



POLITEKNIK SULTAN SALAHUDDIN ABDUL AZIZ SHAH

FINAL YEAR PROJECT REPORT

AUTOMATIC PORTABLE HUMIDIFIER

SUPERVISOR NAME : DR. MARLINA BINTI RAMLI

STUDENT NAME	NUMBER MATRIC
AFIF AZHARI BIN KAMARUL BAHARIN	08DEP20F1040

TABLE OF CONTENTS

Abstract	3
Chapter 1	4
1.1 Introduction.....	4
1.2 Problem Statement	6
1.3 Objective	6
1.4 Scope of Project.....	6
1.5 Important of Research	6
Chapter 2	7
2.1 Literature Review	7
Chapter 3	9
3.1 Methodology	9
Chapter 4	17
4.1 Data Analysis and Results.....	17
Chapter 5	23
5.1 Conclusion	23
5.2 References	25

ABSTRACT

The Most children develop eczema before their first birthday. However, eczema can occur as late as 5 years of age. Studies have shown that eczema usually recovers with increasing age of the child. However, for some children (approximately 20-25%), eczema may persist into adulthood with symptoms coming and going. Eczema is not an allergy (Although it may be related) and is not contagious. The exact cause of eczema is still under study and may be related to an overactive immune action against certain irritants. In addition, among other causes are genetic factors, including inheriting dry skin problems, eczema, asthma, or allergic fever from one or both parents. Other risks are from the living environment (urban areas or cold climates are riskier) and gender (men are more likely). Eczema can be treated by controlling or identifying the triggers. Among other things, eczema treatment tips are to maintain a comfortable temperature and humidity level. Use an air humidifier or air conditioner indoors. So, the ambient humidity level may be maintained with this automatic portable humidifier. Additionally, a DHT11 sensor is built within it to measure atmospheric humidity levels. If it determines that relative humidity is below the necessary threshold, it activates the humidifier, and vice versa. As a result, using this product in some cases can aid eczema patients in managing their symptoms.

CHAPTER 1

1.1 INTRODUCTION

Science and technology are the two most important part of our living life. Science and technology have made our life so easy and luxurious. Everything which we see around us is a part of science. Gadgets, clocks, light bulbs, Mobiles, computers, Tables, Chairs, Paper, Pen and many infinity things are part of technology and science. Science is not just important for all our daily activities of our home. Science and technology are very useful for every factor. Today, Medical science have treatment for every disease and due to which, Humans are diseases free. Moreover, Science and technology are seen as a prime thing in human life since entering the 21st century. Its development is seen to grow like a mushroom after rain when the cost of using technology becomes more affordable and commercialized in accordance with human life.

Perhaps the presence of technology in ancient times did not have a balanced ecosystem to support. Today, the rapid development has even become a race between developed countries such as the United States and Japan. The various benefits derived from the effects of development on human life. There are also those that do harm but as a first class minded society, we need to throw out the murky ones and take the clear ones. In addition, the results of its development have contributed to the advancement of the healthcare industry globally.

A variety of new drugs and treatments can be developed to treat patients suffering from various types of diseases. It also helps in preventing infectious diseases from spreading and sacrificing thousands of human lives like in the past. Today, it has made the medical laboratory an important institution for humans to study and find cures to diseases that harm human life. In addition, collaboration between science & technology also contributed to self -health observation when smart watches were successfully created. The wearer of this watch can see the heart rate which gives an indication of the level of health of an individual. If every individual can use this watch and take care of their health on their own, it can definitely give birth to a healthy and prosperous society.

Lastly, various health benefits that we get as a result of the development of science & Technology. We should prepare an umbrella before the rain so that we do not regret it Later.

1.2 PROBLEM STATEMENT

Often, we hear of eczema problems occur in children with the skin becoming a red rash, swelling and prolonged itching that causes discomfort. However, do not think that this problem only occurs in children, instead adults can also experience it. Eczema is a group of skin diseases that cause itching and redness of the skin. It is not a disease that is contagious to others and there is no cure, but it can be controlled by taking specific medications and treatment if it gets worse. In addition, people with eczema skin disease should practice the use of mild soap and do not dry out the skin. The use of moisturizer is very important especially immediately after bathing because the moisturizer needs to be applied on the skin that is still moist. From here we can see that skin moisture care is very important for an individual suffering from eczema skin disease either on the body or the environment. Therefore, it should be important to have method or technology that can help in solving the problem.

1.3 OBJECTIVE

- To design an automatic portable humidifier using Arduino.
- To increase the relative humidity of a closed area to ensure enough moisture in the area.
- To test the effectiveness of automatic portable humidifier produced using Arduino with functional test.

1.4 SCOPE OF PROJECT

- A system that can maintain the relative humidity of atmospheric air by using a sensor mechanism.
- We are also using a display to show the relative humidity (RH) in terms of percentage of moisture in the air.
- Apart from the Arduino and LCD, I also use a DHT11 sensor to read atmospheric humidity values. If it finds that the relative humidity is lower than the required limit, it turns on the humidifier, and vice versa.

