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Humidity and Temperature Monitoring and Controlling using Matlab with Arduino

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Abstract

The objective of this paper is to achieve a functional system in terms of hardware and software, to measure temperature and humidity. Also, this system will allow to monitoring the time and control the parameters with the help of fan. In this, we use an Arduino board with interfacing a sensor placed in local environment to measure temperature and humidity. Internet of Things (IoT) is emerging and is accustom for remote monitoring of the surrounding parameters and other stuffs with the use of sensors that acquaint for wireless sensing of real time data and transfer them into the desired form and help to forward the sensed data across the network cloud via 'Internet Connection'. Here the project work deals with The IoT 'Cayenne' web service which is a generous open API service that act as a host for the variety of sensors to monitor the sensed data at cloud level and composite a special feature of porting the sensed data to the MATLAB R2022 using a channel ID and read API key that is assigned by services and able to track data value at picky sample at particular intervals. This project also uses an Arduino UNO board,

ESP8266 Wi-Fi Module that helps to process and transfer the sensed data to the Cayenne Cloud.

Keywords: Arduino , Cayenne App , Humidity and Temperature Sensor , ESP 8266 Node MCU,Fan.

1. Introduction

Today, the increased demand of service over the internet necessitated the data collection and exchange in efficient manner. In this sense internet of things (IoT) had promised the ability to provide the efficient data storage and exchange by connecting the physical devices and vehicles via electronic sensors and internet. Thus, in order to achieve the efficient IoT accomplishment for an application; the proper sensing and monitoring system are essential. Generally a sensing unit is composed of different sensors like temperature, humidity, gas etc.while a monitoring unit composed of current and voltage parameters. The IoT has created a revolution all over the world and fascinatingly it has become integral part of our lives [01]. The day has arrived that the government sectors are also espouse the IoT because of its gigantic significance in each and every area [02]. The present situation is that we can easily locate the every object and peoples. This technology advancement can create more job scopes and research ideas. The complexity in sensors and connection of many sensors in a system has enhanced the data measurement, analysis and also data aggregation in localized level. proposed model comprises of detecting units which sees the ecological quality, (for example, Humidity, temperature, heat list, gas, and so on), voltage and current parameters of the different family unit machines for observing the measure of force devoured. And a controlled framework yielded the amassed information by using IOT.Vibration monitoring is the process of using sensors to monitor small movements of various types of rotating machinery. Increasing vibration levels can be indicative of a developing failure, malfunction, or process restriction. Properly monitoring vibration of rotating equipment is a

key component of a successful predictive maintenance program and can lead to a decrease in unscheduled outages, optimization of machine performance, and a reduction of repair and maintenance costs.

In Monitoring Temperature and humidity for Server Room is a system based an IoT, which provides information while regulating temperature and humidity inside the server room.[1]

Another problem that accrued is that if there is an increase and decrease in the temperature that is drastic on server space that cannot be monitored when the network admin is not in the present..[2]

Wireless Sensor Networks (WSNs) offer a wide range of applications, including next-generation intelligent Internet of Things (IoT) applications. Network nodes in WSNs do not admit their battery replacement since the phenomenon being researched is rarely accessible or inaccessible.[3]

For certain musculoskeletal complex rupture injuries, the only treatment available is the use of immobilization splints. This type of treatment usually causes discomfort and certain setbacks in patients. In addition, other complications are usually generated at the vascular, muscular, or articular level [4]

Every time these values exceed the threshold selected for each notification given to the user via the telegram application by utilizing the telegram API..[5]

In this work, an exponential observer is performed for an exothermal axial dispersion tubular reactor that involves one nonlinear sequential reaction.[6]

The web technology is rapidly increased in various fields. This paper aims to create a server on cloud platform to store data and process the information collected by the air quality monitoring system (AQMS).[7]

Today, there is increased demand for service over the internet for data collection and exchange in efficient manner.[8]

The Internet of Things (IoT) has become the new area of research and development for variety of applications in industrial and domestic areas. The model proposed in the paper consists of a built-in Wifi module Node MCU, an open source IoT platform, Arduino UNO controller, and programming languages along with sensor devices and network.[9]

To monitor and control the temperature-humidity is an important part during the construction of the laboratory. The temperaturehumidity will have an important effect on the normal operation of facilities, the reliability of experimental data, and the correctness of experimental results. So building the monitor-control system of temperature and humidity to the laboratory is both inevitable and necessary.[10]

