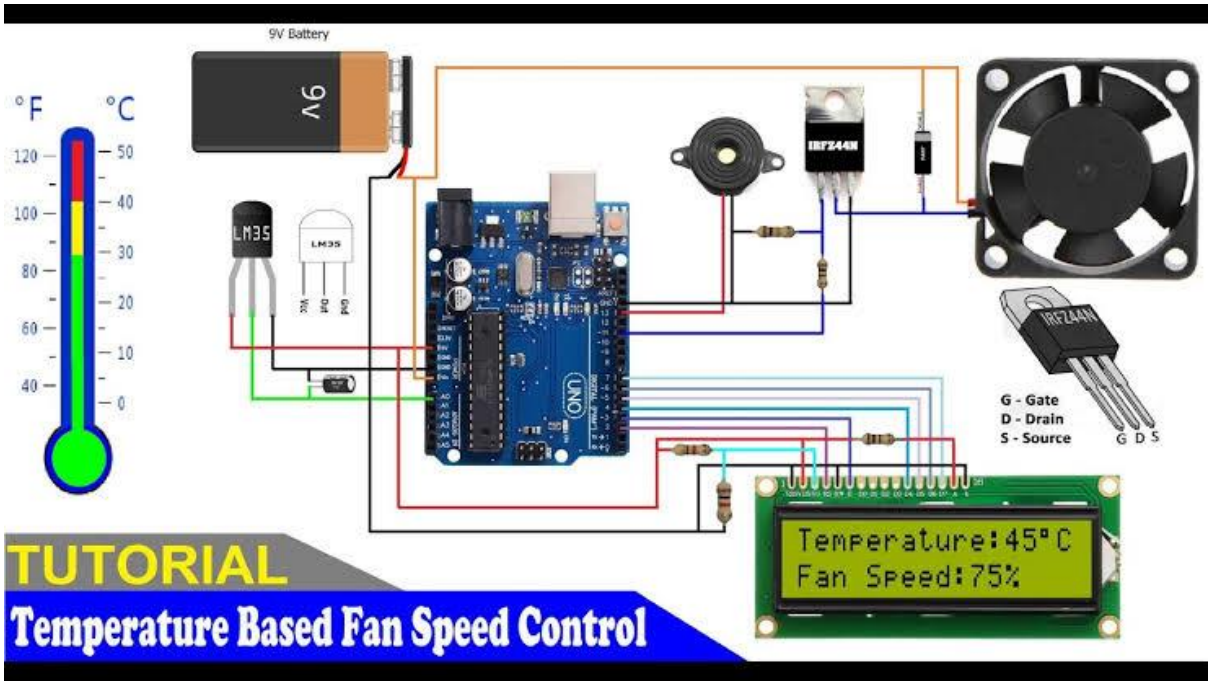
IFTTT

MQTT

4 *DESCRIPTION*

The temperature-based on switching fan speed control system can be done by using an electronic circuit using an Arduino board. Now Arduino board is very progressive among all electronic circuits, thus we employed Arduino board for fan speed control.The proposed system is designed to detect the temperature of the room and send that information to the Arduino board. Then the Arduino board executes the contrast of current temperature and set temperature based on the inbuilt program of the Arduino. The outcome obtained from the operation is given through the o/p port of an Arduino board to the LCD display of related data. The generated pulses from the board which is further fed to the driver circuit to get the preferred output to the

5 BLOCK DIAGRAM



6 NAME OF COMPONENT

1: Arduino Uno

2: 16x2 LCD Display

3: LM35 Temperature sensor

4: IRFz44N Mosfet

5: 12v DC Fan and 12v Buzzer

6: 4.7k,1k and 10k Resistor

7: 10uf capacitor

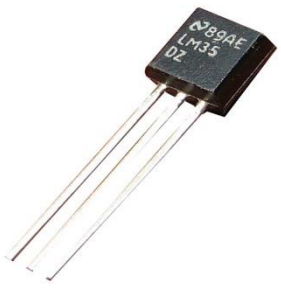
8: Male to Male Jumper Wires

9: Battery 9v

10: Battery clip

Temperature Sensor:

We are using LM 35 as temperature sensor. LM 35 is a precision temperature sensor whose output is linearly proportional to Celsius Temperature. The LM35 is rated to operate from -55° Centigrade 150° Centigrade with a linear scale factor of +10mv/° C



7 Pin Description:

Pin No	Function	Name
1	Ground (0V)	Ground
2	Supply voltage; 5V (4.7V – 5.3V)	Vcc
3	Contrast adjustment; through a variable	V_{EE}
4	Selects command register when low; and data Register when high	Register Select
5	Low to write to the register; High to read From the register	Read/write
6	Sends data to data pins when a high to low pulse is given	Enable
7	8-bit data pins	DB0
8	8-bit data pins	DB1
9	8- bit data pins	DB2
10	8-bit data pins	DB3
11	8-bit data pins	DB4
12	8-bit data pins	DB5