1.5 IMPORTANT OF RESEARCH

- This device will be one of the best ways to control the disease suffered by a person who has skin problems such as eczema. In addition, it can also be used as an effort or initiative of patients in controlling the disease instead of just expecting specific medications and treatments.

Furthermore, the design of this automatic portable humidifier is medium in size and latest can make it easy for its users to use anytime, anywhere and does not look strange when carried along.

Lastly, and perhaps most importantly, this automatic portable humidifier can help those with skin problems go about their normal daily lives like other healthy people without thinking about the problem of the disease they are experiencing.

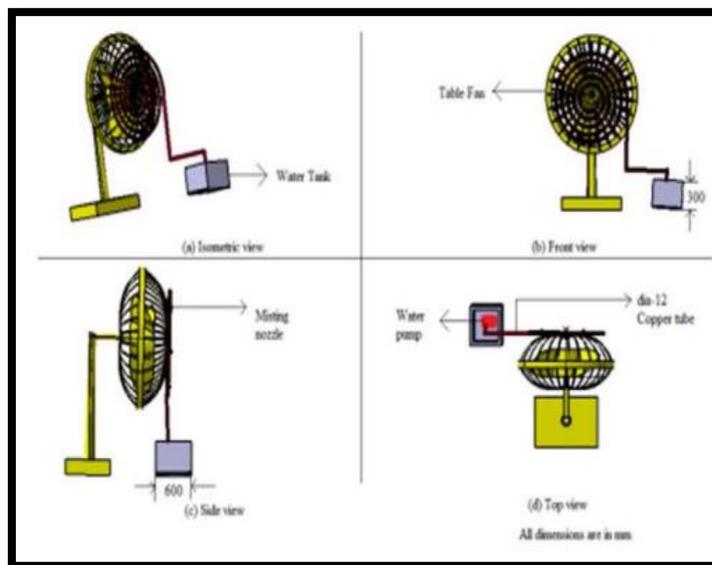
CHAPTER 2

2.1 LITERATURE REVIEW

Humidifier is a device used to increase the relative humidity of a closed area to ensure enough moisture in the area. Especially during winters, when the heater is turned on, it causes the relative humidity of the air to decrease. In this diy project, we are going to build an automatic humidifier, which can maintain the relative humidity of the atmospheric air by using sensor mechanism. We are also using a display to show the relative humidity (RH) in terms of percentage of moisture in the air. Apart from Arduino and LCD, we are also using DHT11 sensor to read the atmospheric humidity values. If it finds that relative humidity is lower than the required limit, it turns on the humidifier, and vice versa.

2.1 Performance Evaluation of Portable Mist Humidifier.[1]

By The power supply was provided to the axial fan and pump for water circulation. Then the water is pumped at high pressure from the water tank to the copper tube. The water is passed through the copper tube and returned to the water tank and this cyclic operation is carried out during the entire process. When water flows through the copper tube, the water molecules are sprayed through the misting nozzles into the atmosphere. When the power supply started supplying the axial fan will provide high velocity of the air and the misting effect of the water particles, the diffusion of water molecules carried out into the atmosphere.



Design of Portable Mist Humidifier

2.2 Ultrasonic Humidifier.[2]

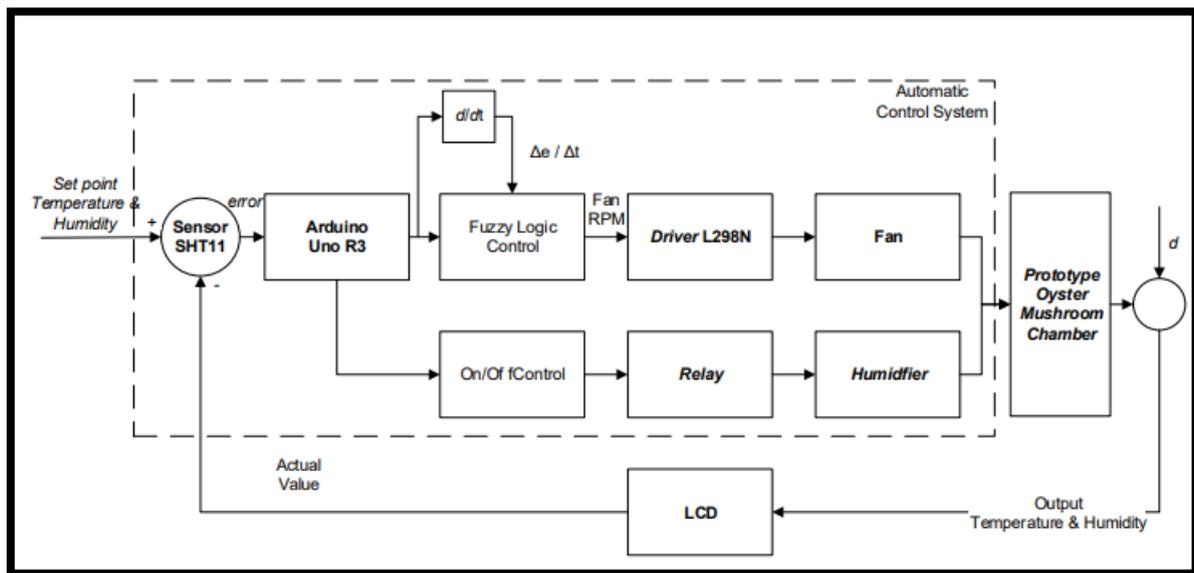
The design of our system is to use an array of transducers in a water reservoir to vaporize water. The target humidification rate is to exceed the dehumidification rate of Friedrich Air's stronger units. This means our humidifier had to produce greater than 11 pints per hour. Having 22 piezoelectric transducers will allow the system to quickly reach a humidity rate of 100% as requested by our sponsor. Once the system has reached the desired humidification rate, several transducers will turn off. A smaller set of transducers will remain running to maintain the humidity level. If any drop in humidity occurs, the required number of transducers to raise it again, will turn on.