This paper introduces the automatic-control system of temperature- humidity in laboratory, which controlled by microcomputer, and consisted by the host computer, lower position machine, and sensor .In the same time, the system can achieve the purpose of the real time supervision to the variation of temperature-humidity in Lab, and as for the automatic control for air conditioning, and as for the control of open- close indication for moisture-trap. Consequently, it is made sure that the lab be in a proper state.[11]

2. Block Diagram

The block diagram of Monitoring and Control of saving Humidity&Temperature

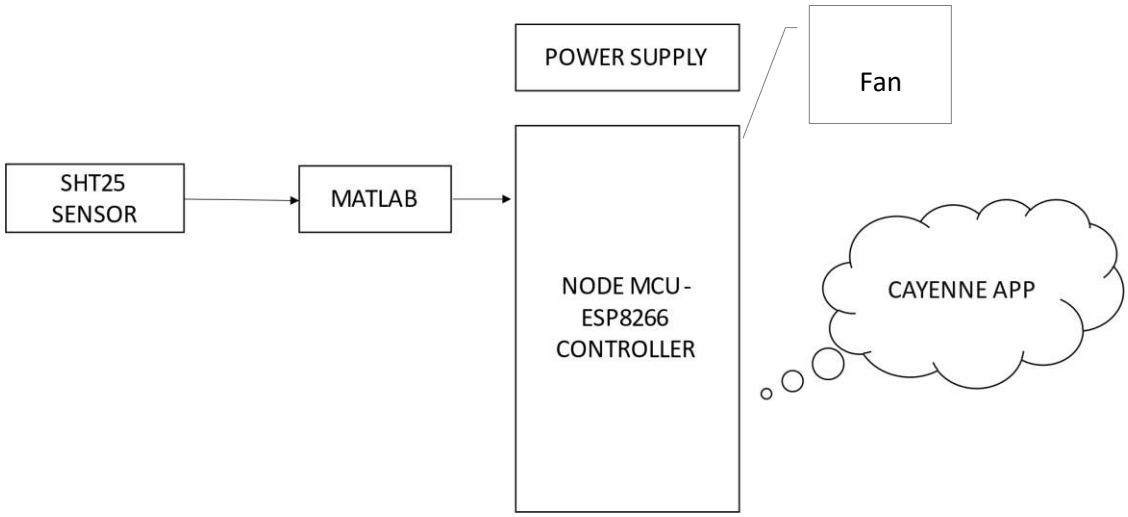

Figure. 1 Block diagram of the system

3. Hardware Description

3.1 SHT25 Sensor:

The SHT25 is a popular temperature and humidity sensor with a devoted NTC for temperature measurement and an 8-bit microcontroller for serial data output of temperature and humidity data.SHT25 Pinout Identification and Configuration: Temperature and Humidity Sensor (SHT25) .Fig. 3 shows the Temperature and Humidity sensor (SHT25). The operating voltage of this sensor is 3.5V to 5.5V. The measuring operating current of this sensor is 0.3mA and its standby is 60 μA. It has serial data output. The temperature range of SHT25 is 20% to 90%, ensuring it has a temperate humidity resolution is 16-bit, and its accuracy is ±1°C and ±1%. Becausethe ESP-01 WIFI Transceiver Module can be addressed through SPI and UART, it's a great choice for anybody looking to develop an Internet of Things device.

Figure.2. SHT25 Sensor

3.2. ESP8266 WIFI Module

The SP8266 ESP-01 Serial WIFI Transceiver Module is a low-cost and modest way to connect to the Internet wirelessly. The ESP8266 has a lotof treating and storage power on board. Its high level of on-chip integration necessitates least outside circuitry and is intended to yield astiny PCB space as conceivable.

Figure. 3 . ESP8266 WIFI Module

3.3. Ardinuo

An Ethernet shield module, an infrared receiver, and an infrared transmitter are used as actuators, together with an Arduino Mega. The Arduino microcontroller board is based on the Atmega328. Because of its extensive collection of the infrared receiver and transmitter

libraries, Arduino was chosen. The C Programming Language is the programming language used by Arduino. The Arduino circuit is an actuator that registers and sends signals to the remote air conditioner through an infrared transmitter and receiver.The infrared receiver is attached to the breadboard with the ground pin connected to the Arduino's ground pin, the power pin to the Arduino's 5-volt power pin, and the signal pin to the Arduino's Digital Pin 3. The goal of the circuit is to obtain the signal code for each temperature setting from a remote air conditioner. The signal code acquired will be input on the Arduino, which will be connected to the Infrared Transmitter. The infrared transmitter is explained to be put on a breadboard. Positive pins (+) are connected on Arduino digital pin 9 while negative pins (-) are installed on Arduino ground pin. By transmitting the infrared signal code from Arduino to the Air Conditioner, the circuit attempts to turn on the air conditioner. The Arduino controller used in this project is given in Fig. 4.