13	8-bit data pins	
DB6		
14	8-bit data pins	
DB7		
15	Backlight VCC (5V)	
Led+		
16	Backlight Ground (0V)	
Led-		

General Pin functions:

- **LED:** There is a built-in LED driven by digital pin 13. When the pin is HIGH value, the LED is on, when the pin is LOW, it's off.
- **VIN:** The input voltage to the Arduino/Genuino board when it's using an external power source (as opposed to 5 volts from the USB connection or other regulated power source). You can supply voltage through this pin, or, if supplying voltage via the power jack, access it through this pin.
- **5V:** This pin outputs a regulated 5V from the regulator on the board. The board can be suppliedwith power either from the DC power jack (7 - 20V), the USB connector (5V), or the VIN pin of the board (7-20V). Supplying voltage via the 5V or 3.3V pins bypasses the regulator, and can damage the board.
- **3V3:** A 3.3 volt supply generated by the on-board regulator. Maximum current draw is 50 mA.
- **GND:** Ground pins.
- **IOREF:** This pin on the Arduino/Genuino board provides the voltage reference with which the microcontroller operates. A properly configured shield can read the IOREF pin voltage and select the appropriate power source or enable voltage translators on the outputs to work with the 5V or 3.3V.
- **Reset:** Typically used to add a reset button to shields which block the one on the board.

SPECIAL PIN FUNCTIONS

Each of the 14 digital pins and 6 Analog pins on the Uno can be used as an input or output, using pinMode(),digitalWrite(), and digitalRead() functions. They operate at 5 volts. Each pin can provide or receive 20 mA as recommended operating condition and has an internal pull-up resistor (disconnected by default) of 20-50k ohm. A maximum of 40mA is the value that must not be exceeded on any I/O pin to avoid permanent damage to the microcontroller.The Uno has 6 analog inputs, labeled A0 through A5, each of which provide 10 bits of resolution (i.e. 1024 different values). By default they measure from ground to 5 volts, though is it possible to change the upper end of their range using the AREF pin and the analogReference() function.

In addition, some pins have specialized functions:

- **Serial:** pins 0 (RX) and 1 (TX). Used to receive (RX) and transmit (TX) TTL serial data. These pins are connected to the corresponding pins of the ATmega8U2 USB-to-TTL Serial chip.

- **External Interrupts:** pins 2 and 3. These pins can be configured to trigger an interrupt on a low value, a rising or falling edge, or a change in value.

- **PWM** (Pulse Width Modulation) 3, 5, 6, 9, 10, and 11 Can provide 8-bit PWM output with the analogWrite() function.

- **SPI** (Serial Peripheral Interface): 10 (SS), 11 (MOSI), 12 (MISO), 13 (SCK). These pins support SPI communication using the SPI library.

- **TWI** (Two Wire Interface): A4 or SDA pin and A5 or SCL pin. Support TWI communication using the Wire library.

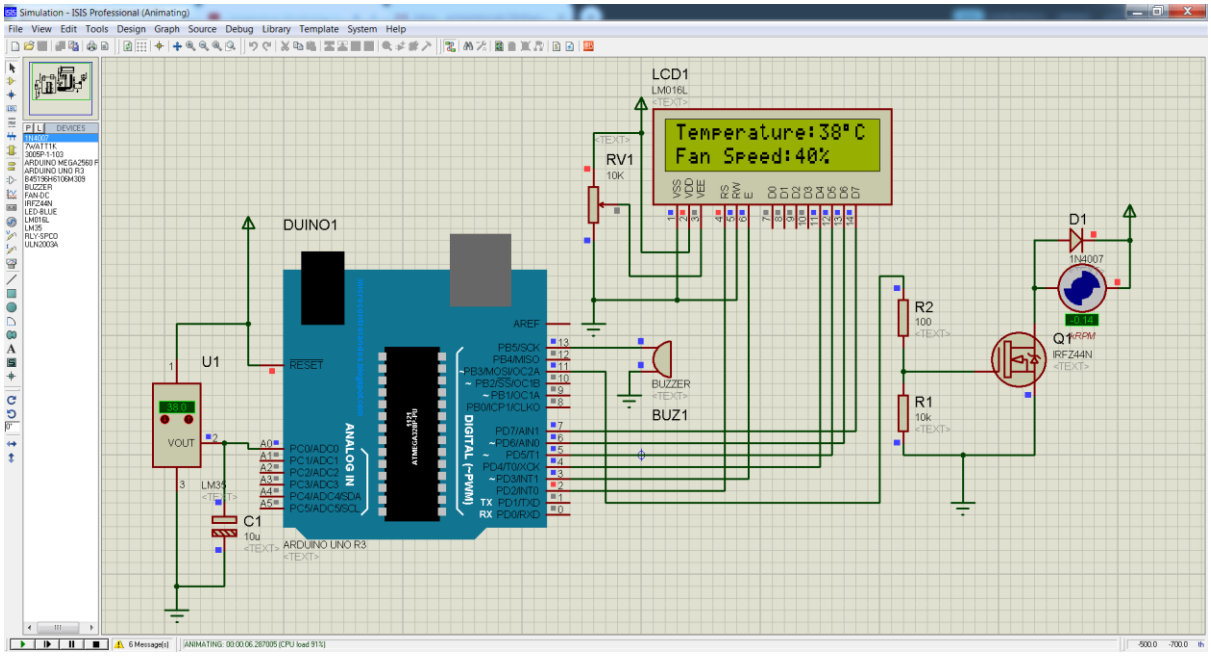
- **AREF** (Analog REFerence: Reference voltage for the analog inputs.