Cart Assembly with Humidifier Facing Out

2.3 Development of Fuzzy Control Systems in Portable Cultivation Chambers to Improve the Quality of Oyster Mushrooms.[3]

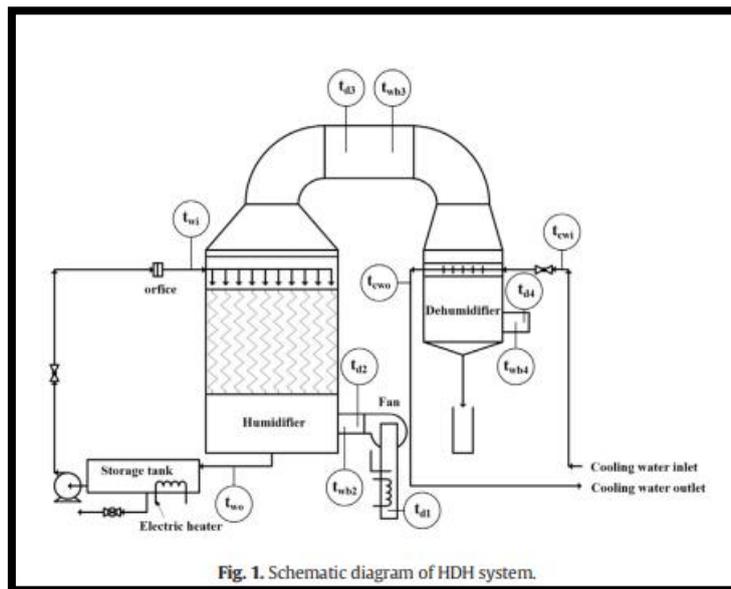
The tools used in this study include plastic container boxes as portable chamber prototypes, Arduino Uno R3 as the processor of the control system SHT11 sensor as a temperature and humidity meter [12], 2x16 liquid-crystal display (LCD) as the data output viewer of the system, L298N driver as pulse width modulation (PWM) regulator from the fan, 2 channel relay to turn on and turn off the humidifier, 12V DC fan as a temperature control actuator, humidifier as humidity control actuator. The materials used in this study include: oyster mushrooms as research material, planting media for oyster mushrooms, and water as a source of steam humidifiers.



Automatic control system scheme.

2.4 Experimental investigation of humidification-dehumidification.[4]

Major parts include a humidifier, dehumidifier, storage tank, heater, pump, fans, flow meter (orifice), and temperature measurements associated with the piping and valves. Any type of energy source such as solar, waste, or geothermal can be used to heat the water. To facilitate the experiment, four electric heaters are used to heat the water inside the storage tank. Then, the water is pumped into the distribution pipes above. The water flows from the lower end of the humidifier and returns once again into the storage tank. The water flows from the lower end of the humidifier and returns once again into the storage tank.



Schematic diagram of HDH system.

2.5 The impact of using portable humidifiers on airborne particles dispersion in indoor environment.[5]

A portable ultrasonic humidifier with a water output capacity of 350 mL/h and an evaporative humidifier with 200 mL/h were selected. Two humidifiers were filled with tested water and operated for 120 min with maximum output setting. Five typical water types (i.e., commercial pure water, deionized water, commercial mineral water, tap water, and plain boiled water) were used to evaluate water's impact on aerosols generated by two humidifiers. Water qualities were measured with a Water Quality Meter (Macro 900, Palin test, UK), which was calibrated with a standard solution before use.