Figure.5. Arduino

3.4. Fan

An axial fan is a type of fan that causes gas to flow through it in an axialdirection, parallel to the shaft about which the blades rotate. The flow is axial at entry and exit. The fan is designed to produce a pressure difference, and hence force, to cause a flow through the fan. Factors which determine the performance of the fan include the number and shape of the blades. Fans have many applications including in windtunnels and cooling towers. Design

parameters include power, flow rate, pressure rise and efficiency. we connected it with arduino it plays a major role in controlling the humidity and temperature.

Figure.5. Fan

4. Proposed Circuit Diagram

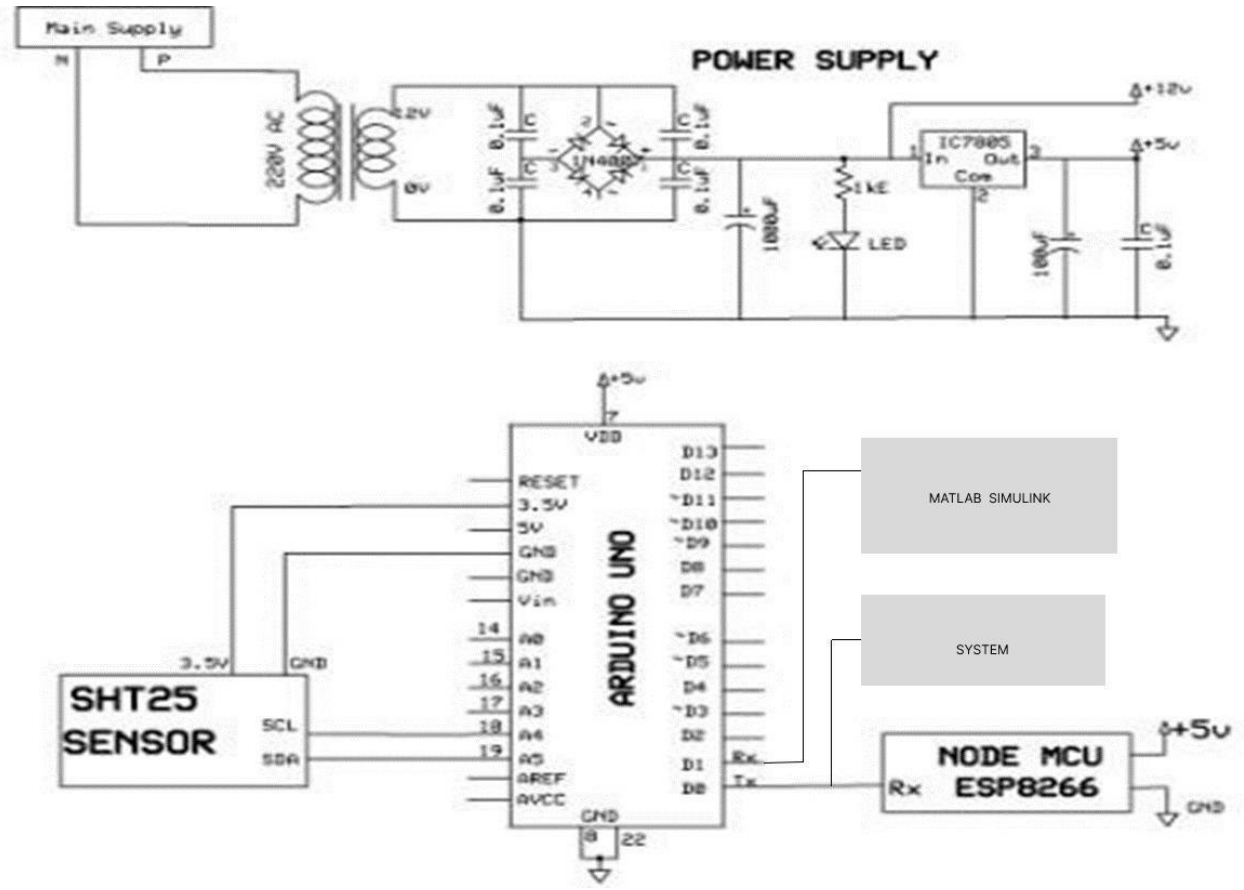

Figure.6. Circuit diagram of the Proposed circuit

5. Software Description

5.1.Cayenne

Cayenne is an app for smartphones and computers that allows you to control the Raspberry Pi and soon also the Arduino through the use of an elegant graphical interface and a solid nice communication protocol. Thefeatures are: Add and remotely control sensors, motors, actuators, GPIO boards, and more.

