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Analysis And Compilation of Humidity and Temperature Data with The Help Of IOT: A Case Study on Go Green Concept

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ABSTRACT

With the overall temperature rise across the globe and the sweltering heat these summers, one can safely assume that households will see a furious shoot-up in their electricitybills this year. While the urban population resorts to air-conditioning to escape the heat wave,the poor clamour for shade in varied confinements. About 300 million people in India live without access to power. The perfect solution for the poor to the problem of rising temperaturesis the 'Eco-Cooler', a cooling device that can run without electricity and introducing 'VentingSkylights'. The process involves creating grids made from repurposed plastic bottles cut in halfand installed on windows as per size. Based on the direction of the wind and the pressure created by airflow, the Eco-Cooler decreases the temperature by five degrees Celsius at optimal conditions. Venting skylights can be opened or closed, allowing fresh air to circulate in home, boosting ventilation beautifully. They can also be opened to release heat build-up ormoisture.

Keywords: Eco-coolers; Venting skylight; Energy efficiency; Zero energy consumption;Temperature drop

1. Introduction

Eco-Cooler [1] is a device which consists of grids of repurposed bottles which are cut into half and the brims are inserted into a cardboard sheet. The Eco-Cooler is then fixedto a window which is in the direction of max air flow so that the wider end of the bottlesfaces outside. The air passes through the bottles and gets compressed while passing through the neck. The compressed air while leaving the brim will expand rapidly [3] and gives cooler air as you can see in the pic below. A wind catcher is a traditional Persian architectural element to create natural ventilation in buildings. Wind catchers come in various designs: uni-directional, bi-directional, and multi-directional. The devices were used in ancient Egyptian architecture.

Skylights are becoming a fixturein today's green homes. With proper installation, the right kindof skylight can help make home more energy-efficient and save on heating and cooling costs. Some skylights can help warm home in winter, saving on heating bills. Others have special
layers of glass to reduce heat intake, helping cool your home in summer. Today's sophisticated skylights can be programmed to release warm air on summer nights, reducing the need for air conditioning. The technology is fantastic. Skylights can also reduce energy use and extend the life of your bulbs by letting natural light fill your home. In addition to helping, you save on lighting costs; it brings us joy and reduces stress.

The Objective of this experiment is to reduce the temperature by 3-4° in the afternoon and also maintain the temperature in the night by using the concept of Eco-cooler and Skylight.

2. Methodology:

Step 1: Preparation of the House:

A model of size 3ft x 2ft x 3ft (L x B x H) respectively was made to carry out the experiment. The model was made by plywood with a thickness of 8mm. The model consists of 2 windows on the wall on opposite sides, a skylight at the roof and a door. The model was painted white in colour at the walls to reflect maximum light and help in lowering the temperature of the model. The roof was painted brown in colour.

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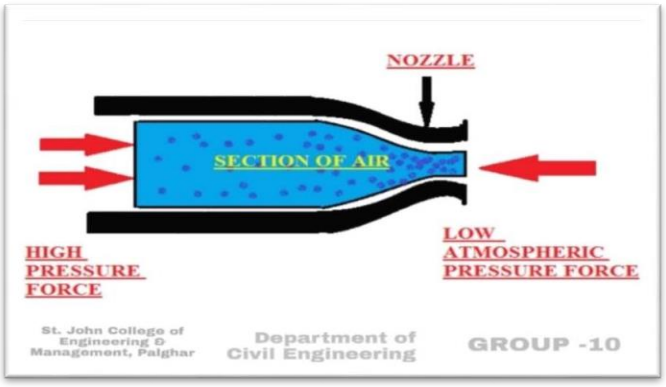
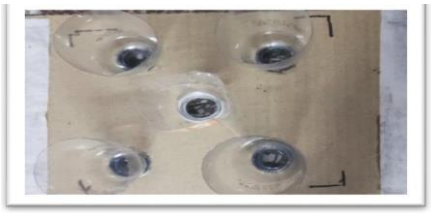
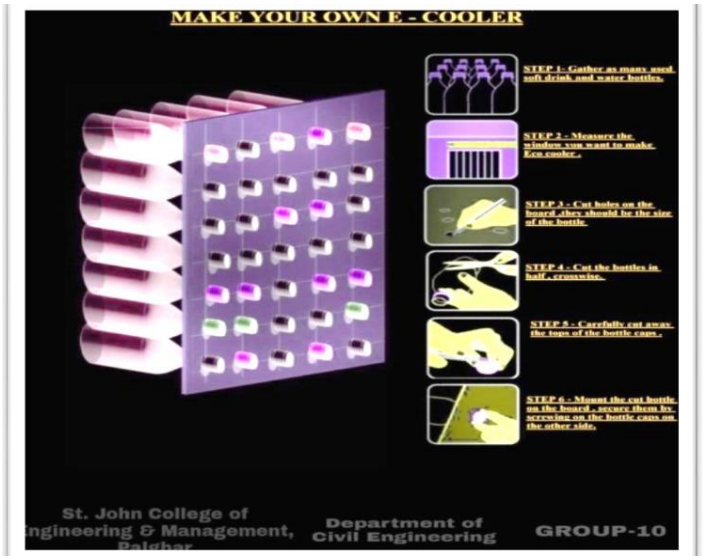


