HUMIDITY BASED AUTOMATED ROOM TEMPERATURE CONTROLLER

BY

ABIR HASAN
ID: 152-15-5539

SHAKIB-BIN-AL-BERUNI
ID: 152-15-5756

AND

TANVIR AHMED PERVEZ
ID: 152-15-5523

This Report Presented in Partial Fulfillment of the Requirements for the Degree of Bachelor of Science in Computer Science and Engineering

Supervised By

NAZMUN NESSA MOON
Assistant Professor
Department of CSE
Daffodil International University

Co-Supervised By

MR. MD SADEKUR RAHMAN
Assistant Professor
Department of CSE
Daffodil International University

DAFFODIL INTERNATIONAL UNIVERSITY

DHAKA, BANGLADESH

MAY 2019

APPROVAL

This Project titled **"Humidity Based Automated Room Temperature Controller"**, submitted by Abir Hasan, ID No: 152-15-5539, Shakib-Bin-Al-Beruni, ID No: 152-15-5756, Tanvir Ahmed Pervez, ID No: 152-15-5523, to the Department of Computer Science and Engineering, Daffodil International University has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of B.Sc. in Computer Science and Engineering and approved as to its style and contents. The presentation has been held on 3rd May, 2019.

BOARD OF EXAMINERS

Dr. Syed Akhter Hossain
Professor and Head
Department of Computer Science and Engineering
Faculty of Science & Information Technology
Daffodil International University

Chairman

Dr. Md. Ismail Jabiullah
Professor
Department of Computer Science and Engineering
Faculty of Science & Information Technology
Daffodil International University

Internal Examiner

Dr. Sheak Rashed Haider Noori
Associate Professor & Associate Head
Department of Computer Science and Engineering
Faculty of Science & Information Technology
Daffodil International University
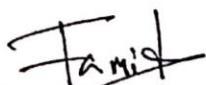
Internal Examiner

Dr. Dewan Md. Farid
Associate Professor
Department of Computer Science and Engineering
United International University

External Examiner

DECLARATION

We hereby declare that, this project has been done by us under the supervision of **Nazmun Nessa Moon, Assistant Professor, Department of CSE,** Daffodil International University. We also declare that neither this project nor any part of this project has been submitted elsewhere for award of any degree or diploma.

Supervised by:
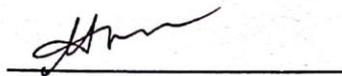
Nazmun Nessa Moon
Assistant Professor
Department of CSE
Daffodil International University

Co-Supervised by:

Mr. Md. Sadekur Rahman
Assistant Professor
Department of CSE
Daffodil International University

Submitted by:
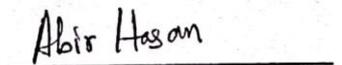
Abir Hasan
ID: 152-15-5539
Department of CSE
Daffodil International University
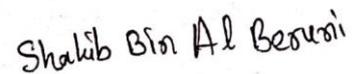
Shakib-Bin-Al-Beruni
ID: 152-15-5756
Department of CSE
Daffodil International University
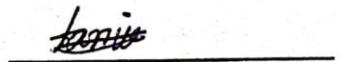
Tanvir Ahmed Pervez
ID: 152-15-5523
Department of CSE
Daffodil International University

ACKNOWLEDGEMENT

First, we express our heartiest thanks and gratefulness to almighty God for His divine blessing makes us possible to complete the final year project successfully.

We really grateful and wish our profound our indebtedness to **Nazmun Nessa Moon**, **Assistant Professor**, Department of CSE, Daffodil International University, Dhaka. Deep Knowledge & keen interest of our supervisor in the field of "*Internet of Things*" to carry out this project. His endless patience, scholarly guidance, continual encouragement, constant and energetic supervision, constructive criticism, valuable advice, reading many inferior draft and correcting them at all stage have made it possible to complete this project.

We would like to express our heartiest gratitude to Dr. Syed Akhter Hossain, Professor and Head**,** Department of CSE, for his kind help to finish our project and also to other faculty member and the staff of CSE department of Daffodil International University.

We would like to thank our entire course mate in Daffodil International University, who took part in this discuss while completing the course work.

Finally, we must acknowledge with due respect the constant support and patience of our parents.

ABSTRACT

This project titled "Humidity Based Automated Room Temperature Controller" which presents the design, construction, program, development, control and evaluation of an automatic switching speed electric heater, and control room temperature automatically. This further step of an intelligent electric room heater and automatic control ac load (fans, light) than before that using "intelligent technology'' such sensing the temperature and humidity and functioning by analog circuit relay. The microcontroller base automatic room temperature control and auto switching system presented in this project is required to fulfill the requirement of technologies "tomorrow will be more advanced than today". The electric fan automatically switches the speed according to the environment temperature changes. This electric hardware fan system contains combination of sensor, controller, driver and motor with integration of embedded controlled programming which means in this case using Arduino UNO as the main controller. In this system, the input which is a temperature sensor, also use a controller which is a microcontroller. On the other hand the output is an AC heater and also LCD for status monitoring. To find out the measurement of temperature it is critical in modern electronic devices. These modern devices are to be noted as expensive laptop computers and other portable devices with densely packed circuits which dissipate considerable power in the form of heat. The user can edit the humidity and temperature number as their comfort.

TABLE OF CONTENTS

CONTENTS	PAGE

LIST OF FIGURES

LIST OF TABLES

CHAPTER 1

INTRODUCTION

1.1 Introduction

With the headway of innovation, mechanization has progressed toward becoming piece of our lives. Territories in the home that are normally involved by individuals, for example, the family room and rooms should be kept up inside livable temperature. These issues are relevant principally that are involved by babies. Grown-ups could discover the safe place, yet newborn children may not. The capacity territories of home which is for short-lived nourishment things likewise should be thermally controlled to avert quickened rot of such things. It makes the need to necessity for a Temperature Control Framework inside the home. Room hotter control structures came in the eighteenth century and the thought was first checked in Norman School of Oklahoma, who an educator named Warren S. Johnson. At first built up the pneumatic temperature control framework which considered temperature control on a room by room premise in structures and homes. By the mid twentieth century the Programmed Temperature Control Framework creation twisted up noticeably famous in undertakings and homes. Beginning late, a great extent of work is being finished by relationship in this field. A ton of customized room hotter structure business things is quickly open in the market and this joins contraption, for instance, Air con.

1.2 Motivation

Insurance from the chilly environment amid the winter season, particularly for the old and newborn children. With the assistance of the cutting edge advancements e needs to discover the better arrangements of the issues. By this undertaking the general population will get the least complex answer for dispose of the cold inside. We need to make people groups life simpler than today. In general our motivation is to tackle the everyday life issues of ourselves. It is exceptionally simple to use for the average folks. The expense of the electrical gear are not all that high. The all areas of individual's general individuals can purchase that and utilize that framework. The

Expense is very low. Electric radiators are very easy to utilize. You simply need to just it in and control. Electric radiators are amazingly sheltered to utilize. The vast majority of the electric warmers are worked in with these two wellbeing precautionary measures.

1.3 Objective

The objectives of this project are to:

Room warmers are incredible to spare ourselves from the brutal winters as the outside temperature fluctuates. Relies upon our north side of our nation as there is a gnawing cold in that season. A year ago the rate was the most reduced 3 degree Centigrade. It was unsafe to us essentially for old and kids. Empower the electric radiator to change the speed level naturally as indicated by temperature changes. The client can see the temperature and dampness rate by Fluid Precious stone Showcase (LCD).