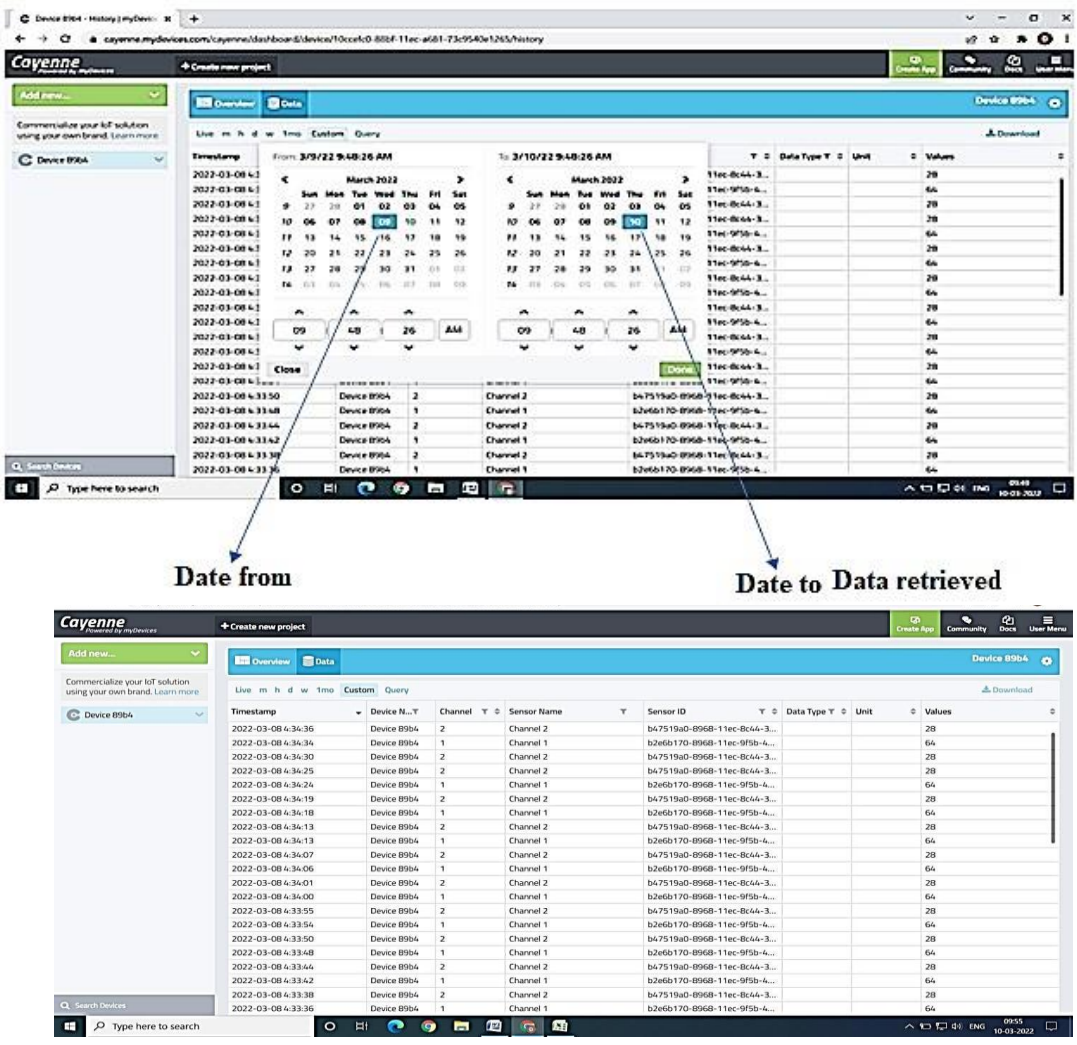

Figure.7. Cayenne

5.2 Arduino

The Arduino software is easy-to-use for beginners, yet flexible enough for advanced users. It runs on Mac, Windows, and Linux. Teachers and students use it to build low cost scientific instruments, to prove chemistry and physics principles, or to get started with programming and robotics.