Step 2: Preparation of the Eco Coolers:

Eco coolers were made by reusing cardboard boxes and empty plastic bottles [4] [5]. Holes were cut out in the cardboard in the size of lid of the bottle. The bottles are placedin the manner such that the smaller lid is placed on the inside of the model and the largeropening is placed outside of the model. The cardboard is cut in the size of the windowsi.e., 22 x 22 cm. The eco cooler is the stick on the window.





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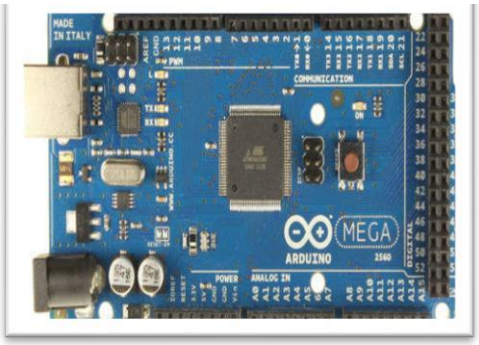
Step 3: Installation of VentingSkylight:

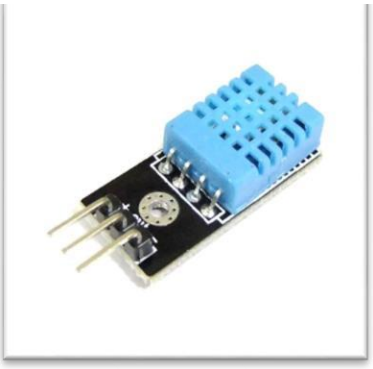
A skylight is installed on the roof of the model to regulate theventilation and also provide thesunlight. The skylight isinstalled on the east of the model on an inclination so as to
provide ample of sunlight.

Step 4: DHT 11:

An electronic component namely DHT 11 [2] is usedfor measuring Humidity and Temperature of themodel. DHT 11 is programmed and powered throughArduino Mega. DHT 11 is programmed in such a way that it detects humidity and temperature of the model at every 30 mins interval.



Step 5: Experimental Work:



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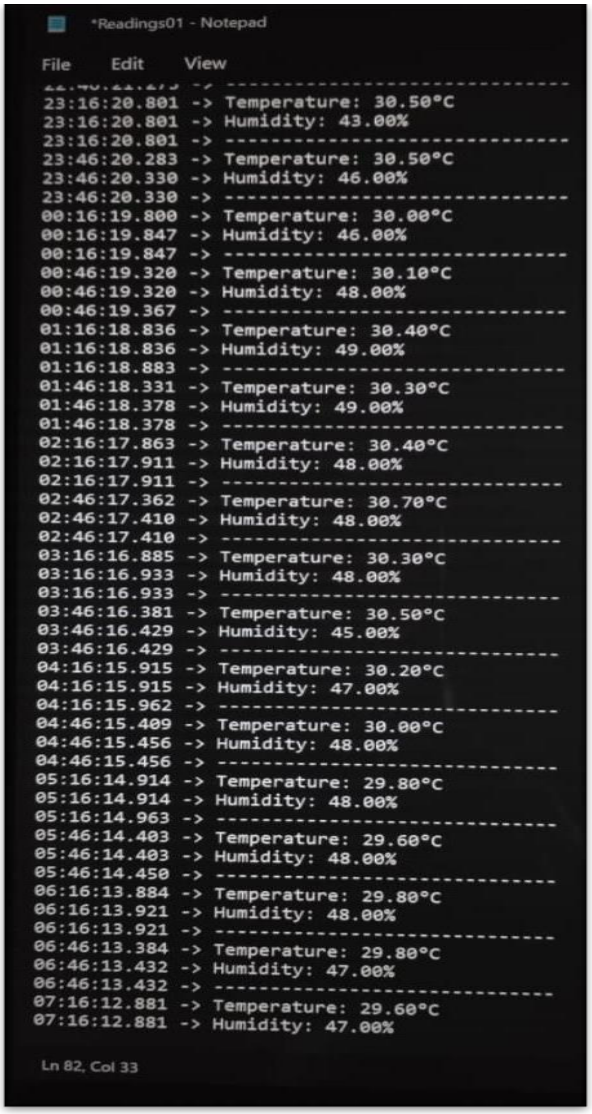
The model is kept in the open surrounding for a whole day for 1 set of the reading. The temperature and the humidity inside the model is displayed on the laptop which is detected bythe DHT 11.