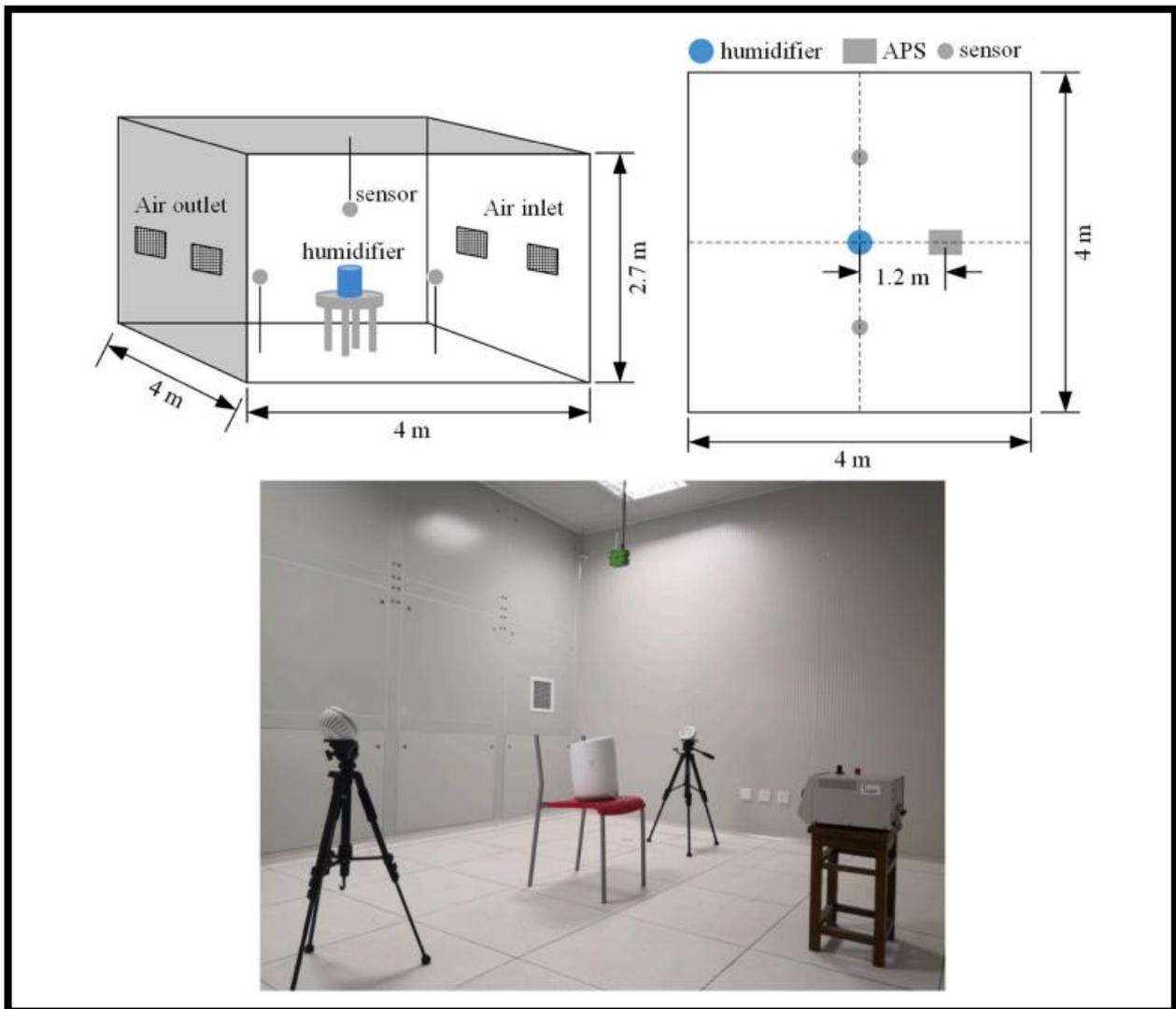


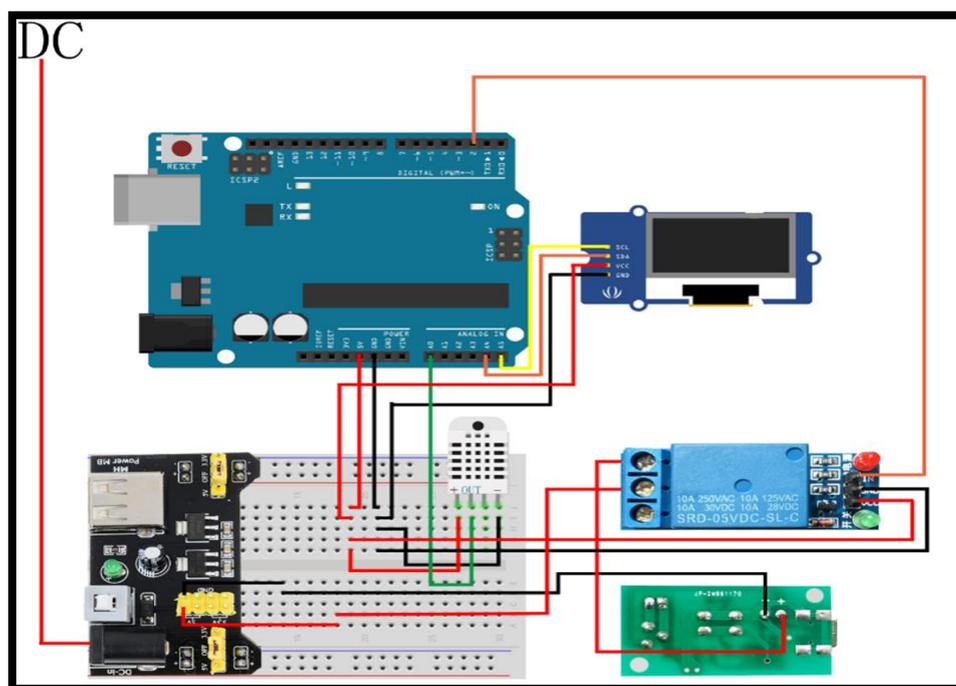
Diagram of the experiment chamber.