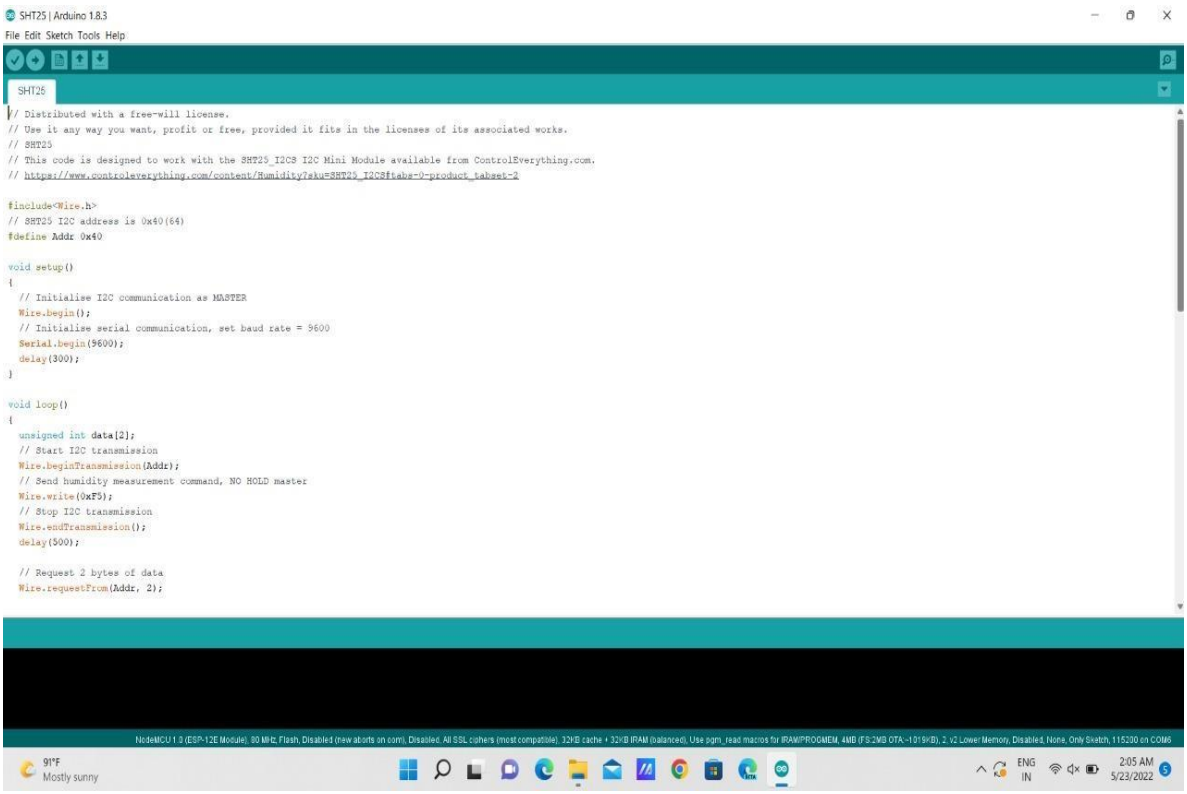

Figure.8. Ardunio Program

6. Experimental Setup / Hardware Prototype

The below figure depicts the hardware prototype that has been developed to realize the proposed methodology. The tests wereconducted using the below experimental setup.