1.4 Expected Outcome

Finally, this system execution will be evaluated by standing out execution data from the speculative a structure is worked with a particular parts that each fragment has its own ability consolidated to each other's for completing the whole system to working. The sections will be the information, controller and the yield. In this system, the data is a temperature sensor, the controller is a microcontroller and the yield is a hotter and besides LCD for status checking. Estimation of temperature is essential in current electronic devices, especially expensive PCs other advantageous contraptions with thickly stuffed circuits which disperse broad power as warmth.

1.5 Report Layout

This venture report has six parts altogether.
The Main Part depicts Presentation, Inspiration, and Goals Result And so on.
The Second Section portrays related works of the venture and it likewise gives issues of the task.

The Three Section portrays Determination of prerequisite

The Fourth Section portrays the structure and segment depiction of the task

The Five Section portrays the usage and testing of the venture.

The six Section portrays the end and the future extent of the venture.

CHAPTER 2

BACKGROUND

2.1 Introduction

The guideline factor of that adventure is to shield the all-inclusive community from chewing cold outside .The maker of the essential mechanical tachometer is believed to be a German pro Dietrich Bullhorn; he used to check the proportion of the system at the rate of the temperature which is absorbable for the person. In any case when it gets initiating current heartbeat from the begin structure, the circuit changes to the quasar stable state for a given time before returning again to the unfaltering state. Thusly, every begin beat made an unblemished beat of fixed length that was urged to the measure framework. This makes it basic the prerequisite for a Temperature Control Framework inside the home. Modified room radiator control structures returns in the eighteenth century and this examination was first checked in Norman School, Oklahoma by a teacher named Warren S. Johnson. Preceding that time, Janitors were compelled to go in every homeroom to check the temperature of the classes, and starting there ahead, control the dampers in the S-basement in like manner. The rate of the structure is exceptionally cool situation of the in the midst of north bit of our country.

2.2 Related Work

This is neither a unique nor the freshest thought, there are numerous thoughts and the usage of that like this undertaking. The taken thoughts and the hardware's of that venture and the taken chart and figures are to be taken from the numerous sides and areas. This is one sort of human life related venture so we have to apply the day by day life issues and the arrangements of that parts. The Drove screen must be shown the data of the rate of the estimation of moistness and the temperature. The literature review assesses the past and current status of humidity based automated room temperature controller. We can assure that our idea is quite specific. Before ours there is a little relatively information published based on the heater system [1]. Though we

have taken only some ideas based on that But ours is unique cause of the humidity based, actually it automatically measures the humidity and control the temperature based on that humidity. Ours is different cause of its automatic humidity and temperature control system. As it works very quickly to spread the head and it works automatically so user can use it very easily. As well as the price of our product is limited so it is also beneficial to the people to use it. Moreover it is the first time we have taken the idea and implemented to run a project. We hope ours is quite unique [2].

2.3 Comparative Studies

This venture report has six parts altogether. The beginning of the Section portrays Presentation, Inspiration, and Targets Result And so on. The Second Part portrays related works of the venture and it likewise gives issues of the task. The following of Part depicts Determination of necessity The Fourth Section portrays the plan and segment depiction of the undertaking. The following Part depicts the execution and testing of the undertaking .The last Section portrays the end and the future extent of the venture. Generally speaking the venture works are to be characterized as the dispose of the gnawing cold of in the winter season [3].

2.4 Scope of the Problem

This examination center around the finding of the issues of the everyday life of individuals amid winter season .There is numerous offices in that venture for the general population of day by day life employments.
No pressure in the Solace life:
There ought to be no pressure in wellbeing satiations. The venture will guarantee individual's home inside environment keeping so solid and agreeable.
This warmer framework is anything but difficult to control for the clients. The clients can include the moistness rate and the temperature rate as their desires.

2.5 Challenges

Power Supply things are to be required for the framework. Since the electric supply is the most vital for running the venture .The moistness measure ought to be accurately for the arrangement of the temperature and the dampness computation.

The electric supply thing is perilous as the flow or voltage is extremely risky so the general population ought to be progressively cautious.

CHAPTER 3

DESCRIPTION OF COMPONENT

3.1 Introduction

Here really the presenting some portion of various types of the parts and the articles that we have utilized in this undertaking. In a computerized mugginess base room radiator we have utilized numerous sorts of parts electronic hardware. Here are generally the supply of dc (direct current) and supply of air conditioning. As a matter of fact the changing over of the present supply. While they are said to change over dc to air conditioning, this is an improvement, and as we will see, the yield of any inverter is developed by beat dc. Voltages.

3.2 List of Components used in Circuit:

In this table here we are showing about the list of the components of our project and what are the amounts of the components, which are showing below in the table 3.1.

Table 3.1: List of Components used in Circuit

No	Component Name	Quantity	Used
01	Arduino Uno	01	Used as a power generating method from sunlight
02	Display (16x2)	01	Used to save energy
03	Humidity Sensor (DHT11)	01	current to flow in the opposite direction through the panels
04	Adapter 9v Volt	01	Supply voltage
05	Heater	01	To controlled AC Power Load
06	Buck Converter	01	To detect temperature
07	Led (16*2)	03	To connection

08	DC cooler	01	To controlled the heating system on this cooler
09	Relay shield	01	To controlled amounts of resistance into electrical circuits
10	Jumper wire	75	To communication

3.3 Arduino UNO

The Arduino UNO is an open-source microcontroller board subject to the Microchip ATmega328P microcontroller and made by Arduino.cc. The board is outfitted with the course of action of different kind of modernized and straightforward stick set up structure. The working methodology of that microcontroller is incredible now days. As it is a microcontroller the contraption is coordinated with the course of action of supply of the fixed supply of current. There are 14 electronic stick and 6 Simple stick in the devices. We can use various kind of that pic structure as our required. The controller needs to connect with 9 volts external volt battery. In spite of the way that the power is between 7 to 20 volts. The affiliation should have the USB connect or the external sources. It confers the using the first STK500 show. The Uno also differs from each and every going before board in that that does not use the FTDI USB-to-consecutive driver chip. Or maybe, it incorporates the Atmega16U2 (Atmega8U2 up to shape R2) altered as a USB-to-consecutive converter [4]. So this device is showing below in figure 3.1.
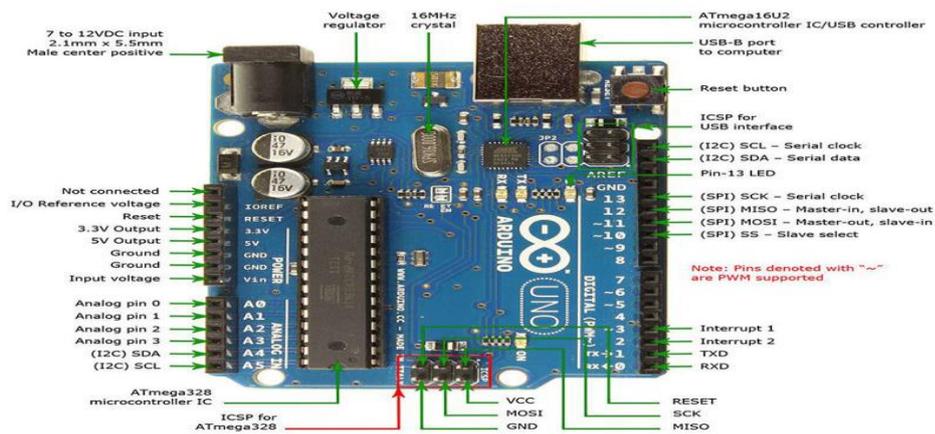
Figure 3.1: Arduino UNO

