

# Raspberry pi Based Boiler (Incubator) Temperature Controlling and Monitoring System Using IoT

K.Rajeshkumar<sup>1</sup>, G.Senthamil<sup>2</sup>, S.Sooriyakumar<sup>3</sup>, M.Sudharsan<sup>4</sup>, P.Zeeshanazam<sup>5</sup>

Assistant Professor, Department of ECE, Adhiyamaan College of Engineering, Hosur, Tamilnadu, India<sup>1</sup>

UG Student, Department of ECE, Adhiyamaan College of Engineering, Hosur, Tamilnadu, India<sup>2,3,4,5</sup>

**ABSTRACT:** The design and implementation of an incubator temperature control based on IoT technology. This system is composed of the incubator, Raspberry pi-based PID controller. The AD590 sensor will produce temperature then the temperature value converted into a voltage signal of 0-5V into Raspberry pi. Voltage signal setting compared to the temperatures unconventionality next PID operation. The systems will production a temperature control signal to the boiler voltage control. So that it creates a continuous control of the temperature. The experimental outputs illustrated here are useful people interested in the use of measuring temperature parameters for monitoring conditions of medical purpose controlled by Raspberry pi. The final result is temperature will be maintained in the same level of set point.

**KEYWORDS:** Incubator, Temperature sensor, Raspberry pi, Internet of Things.

## I. INTRODUCTION

Many kinds of technology have been created by human to make it easier for them in doing their job. One of essential technology that has already grown rapidly is internet. The IoT is a technology this allows to connect machines, equipment's and other physical devices with network sensors and actuators to get data and manage its own performance. Technology is changing how we investigate and protect the babies, medical equipment's, and boilers. An incubator is used to control and monitoring the environmental conditions suitable for the babies and other things. Answers that is needed to resolve that problem is creating a control and monitoring system of chicken eggs incubator and industrial things based on "Internet of Things" which is worked automatically in doing control and monitoring of temperature and humidity in chicken eggs incubator and medical devices[1]. Internet users give easiness to the breeders to control and monitor the chicken eggs incubator from distance [2]. Chicken eggs incubator which is prepared, consists of microcontroller Raspberry Pi which is joint with temperature and humidity instrument, and also light sensor, which then give an output command to step motor, webcam, and relay[2]. Data which are acknowledged by microcontroller Raspberry Pi will be directed to the server to the internet to be stored in databank and get intodone website[2].It needs a modern chicken eggs incubator tool that make it easier for the farmer to control and monitor it anytime and anywhere[1]. Which the incubator this oneput on a same way with natural marking that is completed by chicken. Chicken eggs incubator can be found easily with many kinds of features which are offered with the amount of hatching capacity is diverse, but some of those incubators still work manually[1].

## II.RELATED WORK

The analysis in [3] had able a method that could variety temperature in scaredseeds incubator and referred the facts in sorting of temperature telemetrically. The useful could direct the facts in space anytime it was needed, it gave charity to

People who wanted to display the chicken eggs incubator without oversee it all day. Telemetry trick was comprised of two main parts, there are transmitter and receiver. Transmitter part consists of illness beam constituent, Arduino Uno R3, and RF Component Sheet 433 MHz The main role of Arduino Uno R3 in the study was as files handling from temperature sensor and sent it to the receiver.