Following set of combinations weretested:

- Day 1. Model without Eco coolers andventing skylight opened.
- Day2. With eco coolers and ventingskylight opened (during heat waves)
- Day3. With eco coolers and ventingskylight opened
- Day4. With eco coolers and venting skylight closed
- Day5. Without eco coolers and venting skylight closed

Program Code **Output**



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```
#include <Adafruit_Sensor.h>#include <DHT.h>
#include <DHT_U.h>

#define DHTPIN 2              // Digital pin connected to the DHTsensor
#define DHTPIN1 4             // Digital pin connected to theDHT sensor

#define DHTTYPE    DHT11      // DHT 11


DHT_Unified dht(DHTPIN, DHTTYPE); DHT_Unified dht1(DHTPIN1, DHTTYPE);

uint32_t delayMS;int count = 30; void setup() {
Serial.begin(9600);
// Initialize device.dht.begin(); sensor_t sensor;
dht.temperature().getSensor(&sensor); dht.humidity().getSensor(&sensor); delayMS = sensor.min_delay / 1000;
delay(delayMS);
}

void loop() {

// Get temperature event and print its value.if(count == 30){ //30 : 30 min
count = 0; Serial.println(); sensors_event_t event;
dht.temperature().getEvent(&event); dht1.temperature().getEvent(&event);if (isnan(event.temperature)) {
Serial.println(F("Error reading temperature!"));
}
else { Serial.print(F("Temperature: "));Serial.print(event.temperature);Serial.println(F("°C"));
}
// Get humidity event and print its value
dht.humidity().getEvent(&event);
if (isnan(event.relative_humidity)) { Serial.println(F("Error reading humidity!"));
}
else { Serial.print(F("Humidity: "));
Serial.print(event.relative_humidity);Serial.println(F("%"));
}
}
Serial.print(F("-"));count += 1;
// Delay between measurements.delay(60000);
}
```

3. Results