3.4 Display (16x2)

A liquid valuable stone exhibit (LCD) is a dimension board appear or other electronically changed optical contraption that uses for the light-managing properties of liquid jewels and distinctive purposes. It is the advancement of the CRT. Liquid valuable stones don't emanate light truly, rather using a background enlightenment or reflector to convey pictures in shading or monochrome. LCDs are available to demonstrate optional pictures (as in an extensively valuable PC appear) or fixed pictures with low quality or information content, which can be appeared concealed, for instance, preset words, digits, and seven-parcel appears, as in a propelled clock. And this is showing in figure 3.2. The LCD can work in two extraordinary modes, to be explicit the 4-bit mode and the 8-bit mode. In 4 bit mode generally we send the data nibble by bite, first upper tidbit and after that lower nibble. For those of you who don't have the foggiest thought what a tidbit is: a bite is a social event of four bits, so the lower four bits (D0-D3) of a byte structure the lower nibble while the upper four bits (D4-D7) of a byte structure the higher bite.
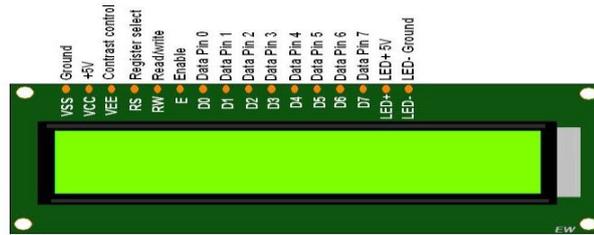
Figure 3.2: LCD Display

3.5 Humidity Sensor

This DHT11 Temperature and Moistness Sensor includes an aligned advanced flag yield with the temperature and dampness sensor capacity. It is coordinated with superior 8-bit microcontroller which gives us the high evaluated contribution from the earth. Its innovation guarantees the high unwavering quality of that sensor and fantastic long haul security. Each DHT11 sensors includes amazingly exact adjustment of mugginess which takes the alignment chamber. The adjustment part put away the OTP for the information. The single-wire sequential interface framework is incorporated to turn out to be fast and simple. Little size, low power, flag transmission separate up to 20 meters, empowering an assortment of utilizations and even the most requesting ones. We can see about the sensor is shown in figure 3.3. The item is 4-stick single column stick bundle. Particulars are depicted underneath:

Supply Voltage: +5 V

Temperature range: 0-50 °C error of ± 2 °C

Humidity: 20-90% RH ± 5% RH error
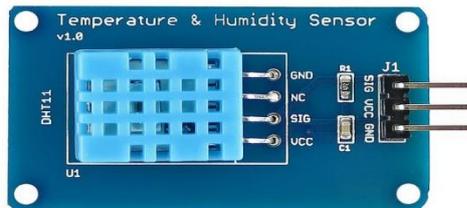
Figure 3.3: Humidity Sensor (DHT11)

3.6 Adapter 9V

An Air conditioner connector, air conditioning/DC connector, or air conditioning/DC converter is a sort of outer power supply, likewise frequently encased for a situation like an air conditioner attachment of the supply. Other basic names incorporate attachment pack, module connector, connector square, local mains connector, line control connector, divider mole, control block, and power connector. Connectors for battery-fueled gear might be portrayed as chargers or rechargers (see additionally battery charger).It for the most part the connector controls the rapid progression of current and voltages. Utilization of an outside power supply which permits the compactness of hardware fueled either by mains or auxiliary gadgets like battery without the additional greater part of interior power segments, and makes it superfluous to create gear for utilize just with a predefined control source; the gadget can be controlled from 120 VAC or 230 VAC mains, vehicle or flying machine battery by utilizing an alternate connector. It is the primary supply current pieces of the gadgets. This adapter is shown in figure 3.4.

Figure 3.4: 9V Adapter

3.7 Electric Heater

Electric hotter is the bits of an electric system which makes heat by taking the supply of the stream. It truly use to make a space hot. The warming is a strategy in which electrical imperativeness is changed over to warm essentialness for the particular district. The employments of that devices consolidate space warming, cooking, warming, and water warming and current methodology. It is an electrical device that changes over an electric stream into warmth and supply the glow. The warming segment inside every electric radiator is an electrical resistor, and wears down the standard of Joule warming: an electric stream experiencing a resistor will change over that electrical essentialness into warmth imperativeness. This hotter is involves in the twist of the item that makes heat [5]. We can see the heater in figure 3.5.

Figure 3.5: Electric Heater

3.8 Buck Converter

A buck converter which (adventure down converter) is a DC-to-DC control converter which adventures down voltage (while wandering up current) from its data (supply) to its yield (load). It is one kind of class of traded mode control supply (SMPS) customarily containing no under two semiconductors (a diode and a transistor, yet current buck converters a significant part of the time replace the diode with a second transistor used for synchronous change) and something like one essentialness amassing segment, a capacitor, inductor, or the two in blend. To decrease voltage swell, channels made of capacitors (all over in mix with inductors) are normally added to such a converter's yield (load-side channel) and data (supply-side filter).Switching converters, (for instance, buck converters) give significantly progressively unmistakable power profitability as DC-to-DC converters than straight controllers, which are less intricate circuits that lower voltages by spreading power as warmth, yet don't wander up yield current. It makes the supply of the voltage and current advance down, implies the low nature of the supply of voltages. We can increment and decrease the limit of the supply by moving the key of the converter [6]. This converter is shown in figure 3.6.
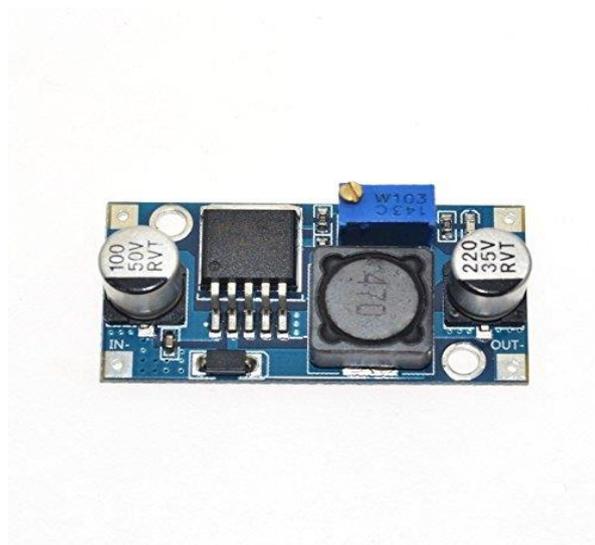

Figure 3.6: Bulk Converter

3.9 DC Cooler

This is one sort of Direct Current cooler which makes anything cool in any gadgets or framework. It is one sort of fan, we for the most part utilize this kind of present day fan for cooling anything all voltage sources can't ready to give fixed yield because of vacillations in the circuit. For getting predictable and suffering yield, the voltage controllers are realized. The yield of that contraptions depends upon the intentional of the fragment supply of the current. The organized circuits which are used for the rule of voltage are named as voltage controller ICs. Here, we can discuss IC 7805.The voltage controller IC 7805 is extremely a person from 78xx plan of voltage controller ICs [5]. So the DC cooler is shown in figure 3.7.

Figure 3.7: DC Cooler

3.10 Jumper Wire

A bounce wire (generally called jumper, jumper wire, jumper interface, DuPont wire, or DuPont cable– named for one maker of them) is an electrical wire, or assembling of them in a connection, generally the social affair of item that related each other and with a connector or stick at each end (or a portion of the time without them– basically "tinned"), which is conventionally used to interconnect the sections of a breadboard or other model or test circuit, inside or with other equipment or fragments, without official. The jumper wire are basically the relationship with the one contraption to other. And this is shown in figure 3.8.

Fastens of Crocodile– that are used, among various applications, to quickly associate sensors, gets and diverse segments of models with parts or apparatus that have abstract connectors, wires, screw terminals, etc.

Banana connectors of ware– these are typically used on test equipment for DC and low-repeat cooling signals. The item is exceptionally useful well ordered.

Enlisted jack (RJ) – That are conventionally use in the relationship of the devices.