Automatic (Software) Reset:

Rather than requiring a physical press of the reset button before an upload, the Arduino/Genuino Uno board is designed in a way that allows it to be reset by software running on a connected computer. One of the hardware flow control lines (DTR) of the ATmega8U2/16U2 is connected to the reset line of the ATmega328 via a 100 nanofarad capacitor. When this line is asserted (taken low), the reset line drops long enough to reset the chip.

This setup has other implications. When the Uno is connected to either a computer running Mac OS X or Linux, it resets each time a connection is made to it from software (via USB). For the following half-second or so, the bootloader is running on the Uno. While it is programmed to ignore malformed data (i.e. anything besides an upload of new code), it will intercept the first few bytes of data sent to the board after a connection is opened.

8 Description of Components Circuit Diagram



9 SOURCE CODE

```
#include <LiquidCrystal.h>
LiquidCrystal lcd(2,3,4,5,6,7);
int tempPin = A0;   // the output pin of LM35
int fan = 11;       // the pin where fan is
int buzzer = 13;    // buzzer pin
int temp;
int tempMin = 30;   // the temperature to start the fan
int tempMax = 50;   // the maximum temperature when fan is at 100%
int fanSpeed;
int fanLCD;

void setup() {
  pinMode(fan, OUTPUT);
  pinMode(buzzer, OUTPUT);
  pinMode(tempPin, INPUT);
  lcd.begin(16,2);
  lcd.setCursor(0,0);
  lcd.print(" WELCOME To  My ");
  lcd.setCursor(0,1);
  lcd.print("Channel  YouTube");
  delay(2000);
  lcd.clear();
}
```

```
void loop() {
  temp = readTemp();     // get the temperature

  if((temp >= tempMin) && (temp <= tempMax)) {  // if temperature is higher than minimum temp
     fanSpeed = map(temp, tempMin, tempMax, 32, 255); // the actual speed of fan
     fanLCD = map(temp, tempMin, tempMax, 0, 100);  // speed of fan to display on LCD
     analogWrite(fan, fanSpeed);  // spin the fan at the fanSpeed speed
  }

  if(temp < tempMin) {   // if temp is lower than minimum temp
   fanSpeed = 0;      // fan is not spinning
   fanLCD = 0;
   digitalWrite(fan, LOW);
  }

  if(temp > tempMax) {       // if temp is higher than tempMax
   digitalWrite(fan, HIGH);
   digitalWrite(buzzer, HIGH);  // turn on buzzer
  } else {                  // else turn of bubber
    digitalWrite(buzzer, LOW);
  }
```

```
  lcd.setCursor(0,0);
  lcd.print("Temperature:");
  lcd.print(temp); // display the temperature
  lcd.write(223);
  lcd.print("C  ");

  lcd.setCursor(0,1); // move cursor to next line
  lcd.print("Fan Speed:");
  lcd.print(fanLCD); // display the fan speed
  lcd.print("%   ");
  delay(200);
}

int readTemp() {  // get the temperature and convert it to Celsius
  temp = analogRead(tempPin);
  return temp * 0.48828125;
}
```

10 Application:

1. Temperature based fan speed controller is useful for cooling the processor in the laptops and personal computers “more efficiently”. Generally fan in laptop comes with only two or three possible speeds. So it results in more power consumption. 2. The fan designed in this project, has different values of speed according to temperature change. This can be also used in small scale industries for cooling the electrical/mechanical equipment. The whole circuit except motor and fan can be manufactured on a single PCB, and it can be used for temperature based control operations.

Advantages:

1. This project can be used in Home.

2. This project can be used in Industry.

3. This will help in saving the energy / electricity.

4. To monitor the environments that is not comfortable, or possible, for humans to monitor, especially for extended periods of time.

5. Prevents waste of energy when it’s not hot enough for a fan to be needed.

6. To assist people who are disabled to adjust the fan speed automatically.

Disadvantages:

1. It can only be maintained by technical person. Thus, it becomes difficult to be maintained.
2. Due to temperature variation, after sometimes its efficiency may decrease.

Future Scope:

1. We can monitor more parameters like humidity, light and at the same time control them.
2. We can send this data to a remote location using mobile or internet.
3. We can draw graphs of variations in these parameters using computer.
4. When temperature exceeds the limit, a call will be dialed to the respective given number by an automatic Dialer system.

11 REFERENCES

https://www.arduino.cc/en/Main/Software/

http://www.learningaboutelectronics.com/