CHAPTER 3

3.1 METHODOLOGY

This product has several hardware that work together to accomplish its primary goal of being produced. Among them are DHT 11 sensors, which gauge the amount of humidity in the vicinity of the product's installation. While the LCD displays the reading of the humidity level so that the user can understand the level of humidity in their environment, which indirectly becomes the main pillar in achieving the main objective, which is to be one of the initial actions to control the symptoms of eczema for patients who have it. There are also additional pieces of hardware that operate in accordance with their intended purposes and aid in the accomplishment of the primary goal of the goods created.

CIRCUIT DIAGRAM



HARDWARE

1. Arduino Uno

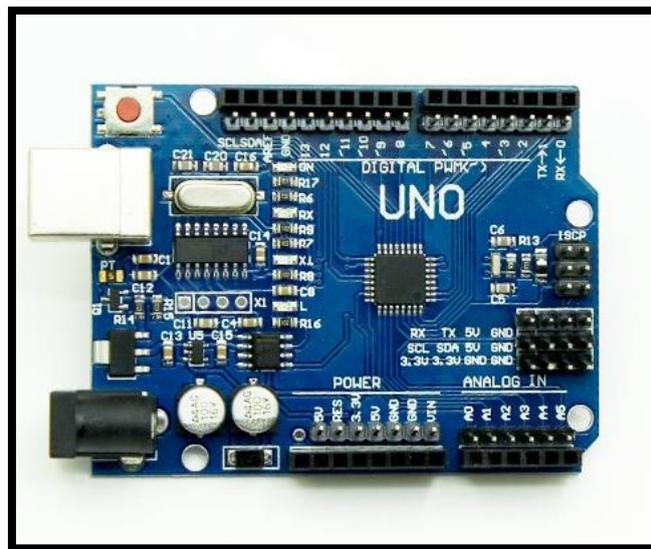


FIGURE 3.1 : Arduino Uno R3

Arduino Uno as in Figure 3.1, is a microcontroller board based on the ATmega328P (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button.

2. Relay

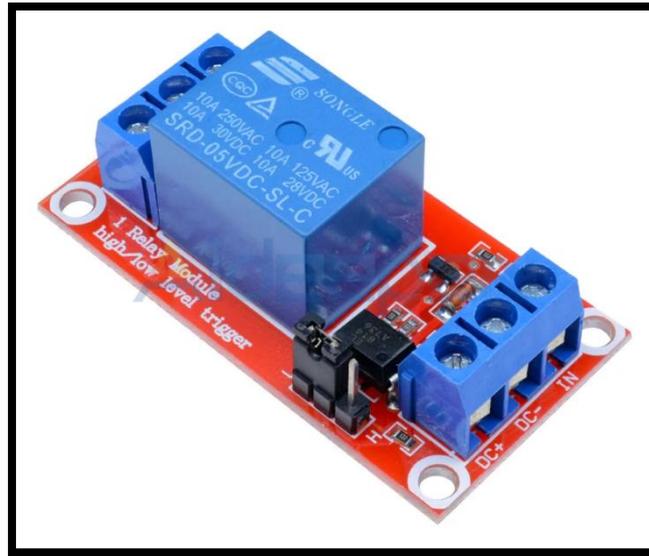


FIGURE 3.2 : Relay 5v 1 Channel

The 1 Channel 5V Relay Module provides a single relay that can be controlled by any 5V digital output from your microcontroller. The relay is accessible using screw terminals and can handle up to 2A of current.