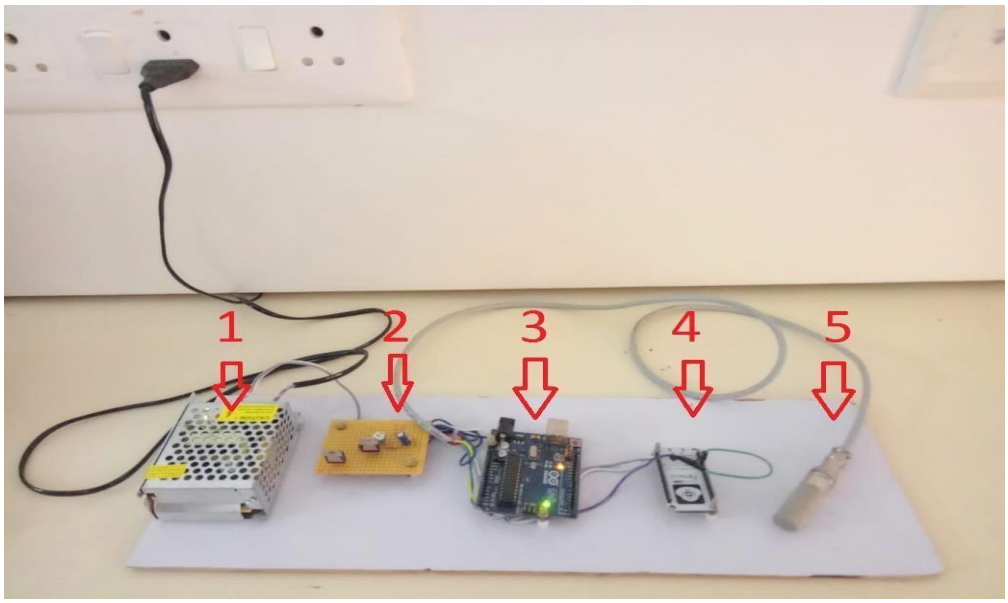

Figure.9. Experimental Setup

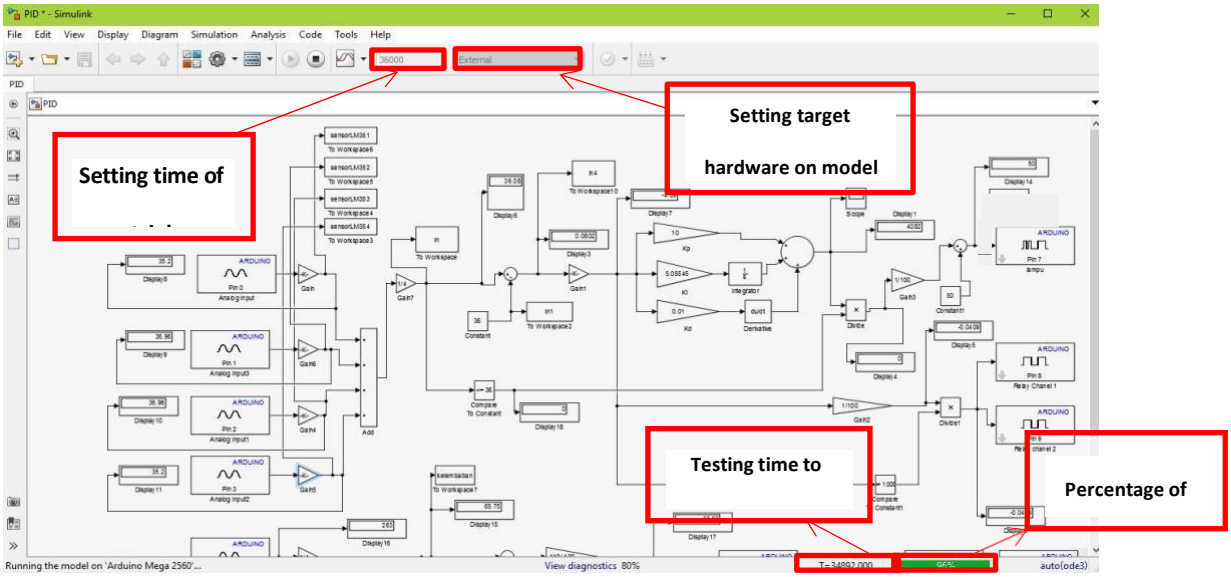

Figure.10. Schematics running asserted prototype testing without loadwith the help Of Simulink/MATLAB software