Figure 3.8: Jumper Wire

3.11 Relay Shield

A hand-off is a mechanical switch that electrically worked. Similarly as definitely work a switch, yet other working principles which are also used, for instance, solid state exchanges. Exchanges are generally used where it is critical to control a circuit by an alternate low-control banner or low supply, or where the few circuits must be obliged by one banner. The primary moves were used in long partition communicate circuits which work as intensifiers: they reiterated the banner coming in from one circuit and re-transmitted it on another circuit. Exchanges were used comprehensively in telephone exchanges and early PCs to perform reliable exercises. The primary concern of that transfer is to security of any gadgets. It controls the supply of stream. The transfer is one sort of savvy gadget as it is little in size so utilize excessively simple of the gadgets. It is shown in figure 3.9.

Figure 3.9: Relay Shield

CHAPTER 4

PERFORMANCE ANALYSIS

4.1 Introduction

In this section the task are to be characterized as the execution based. By and large the procedure of work the structure the outline, the stream diagrams of the venture and the working procedure and so on. The mugginess based programmed room warmer is one sort of proficient procedure which helps in our day by day life. In here the execution of the venture are to be noted and expound. How it functions.

4.2 System Description of Project

The humidity based automatic room temperature controller works as like the room heater. The procedure of that project based on the arduino system. The initial value of temperature and humidity are given default value in that device ,based on that the heater automatic control the room temperature based on the humidity of the certain area. The device works automatically as like it automatically the heater will ON and OFF when it is needed. The sensor will take the temperature and humidity of the atmosphere of that area. After reaching the expected value of the temperature the device will automatic OFF to supply the power. Actually the devices main motto is to control the room temperature according the given default value. Here we have used the CGS system of the measurement. The Celsius unit is used in this device to calculate the solution and getting the result. We have used code and many building function to run that calculation and making the comparison of the given default and coming output [7]. We have used Arduino 1.8.9 software in our project and there is an opening Arduino software image which is showed up in figure 4.1.

Figure 4.1: Arduino 1.8.9 Software Screenshot

The open-source Arduino condition makes it easy to make the code and exchange it to the I/O driving body of the structure which is showed up in figure 4.1. It can continue running on Windows, Macintosh OS X, and Linux and other working structure. The thought is about the C and C++ programming and other open. It is moreover prepared for requesting and exchanging tasks to the board with a lone snap. There is usually no convincing motivation to modify make records or run programs on a bearing line interface. In spite of the way that developing course line is possible at whatever point required with some pariah mechanical assemblies, for example, Particle. The Arduino IDE accompanies a C/C++library called "Wiring" (from the undertaking of a similar name) [8]. We can see this below in figure 4.2.

Figure 4.2: Arduino Screenshot

4.3 Proposed Methodology

The idea behind our proposed methodology is to design electronic systems by the embedded system which will take the input as the temperature and measure the humidity of a specific area. Then based on that the output as the temperature will increase or decrease to go for the expected output. We have used code and many building function to run that calculation and making the comparison of the given default and coming output. We have used many hardware equipment to control and run the whole system. Mainly it will take the input from the environment and based on that the heater will turn on to reach the expected value. The methodology is quite technical where the equipment control the whole system. In our project we could working about the humidity temperature controlling system and the temperature controlling is the very important part of our project. The design of temperature and humidity is showed up on figure 4.3.
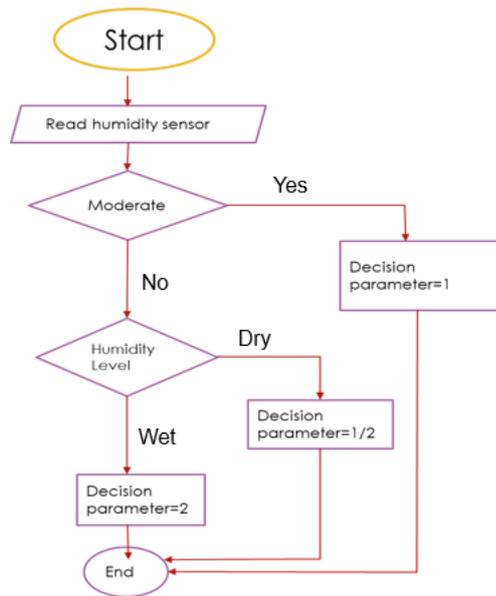
Figure 4.3: Design of Temperature and Humidity flowchart

4.4 System Design and Implementation

From the circuit diagram we can see that there are two main power source one is for the heater, which will produce heat. It will control the power supply from the relay, which will reduce the high voltage into the low one. Then the other portion is connected with the arduino uno. Here we have connected the devices with its input and output pin, ground, and the power supply. The LCD monitor, cooler fan etc. are also connected with the ARDOINO UNO microcontroller. After run the code in that device and connect the power supply the initial temperature will show in that LCD screen, then the heater will be turned on automatically when the temperature will reduce , after getting the expected value the heater will turn off. Here we have used humidity and temperature sensor to measure the temperature and humidity of the atmosphere. By thus we have connected the all devices according to the circuit diagram [9, 10]. The circuit diagram of this project is showing below in figure 4.4.
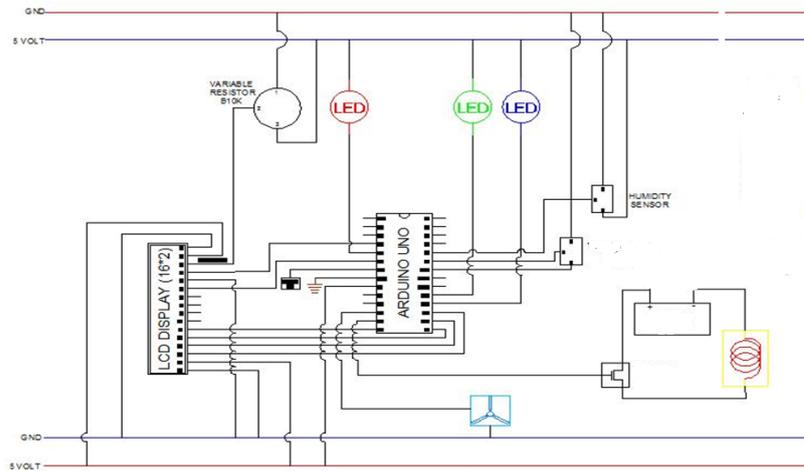
Figure 4.4: Circuit Diagram of this Project