3. LCD

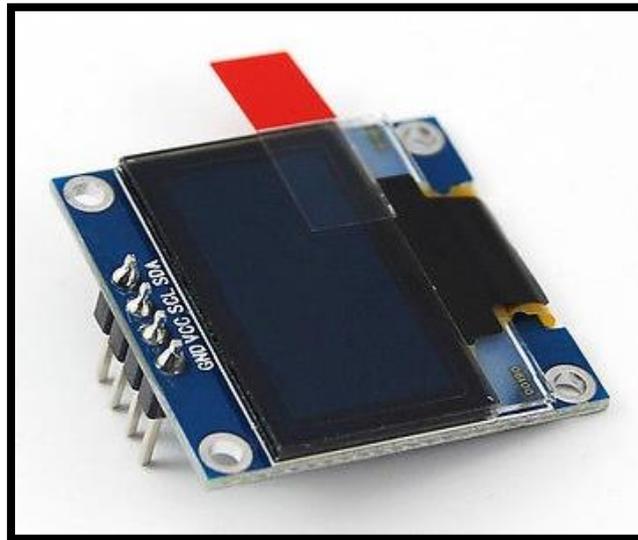


FIGURE 3.3 : 0.96 LCD 4 PIN

In contrast to LCD technology, Organic Light-Emitting Diode (OLED) displays do not require a backlight and are regarded as the ultimate technology for the next generation of flat panel displays. OLED displays are composed of a thin, multi-layered organic film placed between an anode and cathode, which are made up of electric conductive transparent Indium Tin Oxide. The multi-layered organic film includes a Hole Transporting Layer, Emission Layer and Electron Transporting Layer. By applying an appropriate electrical voltage, the holes and electrons are injected into the Emission Layer from the anode and cathode respectively and combine to form excitons, after which electroluminescence occurs. This 0.96" 128*64 Blue OLED Module offers 128*64-pixel resolution. They are featuring much less thickness than LCD Displays with good brightness and produce better and true colors. This OLED Display Module is very compact and will add a great ever user interface experience to your Arduino project. The connection of this display with Arduino is made through the I2C (also called as IIC) serial interface. The 0.96" 4 pin 128*64 Blue OLED Display Module produces blue text on black background with very good contrast when supplied with 3.3V-5V Supply. The OLED Display Modules also offers a very wide viewing angle.

4. DHT 11

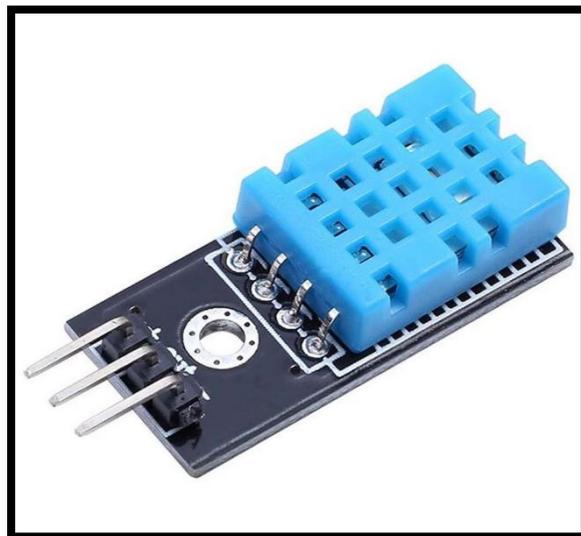


FIGURE 3.4 : DHT 11 Sensor

The DHT11 is a basic, ultra-low-cost digital temperature and humidity sensor. It uses a capacitive humidity sensor and a thermistor to measure the surrounding air and spits out a digital signal on the data pin (no analog input pins needed). It's simple to use but requires careful timing to grab data. Compared to another sensor, this sensor is less precise, less accurate, and works in a smaller range of temperature/humidity, but its smaller and less expensive.

5. Power module

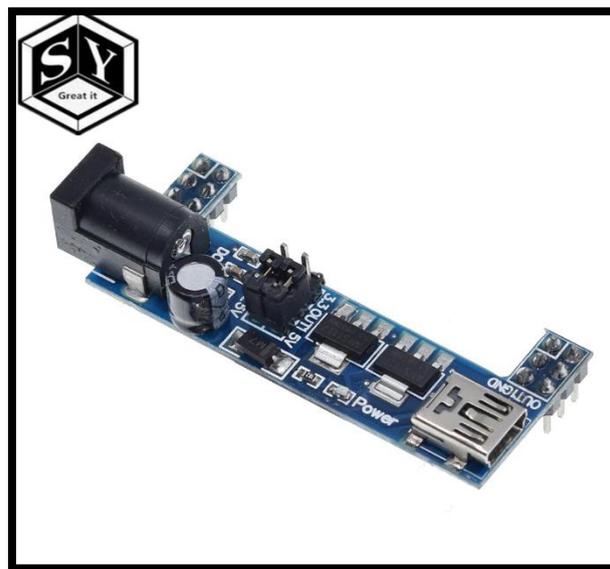


FIGURE 3.5 : Power Module MB-102

The MB102 Breadboard Power Supply Module securely fits in a standard 400 or 800 tie points breadboard and it also features reverse polarity protection, the module can take 6.5V to 12V input and can produce 3.3V and +5V. The module can also output 5V on USB connector or input through the USB connector.