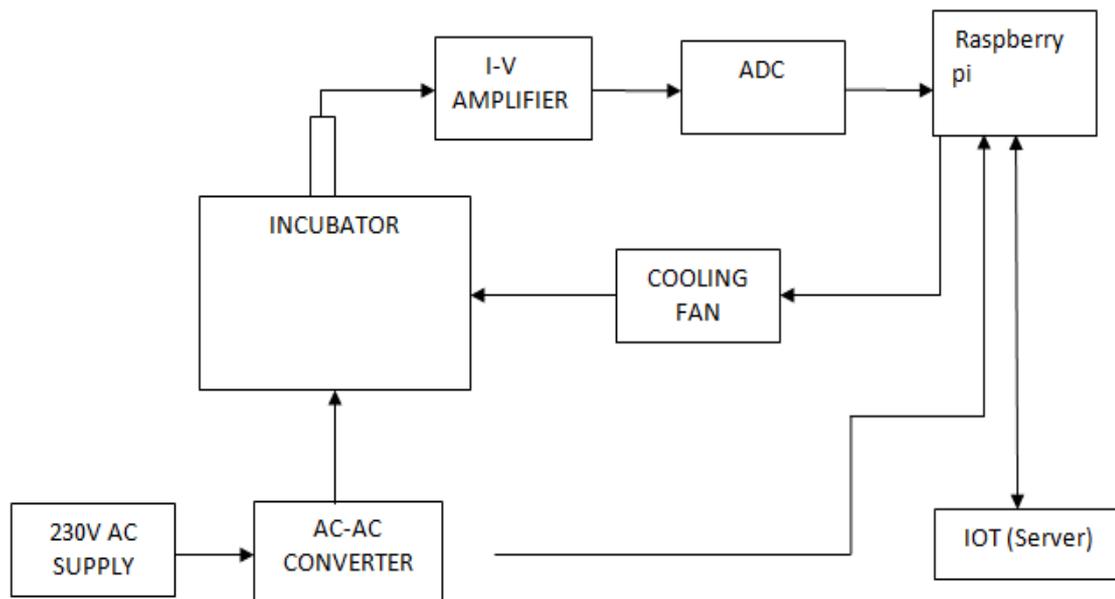
The weakness of the research was data transmission used telemetry system that had a distance International Journal of Internet of Things 2018, 7(1): 16-21 17 limitation caused by the using of radio wave. Besides, there was no temperature control in the incubator space and also the data that were sent are only temperature. The additional investigation in [4] also prepared a similar device by using a 60W light tuber that performed to fix the correct temperature for the eggs[3]. DHT11 temperature and moisture sensor interconnected with Raspberry Pi is hand-me-down to observer the temperature and wetness in incubator machine. Stepper engine was used that swapped the egg turner and transformed the situation of the eggs. The position of the situation inside the incubator could be observed tenuously via cloud. An Android app was used to device the amount of the light bulb by changing the responsibility series of PWM (in %) distantly [3]. The difference was shown at temperature control through Android application by setting the intensity of the light bulb. Besides, the monitoring system that was made did not use web camera, so that users could not monitor the condition inside the incubator machine itself. The studies that had been declared above had a important role in planning and developed device method and observing of scared eggs boiler machine. Some dissimilarity of those studies are in using website for observing and monitoring system that give tractability for the users. The system can be accessed through any devices who have an internet browser, which is different with Android application who can only be used on android smartphone. Piece of observing using web camera is a new increase that operated to variety operators be capable to see the situation privileged the boiler machine. It is not mentioned on the earlier studies[3].

### III. PROPOSED SYSTEM

The AD590 sensor will sense the temperature. The raspberry pi will do the computing task and compare value of current temperature and the set point values. The data will also be sent to the computer where the operator will also be able to monitor the whole process. Then the signal will be delivered to the relays on/off the boiler /calmer for keeping the correct temperature. It is used for controlling the temperature by using IoT server for incubator maintains both fan and light. We can use the set point for both first set point will be fixed light will be produced and set will be increased means automatically fan will be on. An incubator is an instrument used to monitor and controlling the environmental for a medicines. It also monitors temperature in the incubator. The design is based on wireless technologies that measure the important parameters that are controlled relay and boiler. The IoT is essentially developed from the wireless technologies. The internet of things is the functioning in between corporal devices, instruments, software. This paper is also useful for the bio-medical applications. Wi-Fi and cloud technologies storage for storing medical data has been used. So the data viewed in mobile phones and laptops. The medical data can be viewed from systems and mobiles from the place where they are and also they can taking any operation. If there is any problem with the medical data we can directly verify the incubator so that the patients can be saved from irregular health issue.