This is the final implementing design of our project. Here we have designed a room which is made by glass. In this room there is an electric heater and a cooler fan which is controlling the room temperature from the humidity sensor and the temperature output show in LCD display. So the project shown in figure 4.5.
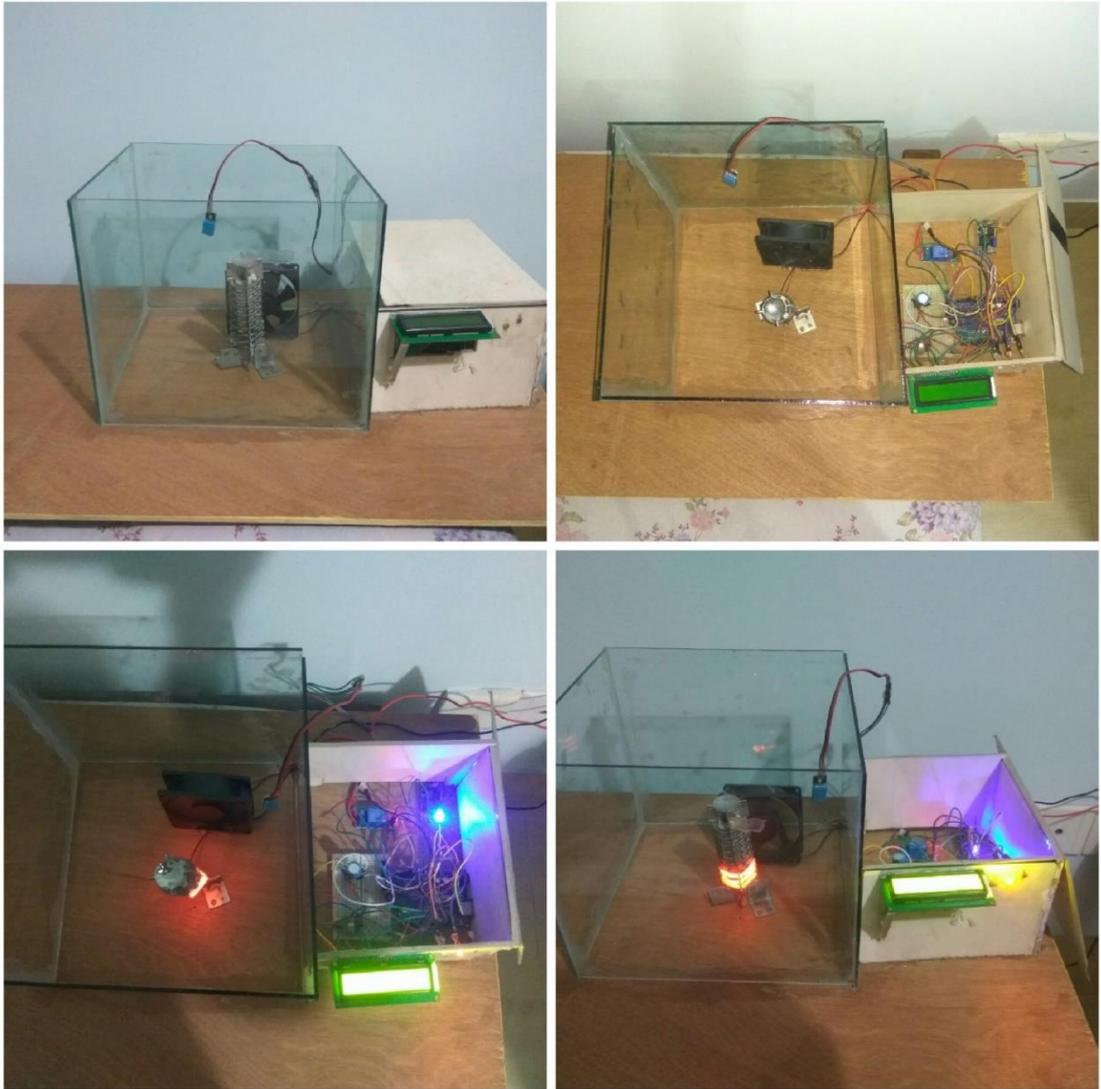
Figure 4.5: Design and Implementation of our Project

We uploaded the programming code in our system which is connected with a USB cable from the laptop to the Arduino Uno in the system. And this is showing below in figure 4.6.

Figure 4.6: Design and Implementation of our Project

CHAPTER 5

RESULT AND DISCUSSION

5.1 Calculation Output

The measure of water which vapor noticeable all around at any is given time is normally not as much as that required to soak the air. The relative moistness is the percent of immersion stickiness, normally determined in connection to soaked vapor thickness [11, 12]. The figuring of the strategy is given beneath

$$R.H. = \frac{10g/m^3}{17.3g/m^3} x100\% = 57.8\%$$

The most widely recognized units for vapor thickness are gm/m3 For example, if the authentic vapor thickness is 10 g/m3 at 20 ° C stood out from the inundation vapor thickness at that temperature of 17.3 g/m3.

Dew point:

In the event that the air is step by step cooled while keeping up the dampness content consistent, the relative stickiness will ascend until it achieves 100%. This temperature, at which the moistness content discernible all around will drench the air, is known as the dew point. On the off chance that the air is cooled further, a portion of the dampness will consolidate [13]. So the Dew Point shown in figure 5.1.
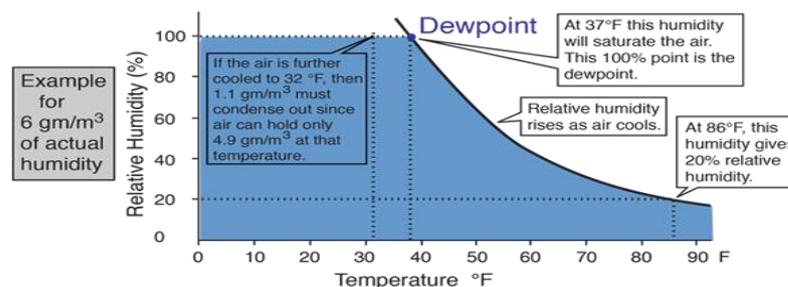

Figure 5.1: Dew Point

When our program will start in our project then firstly we could see some output on the LCD display which are DIU CSE-41, ABIR, SHAKIB, TANVIR, Smart Room heater and Heater Running. Because we initially fixed this in our program. So the output is showed up in figure 5.2.
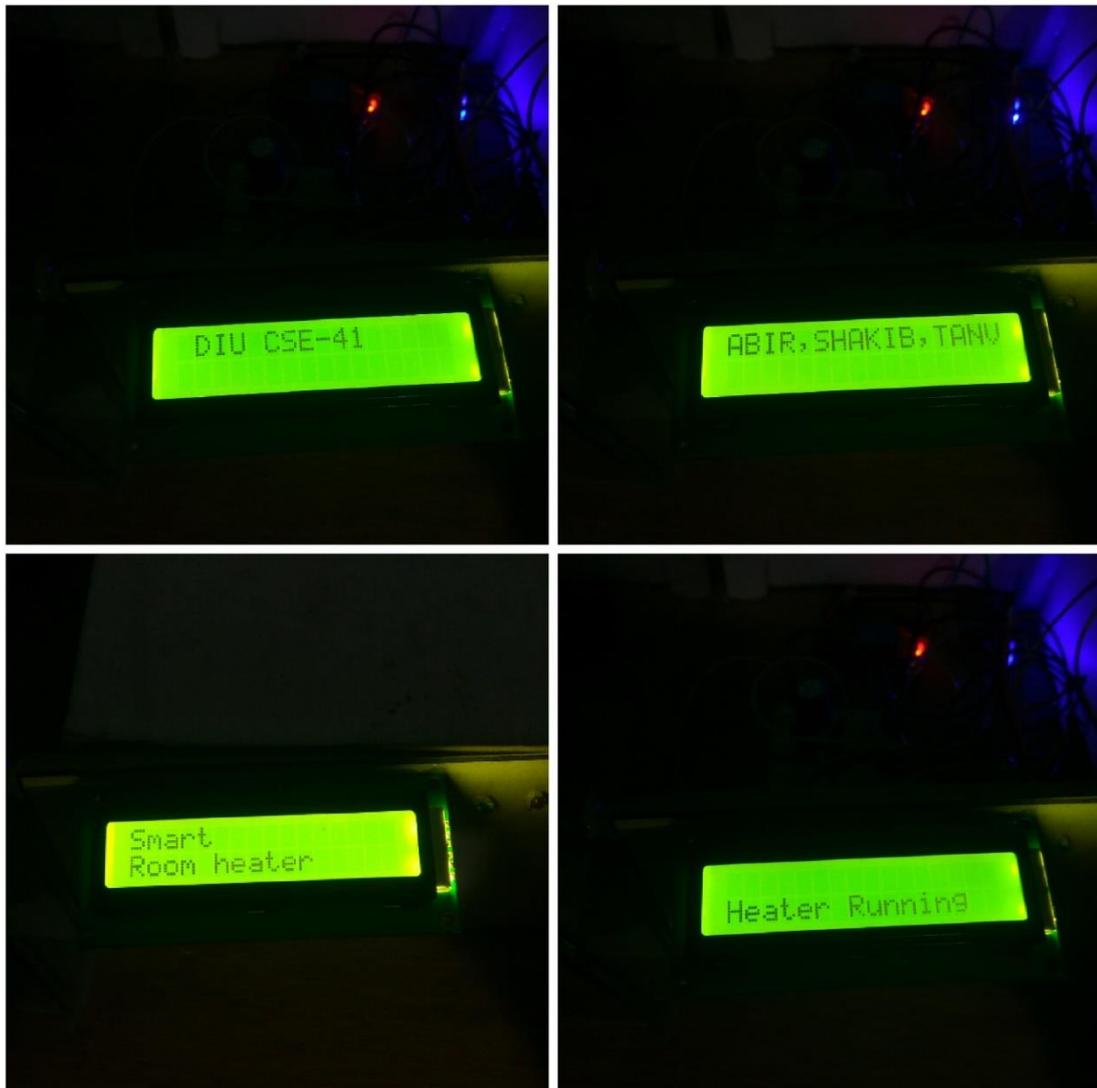
Figure 5.2: Output of LCD Display