7. Result

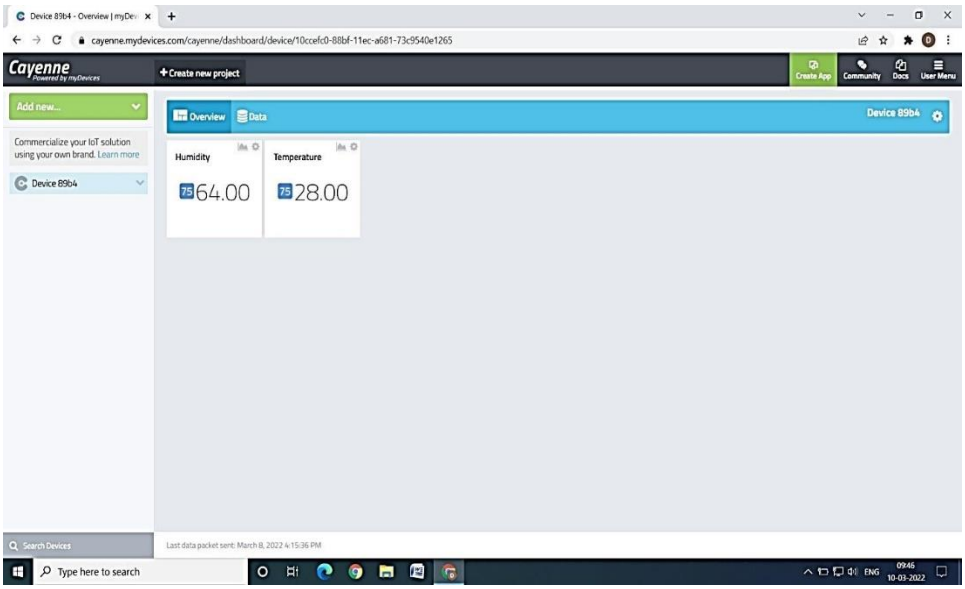

Figure.10. Result

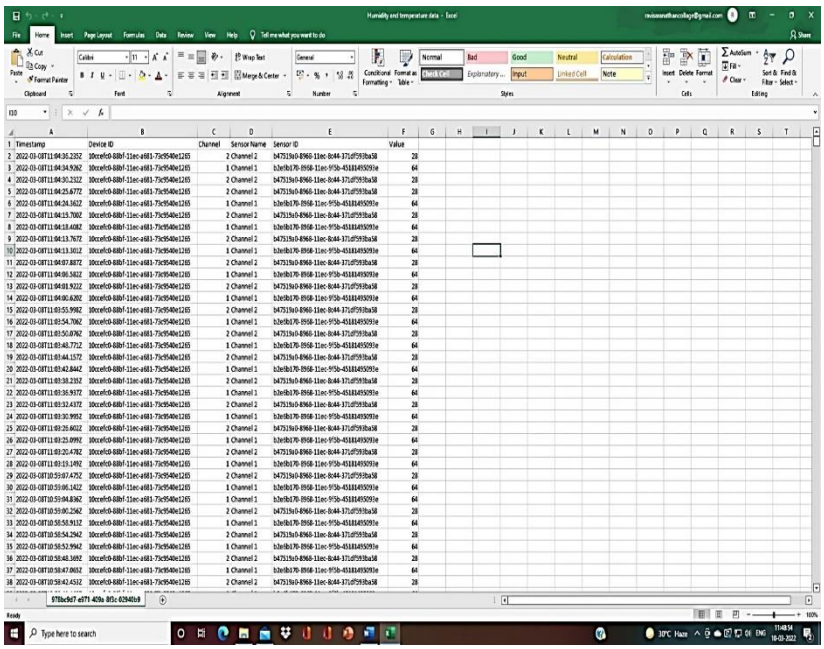

Figure.11. Real-time output in IoT

The device (RH and temperature monitor) is built using components such as the SHT25 sensor, Aurdino Uno board, Node MCU, Switch Mode Power Supply (step down power supply), and Cayenne software.An SMPS is a device that converts 230 V to a 12 V power supply. 12V is converted to 3.5V using a voltage regulator. Because components like the

SHT25, UNO, and Nod MCU only work at 3.5 V, this is required.The SEL pin of the SHT25 sensor is linked to Arduino UNO pin A4 and the SDA pin is attached to Arduino UNO pin A5. The Arduino UNO and SHT25 were then connected. The Rx pin of the Node MCU is linked to the Tx pin of the Arduino UNO.The SHT25 sensor collects data on humidity and temperature and delivers it to the Node MCU through Arduino UNO.The data is sent to the CAYENNE cloud through the internet via the Node MCU. Data from the cloud can be sent to a registered user.

It is critical to know that the data may be seen and restored from any location using a mobile phone or laptop. A datasheet or a graphical representation can be used as the output