6. Spray module



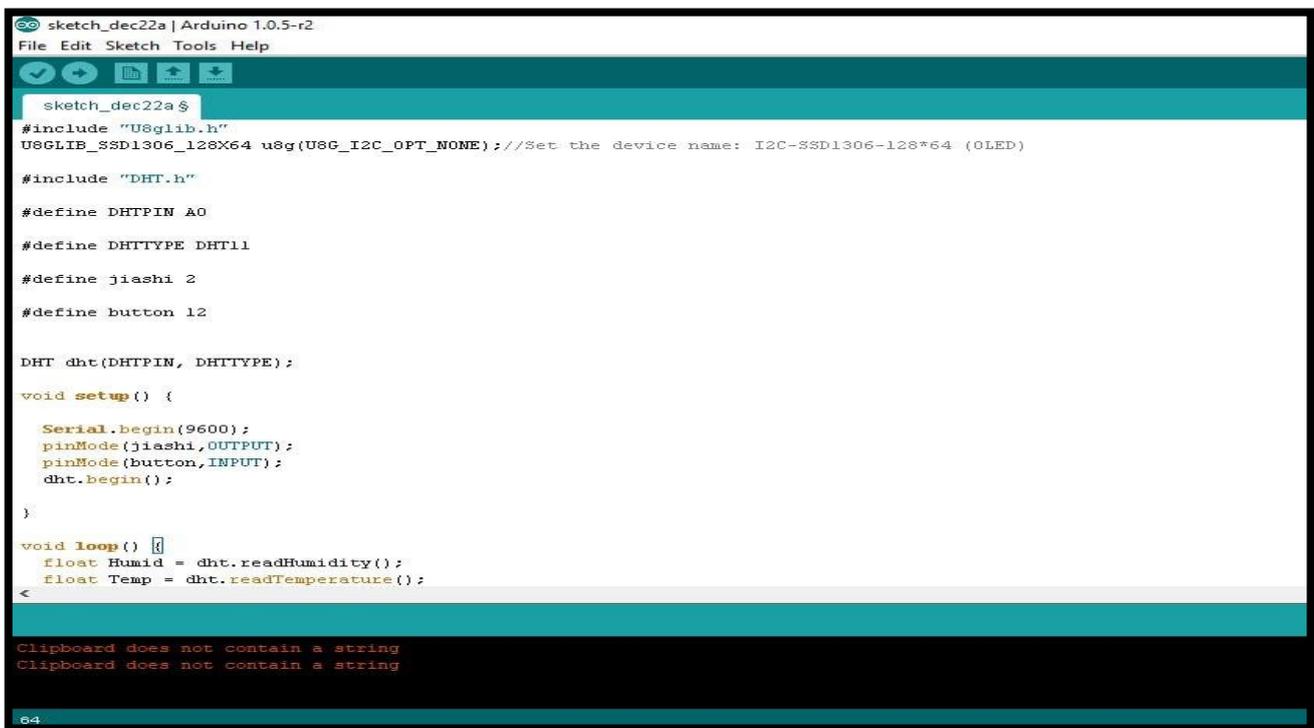
FIGURE 3.5 : Spray module 5v 108khz

Ultrasonic humidifiers have modern, high frequency technology that sends a vibration into the water. The water can't move in time with the vibration. The water breaks down into small droplets, which then transform into vapor. The humidifier releases this mist into the room as clean, sanitized air.

SOFTWARE

ARDUINO IDE

Using C and C++ functions, the cross-platform Arduino Integrated Development Environment (IDE) was created. Users are free to use it however they see fit because it is open-source software. The Arduino IDE gives a few examples of source code from the Examples file on the software's library, which provides several common input and output actions. User-written code only needs two fundamental functions, which are paired with a code stub `main ()` to generate an executable cyclic executive code using the GNU toolchain, which is also included with the IDE, for the sketch to begin and the main programmed loop.



```
sketch_dec22a | Arduino 1.0.5-r2
File Edit Sketch Tools Help

sketch_dec22a $
#include "U8glib.h"
U8GLIB_SSD1306_128X64 u8g(U8G_I2C_OPT_NONE); //Set the device name: I2C-SSD1306-128*64 (OLED)

#include "DHT.h"

#define DHTPIN A0

#define DHTTYPE DHT11

#define jiashi 2

#define button 12

DHT dht(DHTPIN, DHTTYPE);

void setup() {

  Serial.begin(9600);
  pinMode(jiashi, OUTPUT);
  pinMode(button, INPUT);
  dht.begin();

}

void loop() {
  float Humid = dht.readHumidity();
  float Temp = dht.readTemperature();
}

Clipboard does not contain a string
Clipboard does not contain a string

54
```

```
sketch_dec22a | Arduino 1.0.5-r2
File Edit Sketch Tools Help

sketch_dec22a $

Serial.print("Temp");
Serial.print(Temp);
delay(1000);
Serial.print("Humid");
Serial.print(Humid);
delay(1000);

u8g.firstPage();
do
{
  u8g.setFont(u8g_font_gdr14r);
  u8g.setPrintPos(25,18);
  u8g.print("DKARDU");
  u8g.setFont(u8g_font_9x18);
  u8g.setPrintPos(1,40);
  u8g.print("Temp: ");
  u8g.print(Temp);
  u8g.print(" C");
  u8g.setPrintPos(1,60);
  u8g.print("Humid: ");
  u8g.print(Humid);
  u8g.print("%");
}while(u8g.nextPage());

if(Humid<80){
  digitalWrite(jiashi,LOW);
<
```

```
sketch_dec22a | Arduino 1.0.5-r2
File Edit Sketch Tools Help

sketch_dec22a $

  u8g.print("Temp: ");
  u8g.print(Temp);
  u8g.print(" C");
  u8g.setPrintPos(1,60);
  u8g.print("Humid: ");
  u8g.print(Humid);
  u8g.print("%");
}while(u8g.nextPage());

if(Humid<80){
  digitalWrite(jiashi,LOW);
}else
{
  digitalWrite(jiashi,HIGH);
}

}
```

It is used to write code, compile the code to look for errors, and upload the code to Arduino. The IDE creates a Hex file for the code after the user writes it and compiles it, utilizing a USB cord, and the board will receive the (Hex file, which are Hexa Decimal files that Arduino can understand). The microcontroller on every Arduino board receives the hex file and executes the code according to the written source code.