5.2 Temperature Output

It is conceivable to deliver what has all the earmarks of being a solid match of the immersed vapor thickness of water as far as possible up to the breaking point. Be that as it may, for the reasons for computing relative stickiness, the qualities close bubbling are not essential. The conduct of water vapor thickness is a non-straight capacity, however a rough estimation of immersed vapor thickness can be produced using an observational attack of the vapor thickness bend. The output shown in figure 5.3.

$$VD = 6.335 + .6718 \, T_C - 2.0887 \times 10^{-2} T_C^2 + 7.3095 \times 10^{-4} T_C^3$$
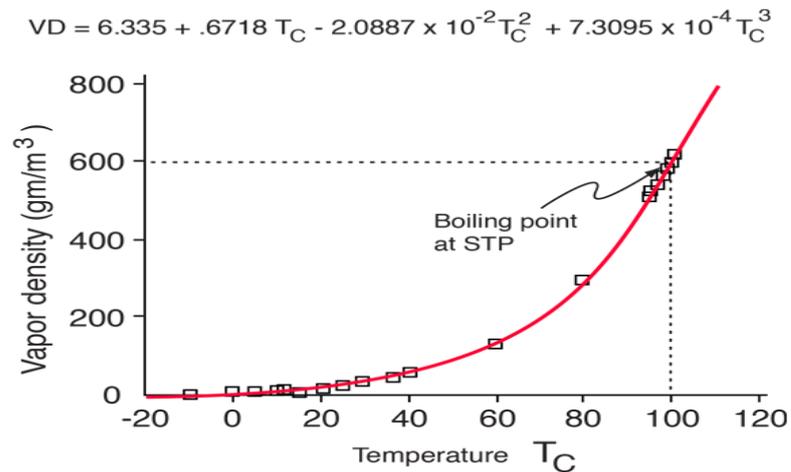
Figure 5.3: Vapor Density vs. Celsius Temperature

On the off chance that just the qualities up to 40 ° C are utilized for the fit, an increasingly exact attack of the information is where there is relative moistness is of intrigue. This is the fit in the figuring of relative stickiness, however it fundamentally belittles the vapor thickness close to the breaking point. The immersed vapor weight achieves 760 mmHg at 100 ° C, the standard breaking point. The soaked vapor weight generally parallels the immersed vapor thickness; the numerical qualities are incorporated into the vapor thickness [14].

The real view of temperature output is showed up in figure 5.4.

Figure 5.4: Output of Temperature and Humidity

5.3 Humidity Output and Calculation of Data

In this project we use humidity sensor for detect the humidity in the room. And there are three types of calculation on this humidity sensor. Firstly it calculate (0 to 30)% for dry, then it calculate (31 to 79)% for moderate and finally it calculate (80 to 100)% for the wet temperature. So the calculating system of this sensor shown below in figure 5.5.

Calculation For Humidity sensor

- ## Let, T=10 C

Dry	Moderate	Wet
0-30% Require Temperature T/2 =10*1/2 =5	31%-79% Current Temperature=15 C Desired Temperature= 25C Need Temperature= 10 C Required Temperature T*1 =10*1 =10 C	80%-100% Required Temperature T*2 =10*2 =20 C

Figure 5.5: Calculation System

The real view of humidity output is showed up in figure 5.6.
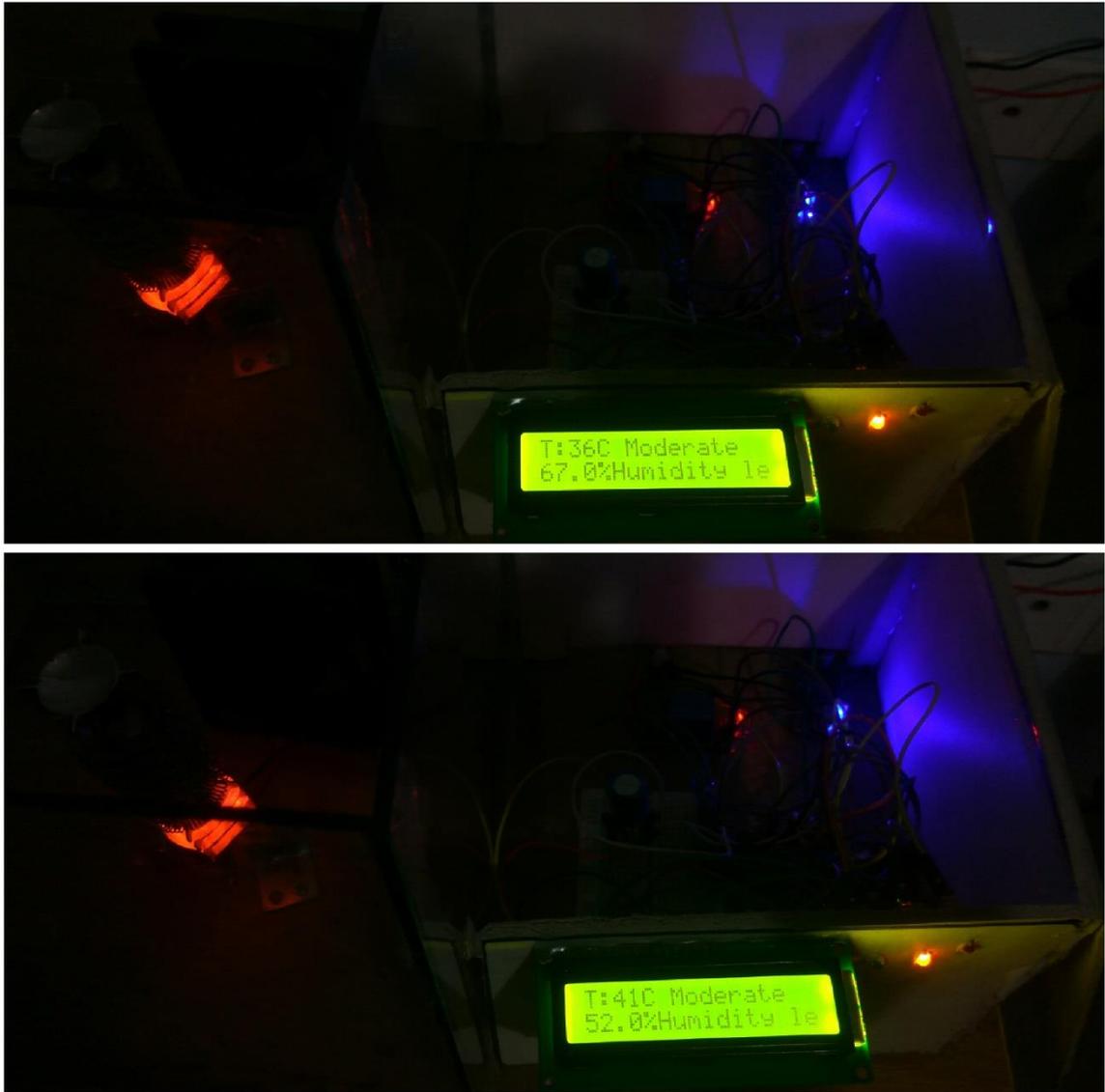
Figure 5.6: Output of Humidity and Temperature

5.4 Result

Here, we can see the output or result of the room temperature and humidity on the LCD display. So the result of the room temperature is 36 degree when the humidity is 57 degree, and this is showed up in figure 5.1. Whatever the temperature of the room, the heaters will keep the temperature at 36 degree. Because when it is very cold outside then I feel relaxed in 36 degree inside the room and that's why we fixed 36 degree in our system. So the result is showing below in figure 5.7.