The test was conducted for 5 days including a day when there were heat waves flowing.Table 1.1 shows the maximum - minimum temperature and humidity of the respected days. Fig 1.1 a & b, Fig 1.2 a & b, Fig 1.3 a & b, Fig 1.4 a & b and Fig 1.5 a & b shows

Date	12/03/22 – 13/03/22	14/03/22 (Heat waves)	15/03/22	16/03/22	17/03/22
Time	13.46pm – 13.16pm	11.53am – 13.23pm	00.11am – 22.41 pm	00.11am – 22.41pm	00.11am – 22.41pm
Inside Temperature	32.00° (max) 29.60° (min)	37.60° (max) 34.50° (min)	33.60° (max) 29.00° (min)	31.80°(max) 29.50° (min)	32.30° (max) 29.50° (min)
Outside Temperature	35.80° (max) 28.50° (min)	41.50° (max) 37.90° (min)	37.00° (max) 29.00° (min)	36.50° (max) 29.50° (min)	37.00° (max) 29.00° (min)

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Inside Humidity	55% (max) 42% (min)	18% (max) 11% (min)	55% (max) 38% (min)	55% (max) 43% (min)	52% (max) 46% (min)
Outside Humidity	56% (max) 44% (min)	14% (max) 12% (min)	55% (max) 34% (min)	52% (max) 45% (min)	55% (max) 38% (min)

the graphs of the days mentioned in the experimental work.

Table 1.1 Humidity & temperature for following date

Day 1:

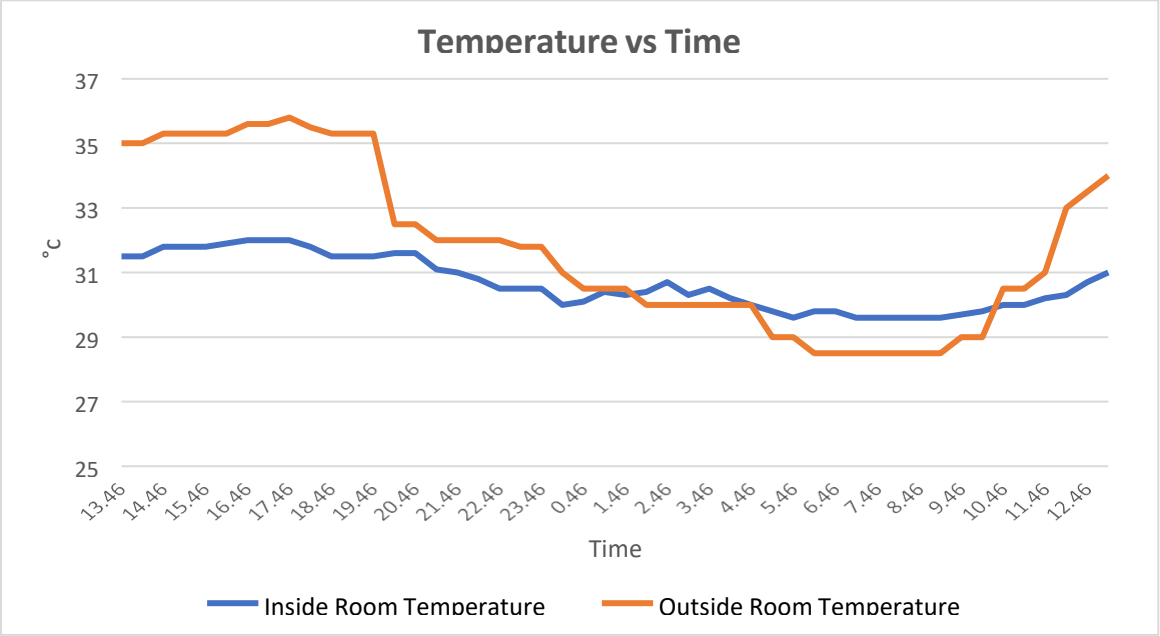

Fig 1.1 (a)

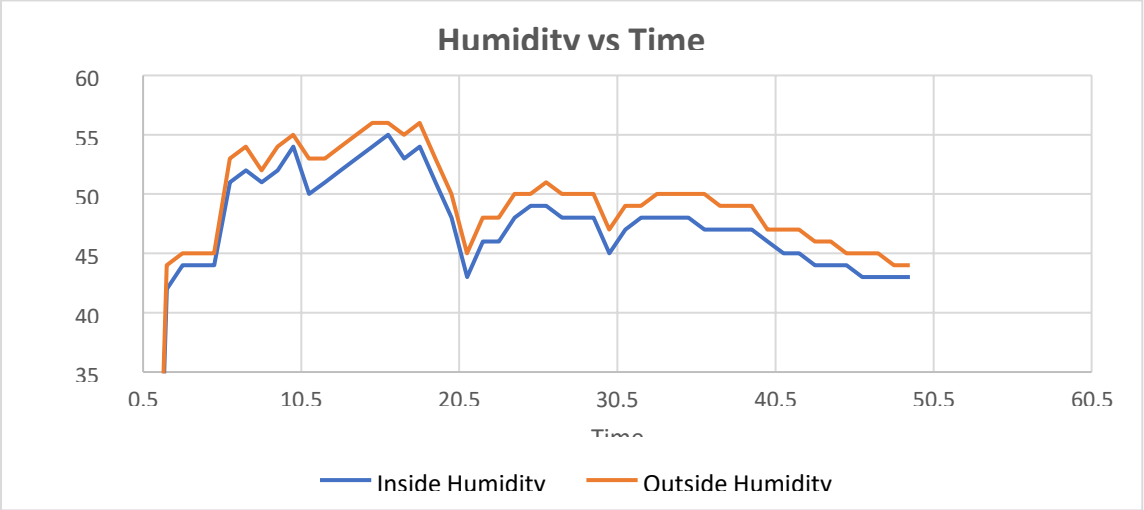

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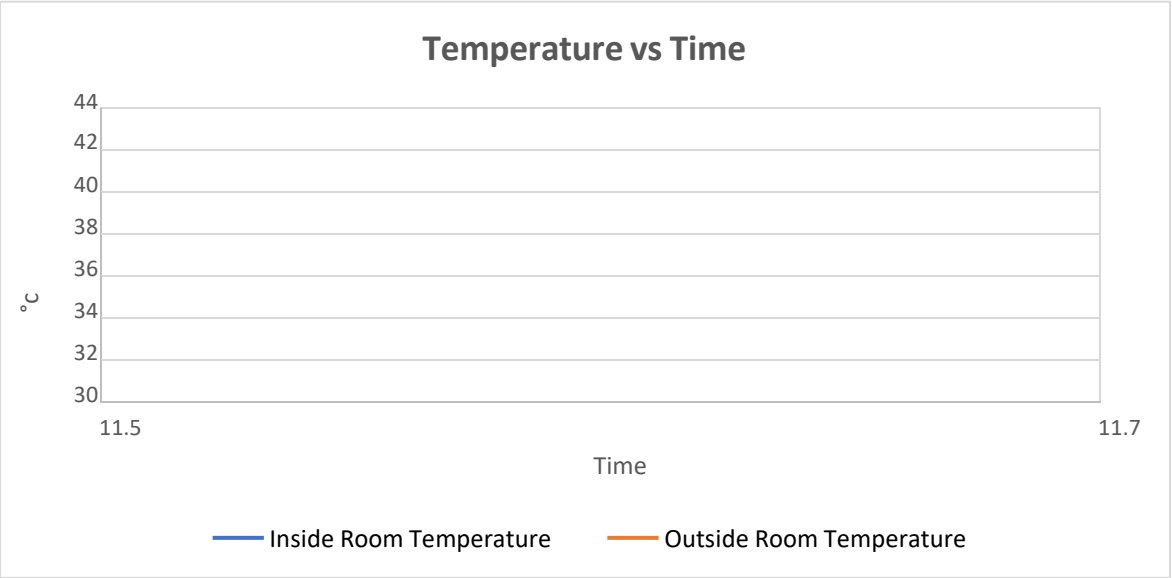
Fig 1.1 (b)



Day 2: This experiment was conducted during the heat waves.

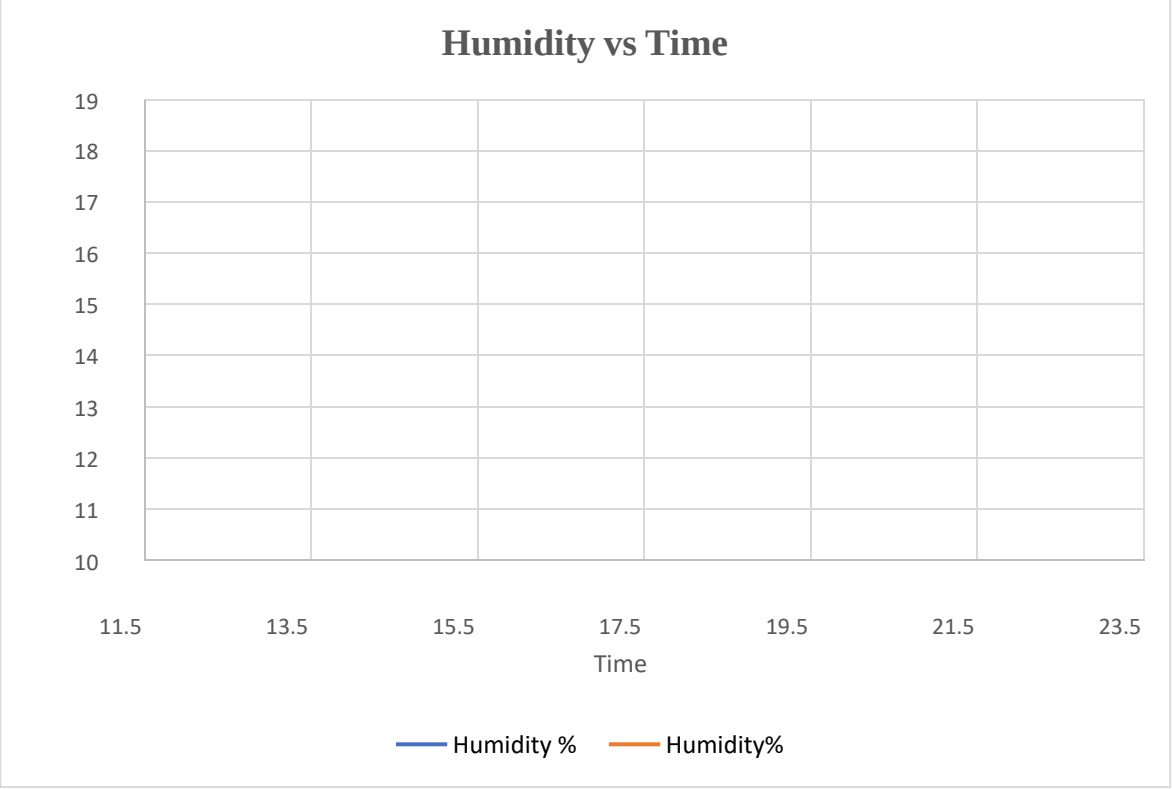


Fig 1.2 (a)

Fig 1.2 (b)

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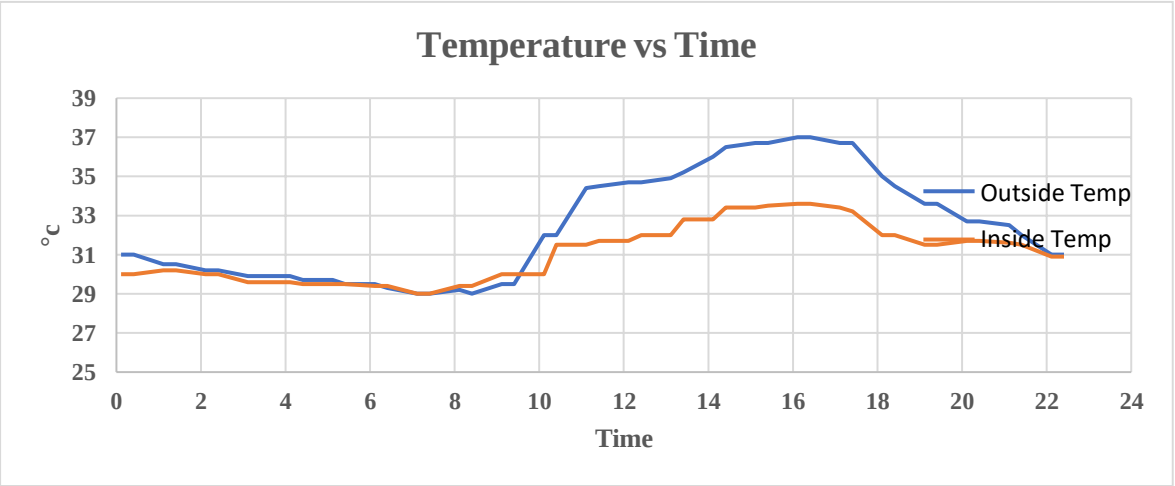

Day 3:

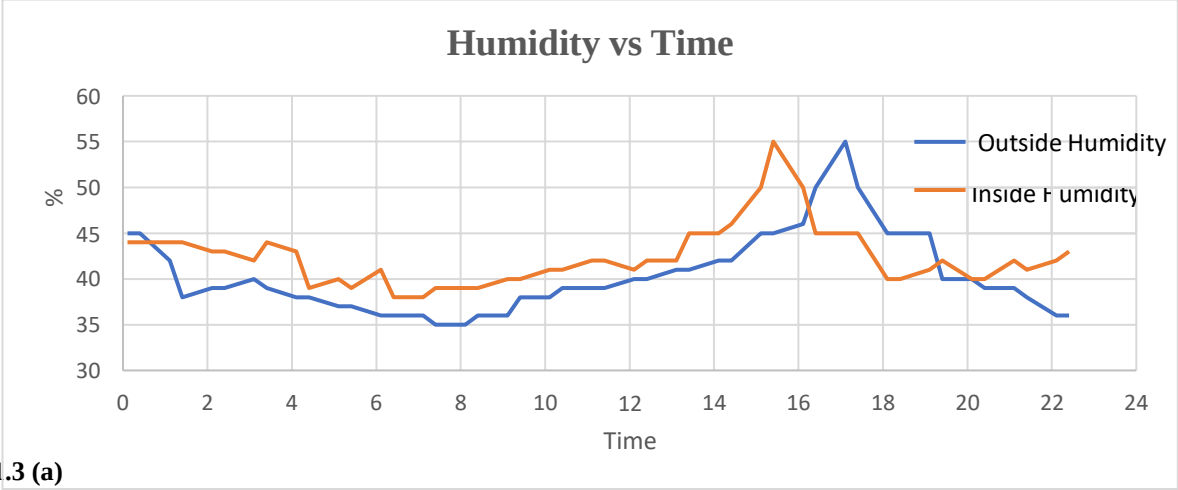

Fig 1.3 (a)

Fig 1.3 (b)

Day 4:

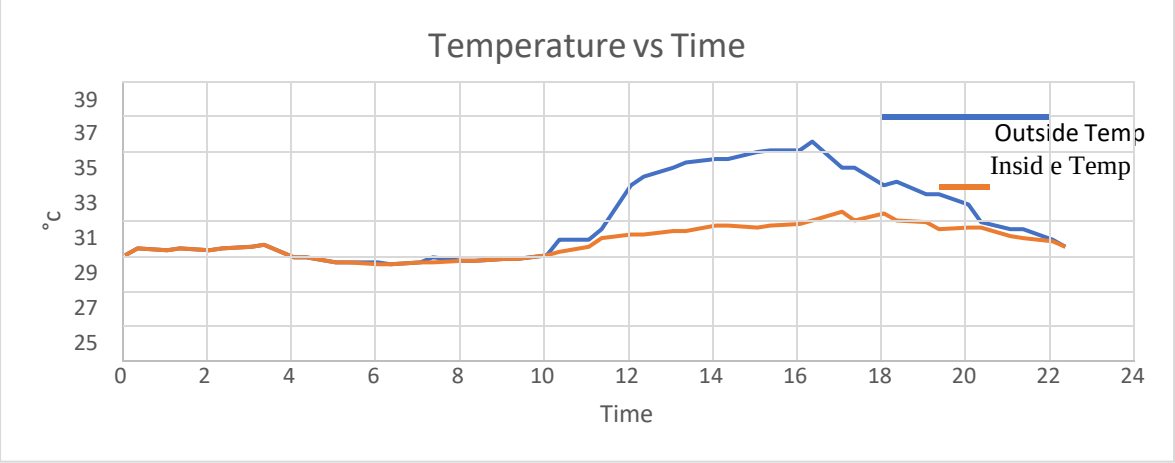

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Fig 1.4 (a)