CHAPTER 4

INTRODUCTION

This subject chapter covers the analysis done for the project's conclusions and findings. The automated portable humidifier has been put through testing, which shows that it was manufactured in line with the required initial specifications, i.e., it operates when the surrounding air humidity is lower than the humidity level that has been specified, which is 80 as the coding has been entered. within the Arduino.

DATA ANALYSIS

After the device has been completely constructed, it must be tested to see how effectively it functions. However, the purpose of testing for monitoring systems is to ascertain whether the product is effective or not on the consumer. Additionally, the initial intent of this product was to measure the relative humidity in a space, and it also had eczema patients in mind. Since eczema patients' skin is extremely sensitive to an area's moisture level, this product is created. However, the investigation revealed that this product only achieved one of its initial goals, namely, maintaining the amount of humidity in a space, and that it has not yet been clinically demonstrated to be effective for treating eczema in patients.

CHAPTER 5

CONCLUSION

As a result of the tight relationship between the humidity level of a location and the sensitive skin of eczema sufferers, a method for determining if an area's humidity level is suitable for such patients was provided in my senior year project. We are aware that new technology has a significant positive impact on people's daily lives in the age of globalisation, whether in terms of growth, employment, or health. In the meantime, I create products to ensure that people with eczema have more options than just relying on expensive hospital-acquired medications. It is preferable to try a new product I've created at a price that is neither expensive nor cheap, which can help to some extent in controlling the symptoms of eczema are worsening. The spray module in the product can be used in this project to create a gadget that can emit a water spray. Therefore, this project makes use of DHT 11 sensors, which can measure the amount of humidity in a certain region.

RECOMMENDATIONS

The goal of this project is to compile ideas for further investigation. The following suggestions are for further research and could be taken into account for project enhancement specifications. Therefore, incorporate technology like Bluetooth or a comparable technology so that users may access the product anytime, anyplace, and without having to flip a switch, making it even better and simpler for the user.

REFERENCES

- [1] M. Mahesh, P. Thangavel, k Bhuvaneshwaran, V. B. Raja, and D. Krishna, Performance Evaluation of Portable Mist Humidifier, 16-Dec 2020[online]. Available: <https://iopscience.iop.org/article/10.1088/1757-899X/995/1/012030/meta>. [Accessed: 23-Sep-2022].
- [2] A. links open overlay panelZhuangboFengacXiaoqingZhoubShihanXucJunweiDingcShi-JieCaoacPersonEnvelope Highlights Impacts of humidification process on indoor thermal comfort and air quality was studied “Building and Environment, 10-Feb-2018. [Online]. Available: <https://www.sciencedirect.com/science/article/abs/pii/S0360132318300775>. [Accessed: 22-Dec-2022].
- [3] J. Steve, “Development of fuzzy control systems in portable ... - iopscience.” [Online]. Available: <https://iopscience.iop.org/article/10.1088/1757-899X/546/3/032013/meta>. [Accessed: 22-Dec-2022].
- [4] Author links open overlay panelHossam A.AhmedaI.M.IsmailaWael F.SalehaM.AhmedabPersonEnvelope, H. A.Ahmeda, a, I.M.Ismaila, W. F.Saleha, M.AhmedabPersonEnvelope, b, AbstractThe performance of a desalination unit using humidification-dehumidification technology with new corrugated packing aluminum sheets in the humidifier was experimentally investigated. The influences of operating variables on yield and performance a, K. Zhani, A. S. Nafey, J.-J. Hermsillo, N. A. S. Elminshawy, F. Gharagheizi, G. P. Narayan, J. C. Ho, H. M. Factor, S. Al-Hallaj, J. Orfi, C. Yamali, C. Muthusamy, N. K. Nawayseh, G. Al-Enezi, Y. J. Dai, and A. E. Kabeel, “Experimental investigation of humidification-dehumidification desalination system with corrugated packing in the humidifier,” Desalination, 04-Feb-2017. [Online]. Available: <https://www.sciencedirect.com/science/article/abs/pii/S0011916416311456>. [Accessed: 22-Dec-2022].

[5] A. links open overlay

panelKangqiGuoaHuaQianabPersonEnvelopeFanLiuaJinYeaLiLiucPersonEnvelopeXiaohongZhengad
, KangqiGuoa, a, HuaQianabPersonEnvelope, b, FanLiua, JinYea, LiLiucPersonEnvelope, c,
XiaohongZhengad, d, AbstractPortable humidifiers are extensively employed to increase indoor
humidity; however, P. Aggarwal, D. V. Hung, C. R. He, K. A. Ramisetty, T. Kudo, M. Zhou, C.
Dekker, W. Yao, S. Gaffney, H. B. Zhang, Z. Feng, P. Wolkoff, M. Sato, J. Razjouyan, L. M.
Reinikainen, V. R. Highsmith, and R. L. Tyndall, “The impact of using portable humidifiers on
airborne particles dispersion in indoor environment,” *Journal of Building Engineering*, 17-Aug-2021.
[Online]. Available: <https://www.sciencedirect.com/science/article/abs/pii/S2352710221010056>.
[Accessed: 22-Dec-2022].