The system consists of following requirements:

- a. Incubator
- b. Temperature sensor
- c. ADC
- d. Raspberry pi
- e. Cooling fan
- f. IoT server
- g. AC-AC converter
- h. 230v ac power supply



## V. WORKING PRINCIPLE

This project aims to implement a measurement & control of Temperature, which is measured from the heating unit. The maximum range of the process variable is given through the keys connected with the Raspberry pi. The 230v AC supply is connected to the AC\_AC converter. The converter performance as Fault converter. The converter is linked to the incubator. The temperature sensor is linked to the incubator. The temperature sensor is a transducer, which converts the temperature into linear current. The temperature sensor is a device whose output value varies with temperature. The temperature sensor used here is AD590. The AD590 is a two-terminal included circuit temperature transducer that creates an output current relational to entire temperature. With the help of operational amplifier in the signal conditioning circuit, the signal is amplified. The signal from the Transducer circuitry is given to the ADC. The Raspberry pi controller is the CPU, which decides the operation of this system is unfamiliar with continually varying analog signal coming from the temperature sensing circuitry. The cooling Fan is connected to the incubator to use of reduce the heat. The IoT is linked to the Raspberry pi director for the watching resolution. The system will issue a temperature control signal to reach the incubator voltage control.

## VI. RESULTS AND DISCUSSION

The output is that Raspberry pi will compare incoming temperature with set point. If temperature is high then fan is ON neither temperature is low then light is ON. This results not only in improved efficiency and accuracy but also in economic benefit and reduced human invasion.

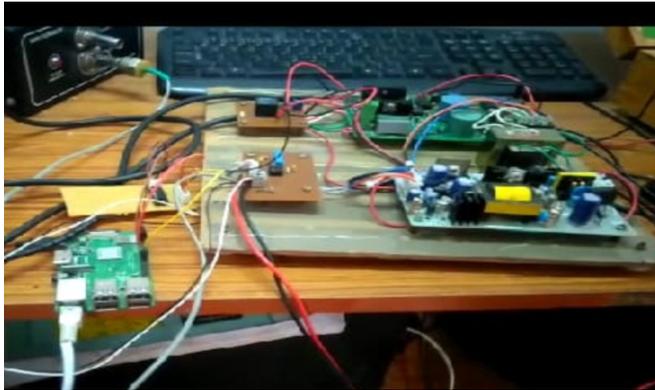


Fig 4.1 Hardware Setup

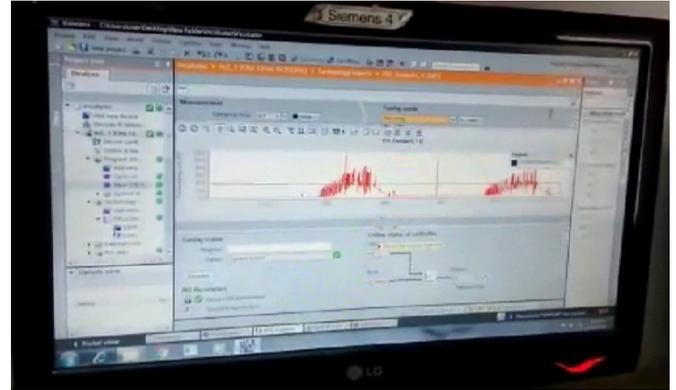


Fig 4.2 Output

## VII. CONCLUSION AND FUTURE ENHANCEMENT

Temperature controlling of boiler incubator machine by applying “Internet of Things” technology using Raspberry pi succeed to be conducted. The Raspberry pi is connected to the IoT server. The set point values can be checked for every second by using SCADA software. By using this system, they can control and monitor though their own incubator machine anywhere and anytime. Using website application as graphical user interface (GUI) gives an easiness to use this system because it can be accessed through internet browser from various devices, such as smartphone, tablet, desktop computer and others. In future it has a great scope it will give high impact in all society.

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