Figure 5.7: Final Result

5.5 Advantage

Cost: The expense of the electrical gear are not all that high. The all areas of individual's general individuals can purchase that and utilize that framework. The Expense is very low.

Safe to utilize: Electric radiators are very easy to utilize. You simply need to just it in and control. Electric radiators are amazingly sheltered to utilize. The vast majority of the electric warmers are worked in with these two wellbeing precautionary measures. Right off the bat, electric radiators consequently close off when anything or individual comes a lot nearer to it. Furthermore, they never get much warmed to cause burning.

Little size: Due to little size the radiator can be set in anyplace is a little room, restroom or kitchen. Electric radiators can be put on the floor, on a table or can even be held tight a divider. By and large it is little in size.

Warms up rapidly: Electric radiators warms up the space right away. On the off chance that you keep the entryway of the room shut, the room will be warmed rapidly.

Compact: Electric radiators are exceedingly versatile. Being lightweight, it is anything but difficult to bear the radiators. Additionally, they are given handles which makes. It simple to bear the radiator. You can even go with them or bear them to your office.

Flexible indoor regulator: Electric radiators are gives movable indoor regulators that enables you to change the temperature of the room as per your prerequisite. Each venture will show signs of improvement than past one as training can make us flawless [15].

CHAPTER 6

CONCLUSION

6.1 Conclusion

The north bangle is the coldest spot. Be that as it may, they can't utilize room warmer as the expense of is extremely high and furthermore reason for power. So we need to give them room warmer requiring little to no effort. Room warmers are incredible to spare our self from the unforgiving winters. Relies upon our nation from the north side the previous winter season most minimal temperature was 3 degree Centigrade. It was destructive to us fundamentally youngsters and matured individual. For having something effect we set up a Microcontroller base savvy room radiator. Which is cleverly control room temperature with Dampness. These little warmers with blowers fit into the empty space under kitchen cupboards, stair tracks and vanities. You can introduce a toe-kick radiator (additionally called a 'kick space warmer') under a current bureau by prying off the toe-kick. To control the warmers, you'll have to keep running from your primary electric board. You can control most units utilizing a switch or an indoor regulator. It merits getting a model with a temperature control (or a high/low switch). Ground-breaking units can blow so hot on the high setting that they could overheat your feet or even relax vinyl flooring. Additionally, a few models are boisterous when the blower works on high. Hydroid toe-kick warmers that interface with boiling water warming frameworks are additionally accessible.

6.2 Future Scope

We can provide more facility's in our smart system example:

1. Automatics room control by an advanced mobile phone

2. We will likewise give savvy changing from web side in straightaway.

3. Every season we can gather information from nature and help to our legislature to spread openly.

4. We like wise can give a power and appropriate power matrix of the framework.

REFERENCES

[1] S. Ludwig, J. Pritchard10 principles of sustainable, cost-effective design: building a safe, more efficient machineControl Engineering Magazine - Available:https://www.plantengineering.com/single-article/10-principles-of-sustainable-cost-effective-design-building-a-safer-more-efficient-machine/ –last accessed on 2 March, 2019 at 7:52 pm

[2] http://www.engineersgarage.com/ -last accessed on 2 March, 2019 at 7:58pm

[3] J.E. Johnson, P.F. Maccarini, D. Neuman, P.R. StaufferAutomatic temperature controller for multi element array hyperthermia systems,IEEE Trans Biomed Eng., 53 (6) (2006), pp. 1006-1015,CrossRefView Record in Scopus -last accessed on 1 March, 2019 at 7:36pm

[4] http://protorit.blogspot.com/2012/03/introduction-to-microcontroller.html -last accessed on 4 March, 2019 at 8:00pm

[5] B. Ian, Self-programmable temperature control system for a heating and cooling system. United States of America Patent US5088645 A, 24 June 1992. https://patents.google.com/patent/US20100211224A1/en -last accessed on 2 March, 2019 at 8:00pm

[6] http://www.resistorguide.com/photoresistor/ -last accessed on 6 March, 2019 at 7:46pm

[7] B. G. Tate and R. P. Ries, Wireless thermostat and room environment control system. Unites States of America Patent US4969508 A, 13 November 1990. https://patents.google.com/patent/US4969508A/en. -last accessed on 6 March, 2019 at 8:30pm

[8] The term crystal oscillator refers to the circuit, not the resonator: *Graf, Rudolf F. (1999). Modern Dictionary of Electronics*, 7th Ed. *US: Newnes. pp. 162, 163.* ISBN 0750698667 -last accessed on 20 March, 2019 at 8:40pm

[9] http://www.circuitstoday.com/how-an-inverter-works -last accessed on 25 February, 2019 at 7:36pm

[10] *No Minoru, automatic temperature control system. United States of America Patent v. 3241603 A, 26 March 1996. HotSpot: //patents.google.co.uk/pentent/WS23241603.* -last accessed on 20 March, 2019 at 9:16pm

[11] http://hyperphysics.phy-astr.gsu.edu/hbase/Kinetic/relhum.html -last accessed on 20 February, 2019 at 7:21pm

[12] https://www.aqua-calc.com/calculate/humidity -last accessed on 22 February, 2019 at 7:27pm

[13] http://massmind.org/techref/microchip/pages.htm -last accessed on 6 March, 2019 at 8:11pm

[14] *Diffenderfes, Robert (2005). Electronic Devices: System and Applications. New Delhi: Delimar. p. 480. ISBN 978-1401835149.* -last accessed on 6 March, 2019 at 8:13pm

[15] https://propakistani.pk/2016/04/22/the-advantages-and-disadvantages-of-a-dc-inverter-ac-series/ - last accessed on 4 March, 2019 at 8:20pm