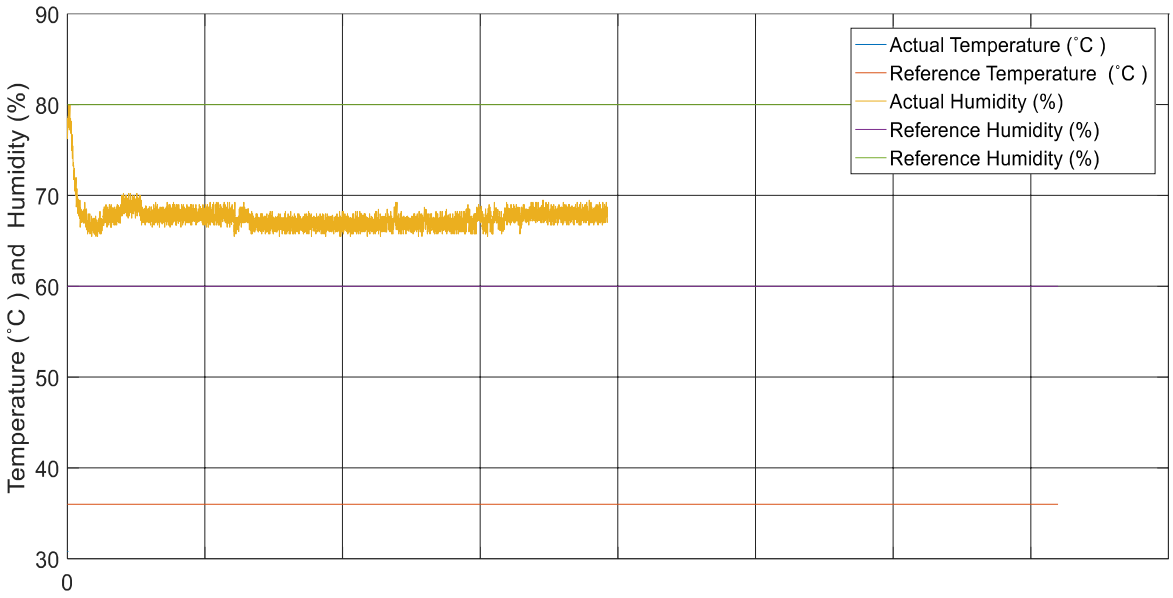

Figure.11. Graph of temperature and humidity connection in simulink

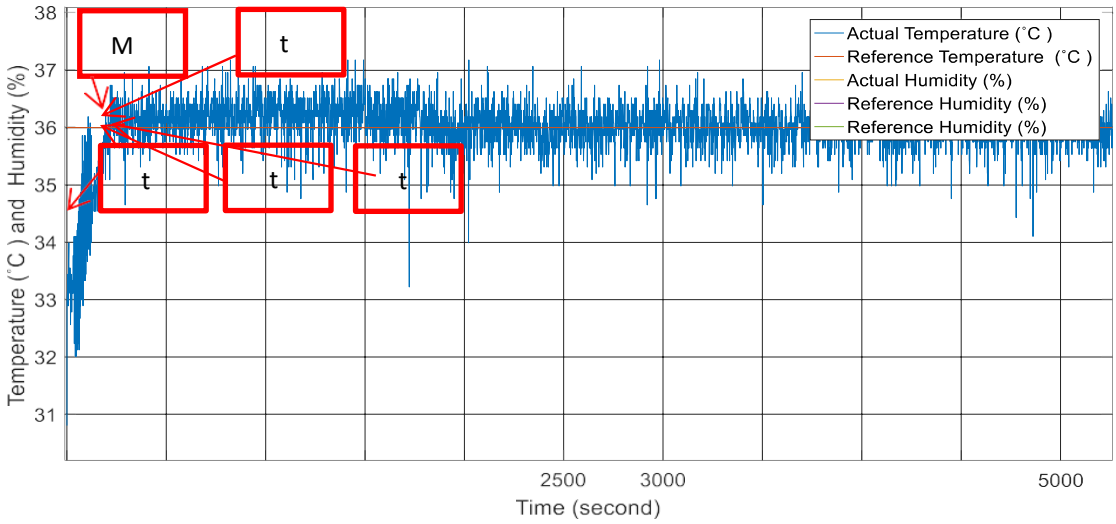

Figure.12. Analysis of system responseusing Simulink/MATLAB

The above Figure Shows The Graphical Representation Or Simulink Representation Of Our Project**.** It is critical to know that the data may beseen and restored from any location using a mobile phone or laptop. A datasheet or a graphical representation can be used as the output

8. Conclusion

The Internet of Things facilitates a numerous benefits to the society and from our project we can provide and prove the strength of IoT using the Cayenne API that is capable to contribute the services for the purpose ofbuilding vast number of IoT applications and help to implement them on the public platform.This Design Provide an Moderate and less expensive way of Sensing and Monitoring system in the field of Domestic and as well industrial standards to implement the IoT.The future of MATLAB in Cayenne and vice versa provides an even deep study and analysis of sensed data at an critical level that is to manage the surrounding environment where the parameters are important to measure.

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