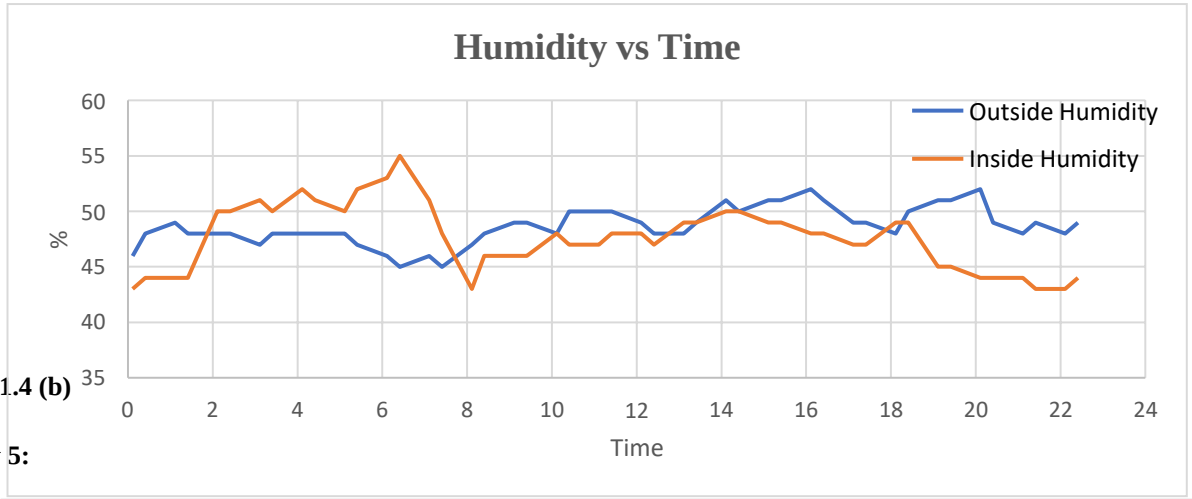
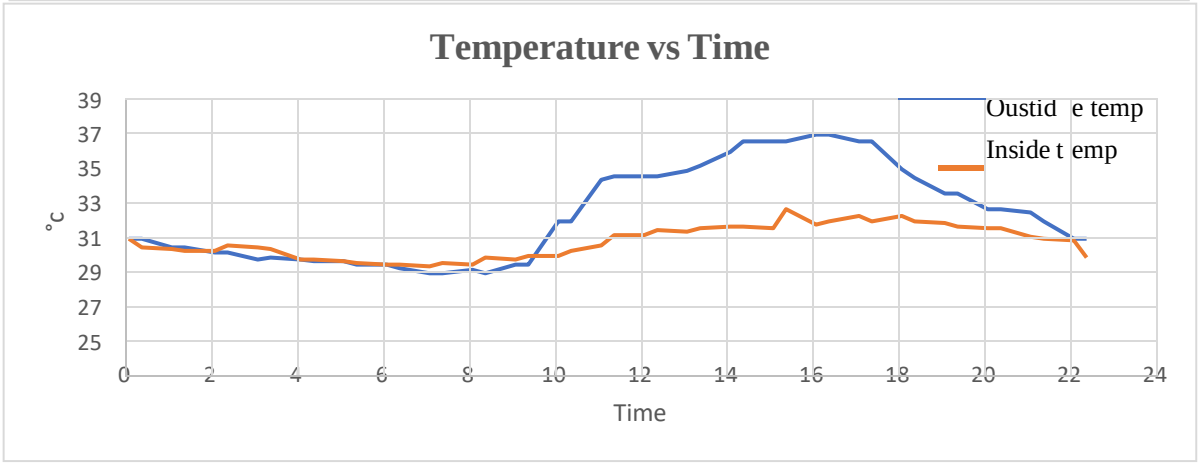


Fig 1.4 (b)

Day 5:



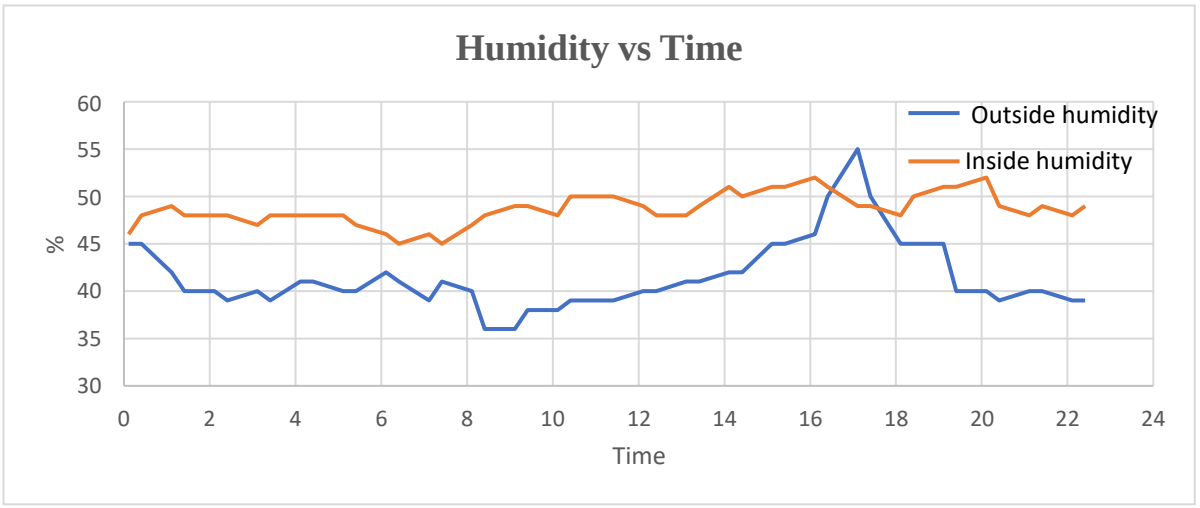


Fig 1.5 (a)

Fig 1.5 (b)

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4. Conclusion:

Temperatures are getting intolerable these days, day by day the temperatures are increasing due to industrialisation, global warming, pollution etc. Our solution, Eco- Cooler with ventilated skylight, will definitely work well within its limits. This zero electricity, zero pollution, low cost, easy to make, and, easy to install cooling device will help the poor in surviving the summer heat by reducing the indoor temperature upto 3-5° Celsius at optimal conditions when installed in the house. Also, the ventilated skylight will help maintain the temperature during night and allows the hot air to escape when opened.

Our project will ensure that the people can battle the ever-increasing day temperatureswithout spending more of their money, in some cases, any of their money. Not only forhumans, Eco-Coolers can be employed effectively in cattle farms and pet houses whichprovides the animals a great sense of relief from the sweltering summer heat without costing a heap on the farmer's head.

References:

[1] https://inhabitat.com/this-amazing-bangladeshi-air-cooler-is-made-from-plastic-bottles-and-uses-no-electricity/eco-cooler-plastic-bottle-air-conditioner-5/

[2] https://uwearduino.wordpress.com/portfolio/dht11-humidity-sensor-individual/

[3] https://www.louisianalandcan.org/article/The-five-principles-of-green-building/868

[4] Castalia Homes (2009)." Building Green Materials, Products, Recycling andManagement."

[5] S Srinivas, "Green Buildings in India – Lessons Learnt"