APPENDIX

CODE SEGMENT

```
#include <dht.h> // library function added

dht DHT;

int temp_data,temp_init=36,diff; // integer variable

float  humidity_data;

#define DHT11_PIN A1 // analog pin


#include<LiquidCrystal.h>

LiquidCrystal lcd (2, 4, 8, 9, 10, 11); // lcd (rs,e,d4,d5,d6,d7) pin no go to arduino

int led1 = 13; //yellow

int led2 = 12; //green

int led3 = 3; //red

int relay = 7;

#define fan 6

int chk;


void setup() {

  // put your setup code here, to run once:

  Serial.begin(9600); // baud rate

  lcd.begin(16, 2);


  lcd.clear();

  lcd.setCursor(0, 0);

  lcd.print(" DIU CSE-41");

  delay (2000);

   lcd.clear();

  lcd.setCursor(0,0);
```

```
lcd.print("ABIR,SHAKIB,TANVIR");

delay (2000);

lcd.clear();

lcd.setCursor(0,0);

lcd.print("Smart");

delay(1000);

 lcd.setCursor(0,1);

lcd.print("Room heater");

delay(1000);

lcd.clear();

lcd.setCursor(0,1);

lcd.print("Heater Running");

delay(1000);


pinMode(led1, OUTPUT);

pinMode(led2, OUTPUT);

pinMode(led3, OUTPUT);

pinMode(relay, OUTPUT);


chk = DHT.read11(DHT11_PIN);


int temp= constrain(DHT.temperature, 0, 100);

delay(1000);

Serial.println(temp_init);

diff=temp_init-temp;


pinMode(fan, OUTPUT);

//pinMode(buzzer,OUTPUT);
}
```

```
void loop() {
 dht_sensor();
}
void dht_sensor() {
 chk = DHT.read11(DHT11_PIN);


 temp_data = constrain(DHT.temperature, 0, 100);
 humidity_data = constrain(DHT.humidity, 0, 100);
 Serial.print(temp_data);
 Serial.print(" ");
 Serial.println(humidity_data);
 delay(2000);
 if (humidity_data >= 0 && humidity_data <= 30) {
  if (temp_data < temp_init + (diff/2)) {
   digitalWrite(fan, HIGH); //fan high
   digitalWrite(relay, HIGH); //relay high
   digitalWrite(led3, HIGH);
   digitalWrite(led2, LOW);
   digitalWrite(led1, LOW);
    lcd.clear();
 lcd.setCursor(0,1);
   lcd.print(constrain(DHT.humidity, 0, 100));
   lcd.setCursor(4, 1);
   lcd.print("%");
    lcd.setCursor(5,1);
    lcd.print("Humidity level");
    lcd.setCursor(0, 0);
   lcd.print("T:");
   lcd.setCursor(2, 0);
```

```
lcd.print(constrain(DHT.temperature, 0, 100));
lcd.setCursor(4, 0);
lcd.print("C");
lcd.setCursor(5, 0);
lcd.print(" ");
lcd.setCursor(6, 0);
lcd.print("Dry");
delay(500);
Serial.print("Temp_data:");
Serial.println(temp_data);
Serial.print("Fan on");
}
else if (temp_data >= temp_init+(diff/2)) {
digitalWrite(fan, LOW); //fan off
digitalWrite(relay, LOW); //relay off
digitalWrite(led2, HIGH);
digitalWrite(led1, LOW);
digitalWrite(led3, LOW);
lcd.clear();
lcd.setCursor(0,1);
lcd.print(constrain(DHT.humidity, 0, 100));
lcd.setCursor(4, 1);
lcd.print("%");
lcd.setCursor(5,1);
lcd.print("Humidity level");
lcd.setCursor(0, 0);
lcd.print("T:");
lcd.setCursor(2, 0);
lcd.print(constrain(DHT.temperature, 0, 100));
```

```
    lcd.setCursor(4, 0);

    lcd.print("C");

  lcd.setCursor(5, 0);

    lcd.print(" ");

    lcd.setCursor(6, 0);

    lcd.print("Dry");

    delay(500);

    Serial.print("Temp_data:");

    Serial.println(temp_data);

    Serial.print("Fan off");

   }

 }

 else if (humidity_data >= 31 && humidity_data <= 79) {

  if (temp_data < temp_init + diff) {

    digitalWrite(fan, HIGH); //fan high

    digitalWrite(relay, HIGH); //relay high

    digitalWrite(led2, HIGH);

    digitalWrite(led1, LOW);

    digitalWrite(led3, LOW);

   lcd.clear();

  lcd.setCursor(0,1);

    lcd.print(constrain(DHT.humidity, 0, 100));

    lcd.setCursor(4, 1);

    lcd.print("%");

    lcd.setCursor(5,1);

    lcd.print("Humidity level");

    lcd.setCursor(0, 0);

    lcd.print("T:");

    lcd.setCursor(2, 0);
```

```arduino
    lcd.print(constrain(DHT.temperature, 0, 100));
    lcd.setCursor(4, 0);
    lcd.print("C");
  lcd.setCursor(5, 0);
    lcd.print(" ");
    lcd.setCursor(6, 0);
    lcd.print("Moderate");
    delay(500);
    Serial.print("Temp_data:");
    Serial.println(temp_data);
    Serial.print("Fan on");
  }
  else if (temp_data >= temp_init + diff) {
    digitalWrite(fan, LOW); //fan off
    digitalWrite(relay, LOW); //relay off
    digitalWrite(led1, HIGH);
    digitalWrite(led2, LOW);
    digitalWrite(led3, LOW);
        lcd.clear();
  lcd.setCursor(0,1);
    lcd.print(constrain(DHT.humidity, 0, 100));
    lcd.setCursor(4, 1);
    lcd.print("%");
     lcd.setCursor(5,1);
     lcd.print("Humidity level");
     lcd.setCursor(0, 0);
    lcd.print("T:");
    lcd.setCursor(2, 0);
    lcd.print(constrain(DHT.temperature, 0, 100));
```

```
       lcd.setCursor(4, 0);

       lcd.print("C");

    lcd.setCursor(5, 0);

       lcd.print(" ");

       lcd.setCursor(6, 0);

       lcd.print("Moderate");

       delay(500);

       Serial.print("Temp_data:");

       Serial.println(temp_data);

       Serial.print("Fan off");

     }

   }

   else if (humidity_data >= 80 && humidity_data <= 100) {

     if (temp_data < temp_init + (diff*2)) {

       digitalWrite(fan, HIGH); //fan high

       digitalWrite(relay, HIGH); //relay high

       digitalWrite(led1, HIGH);

       digitalWrite(led2, LOW);

       digitalWrite(led3, LOW);

        lcd.clear();

    lcd.setCursor(0,1);

       lcd.print(constrain(DHT.humidity, 0, 100));

       lcd.setCursor(4, 1);

       lcd.print("%");

        lcd.setCursor(5,1);

        lcd.print("Humidity level");

        lcd.setCursor(0, 0);

       lcd.print("T:");

       lcd.setCursor(2, 0);
```

```arduino
        lcd.print(constrain(DHT.temperature, 0, 100));
        lcd.setCursor(4, 0);
        lcd.print("C");
   lcd.setCursor(5, 0);
        lcd.print(" ");
        lcd.setCursor(6, 0);
        lcd.print("Wet");
        delay(500);
        Serial.print("Temp_data:");
        Serial.println(temp_data);
        Serial.print("Fan on");
  }
   else if (temp_data >= temp_init+(diff*2)) {
        digitalWrite(fan, LOW); //fan off
        digitalWrite(relay, LOW); //relay off
        digitalWrite(led1, LOW);
        digitalWrite(led2, LOW);
        digitalWrite(led3, LOW);
            lcd.clear();
   lcd.setCursor(0,1);
        lcd.print(constrain(DHT.humidity, 0, 100));
        lcd.setCursor(4, 1);
        lcd.print("%");
         lcd.setCursor(5,1);
         lcd.print("Humidity level");
         lcd.setCursor(0, 0);
        lcd.print("T:");
        lcd.setCursor(2, 0);
        lcd.print(constrain(DHT.temperature, 0, 100));
```

```
    lcd.setCursor(4, 0);

    lcd.print("C");

  lcd.setCursor(5, 0);

    lcd.print(" ");

    lcd.setCursor(6, 0);

    lcd.print("Wet");

    delay(500);

    Serial.print("Temp_data:");

    Serial.println(temp_data);

    Serial.print("Fan off");

  }


 }
}
```

HUMIDITY BASED AUTOMATED ROOM TEMPERATURE CONTROLLER

27%	11%	13%	20%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS