



IoT Enabled Industrial Process Monitoring System

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ABSTRACT

The Internet of Things (IoT) is a fast-evolving technology. The Internet of Things (IoT) is a network of physical things or objects integrated with electronics, software, network connectivity and sensors allowing these devices to collect and exchange data. In this project, we are creating a system (Dashboard) that will automatically monitor industrial parameters and make intelligent decisions based on the Internet of Things concept. Using Dashboard, devices, and sensors, IoT has provided us with a possible way to construct sophisticated industrial systems and applications. This research work's essential contribution is that it outlines IoT applications in the industry. In this application, temperature, Humidity and gas level in air can be monitored from a poultry industry. The dashboard has been created to display real-time temperature, humidity and MQ2 level in the air from the poultry industry.

Keywords: gas sensor, temperature sensor, humidity monitoring, IOT, Power Supply, MQ2 sensor.

I. INTRODUCTION

Meanwhile, in this age of industrialization, it is critical that the manufacturing sector considers worker

welfare, safety and health, and other human flaws that occur throughout the industry. IoT monitoring refers to physical items that are wirelessly connected to the internet and can be observed from anywhere. These days, environmental challenges have the potential to trigger significant disasters. Sometimes the elimination of gases impacts humans and animals. Lung cancer, eye irritation, and breathing problems are common issues when the industry does not take steps to eliminate the gases by government regulations.

The major purpose was to discover and detect air pollution and sound pollution, which were two of the most serious problems. To address these concerns, scheduled activity in the industrial business is one such step toward an environmental disaster that must be controlled efficiently, consistently, and precisely. Monitoring harmful gases in the surrounding sector also compares high pollution rates to the AQI effect factor. Prompt action is made according to government rules. These data digitally delivered 100% results to identify Sound and air pollution to government processes. These will be a watershed moment in the industrial business by linking sensors on a massive scale utilizing IoT technologies.



1.1 Need of Monitoring Industrial Parameters

The project's purpose is to monitor fires using a wireless sensor network. The use of wireless sensor network technology increases automation productivity while decreasing data rate failure. In the project, Arduino and wireless communication are utilised to monitor industrial processes. Wireless multisensory networks have found uses in environmental monitoring, agricultural, industrial, medical, military; traceable metrics include temperature, water level, temperature, and current voltage.

Smoke sensors can detect toxic gases such as carbon monoxide, methane, and others that can be harmful to workers and cause respiratory ailments such as asthma and pneumonia. The humidity sensor detects variations in humidity in a plant's surroundings and informs workers to changes in humidity, which can lead to high pressure in the environment and hence risks from radioactive substances common in power plants.

Objectives of this work study

- Monitoring industrial parameters remotely
- Simple remote configuration and Data availability.
- Create ways for achieving robust nodes and communication security.
- Implementation of IoT enabled measurement, communication and remote monitoring platform for real time industrial parameter monitoring applications.

1.2 Social and Environmental Study

Consequences If sophisticated upgrades were made to its hardware and software, WSN would alter the world of technology. It would make people's life easier and hence be a huge benefit to

society. It would be a whole revolutionary network based on IOT. It is environmentally friendly because it does not need fuel-consuming machinery. It decreases the risks to workers and the surrounding people. It is environmentally friendly because it does not need fuel-consuming machinery. It decreases the risks to workers and the surrounding people. It also results in meticulous planning and emergency procedures.

II. LITERATURE SURVEY

The Internet of Things (IoT) has brought about significant changes in sectors which were employed with various sensors to measure the parameters, such as fire, temperature, gas, and humidity [1].

The Internet of Things (IoT) has revolutionised many industries. IoT is a technology that allows us to control physical things via the internet. In a study, a paradigm for controlling and monitoring all industrial metrics from around the world was employed with the various sensors to monitor the parameters, including a fire, temperature, gas, humidity, voltage, and current sensor. We also employed a speech module to alert the workers, which sends them voice alerts[2].

Forest fires are one of the deadliest and common types of disasters, and they can have serious environmental implications if not detected early. The main reason for selecting this specific application for forest fire detection is to address the shortcomings of existing technologies such as MODIS and Basic Wireless Sensor Network-based Forest Fire Detection Systems, and an updated forest fire detection system is built. The project's two primary components are the



Monitoring Area Module and the Forest Area Module.

All of this is divided into five sub-modules to facilitate development and execution. Sensors' Module, Serial Communication Module with Zigbee, Optimized Solar Energy Harvester with Maximum Power Point Tracking (MPPT), PC-based Web Server, and Mechanical Modelling are among them. The Forest Area Module is in charge of the first three sub-modules.

They are integrated, and mechanical modelling is done in preparation for installation in the forest, while the PC-based Web Server for the Monitoring Area is constructed. The findings of the following implementations demonstrate that adding many sensors to the temperature sensor improves security in locations near forests. It also demonstrates that the Optimized Solar Energy Harvester improves efficiency by roughly 85% and that employing a PC-based Web Server reduces total system bulkiness and cost[3].

Natural gas is odourless and composed of hydrocarbons, which are substances consisting of two elements: hydrogen and carbon. Gas can escape due to an accident or if the valve is not properly closed. This gadget is intended to detect leaks and sound an alarm so that building occupants can maintain proper ventilation and turn off all electrical appliances or exit the area until the repair is done. The system was built using a MQ-9 chemical sensor connected with an Integrated Circuit, and during testing, the system provided enough visual information as well as auditory and timely alerts when detecting a gas leak[4].

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Temperature changes affect the operations of many industrial equipment's, and as a physical property of the environment, monitoring temperature variations is crucial. A system monitors the computer's real-time data collection, which includes an integrated microcontroller chip, for various characteristics. Several parameters' data are displayed and collected on the LCD.

The Arduino contains all of the code that has been burned onto it. Each code denotes a unique parameter, such as air, temperature, pressure, or humidity [7].

Working

Firstly hardware in the poultry industry is powered on and the NodeMCU ESP8266 controller connects to the local server. NodeMCU ESP8266 controller starts to collect the data from the sensors and transfer them to the cloud.

Cloud technology helps us to retrieve information from the industry and directly monitor on the web server

We have created a web page for our poultry industry application where we can monitor different parameters such as humidity, temperature, gas, and the status of the motor. A threshold point(set point) is fixed for these parameters when the limit is crossed repeated actions will take place. If the temperature is increased sprinkler is turned on. If humidity



increases fan will be turned on. If any harmful gas is detected exhaust fan is turned on.

The motor is used in the feeder machine when it is turned on the feeder starts rotating and food is provided to chickens and the motor can be turned off from the web page itself.

Security login page



Fig.1 web page displaying the security login

- Security login page is created for secure login purposes.
- User is provided with a unique id and password with that he can log in to enter the dashboard
- After the confirmation you will get access to the dashboard

Feeder motor:

- In poultry industries feeding was done manually.
- Due to advancements in technology now we are using the motors for feeding purposes.
- In the feeder system motor is connected to the feeder tube and hopper.
- Hopper is filled with food.

- As the motor turned on food passes through the tube from the hopper and falls into the feeder cups.
- In our project we have taken this to another level where the motor is fully automated the time period can be fixed for the running of the motor or we can manually turn it on and off the motor from the web page itself.
- Hence no extra labour is required for this operation.

Fig.2 feeder operation



Intelligent industrial remote monitoring, intelligent furniture monitoring, intelligent warehouse monitoring, and other applications can be developed using the systems platform.

This instils trust in the system's dependability and stability. It has societal benefits and is the most effective and cost-effective method of monitoring the safety of equipment. The IOT is linked to the voice module and the monitoring system. Temperature fluctuations, smoke, and flames, among other things, are detected and sent to a control station via an Android app. Sensors were deployed in three distinct regions in the prototype to detect the specific location of fire threats that occurred.

There are many limitations found in existing methods and to overcome these limitations proposed method is considered and real time monitoring of industrial parameters with its IoT application is designed in proposed work.

Output graph

Normal room temperature and humidity for chickens is $[30^0 \text{ to } 31^0]$, $[60 \text{ to } 70\%]$ hence it should be maintained for proper growth of chickens and eggs.

If the temperature and humidity cross the normal range red line in the graph accordingly actions are performed as shown in Figure 3.

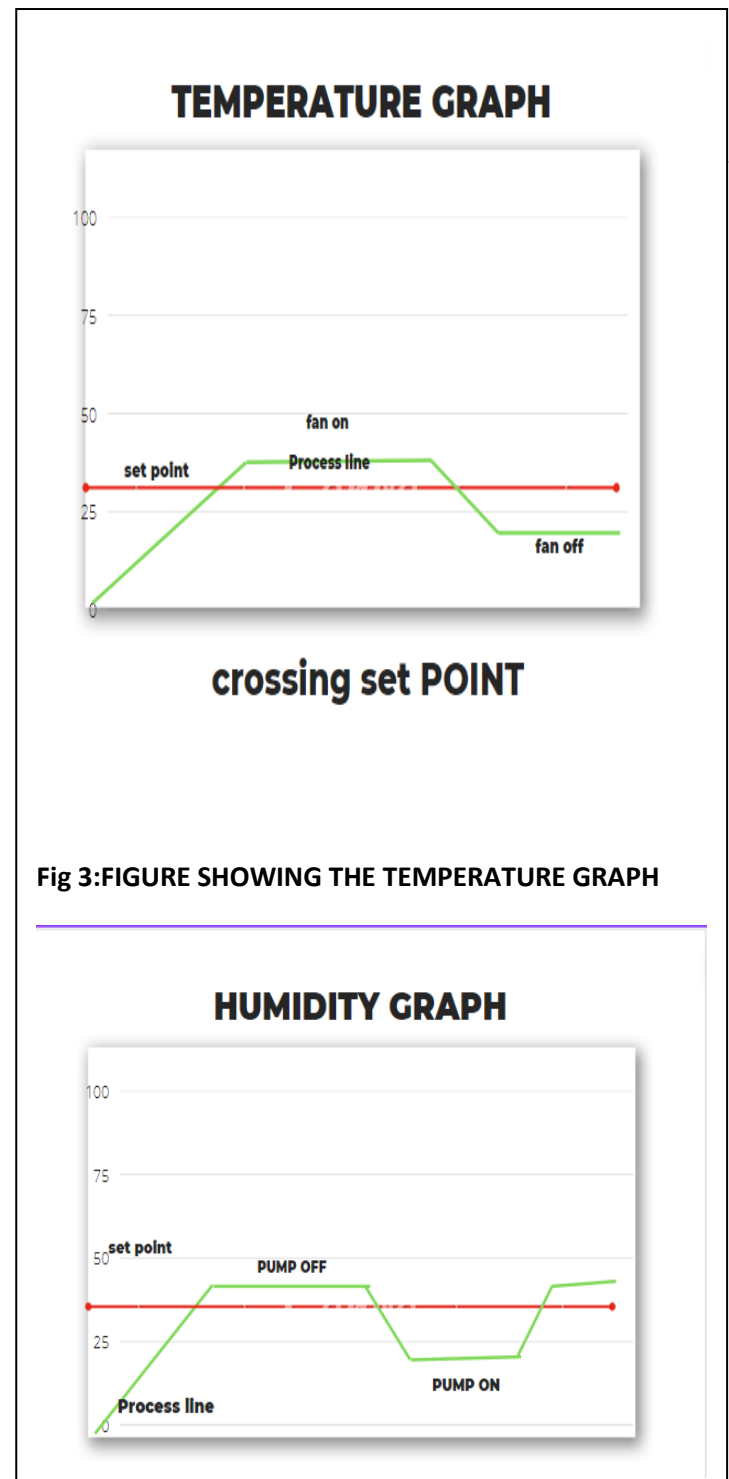


Fig 3:FIGURE SHOWING THE TEMPERATURE GRAPH

Figure 4: FIGURE SHOWING THE Humidity Graphs



III. PROPOSED METHOD

Proposed model has above main six steps. Start with the proposed method means cloud will be started, server also started, person need to login with given credentials to get monitoring status of industrial parameters, status can be showed only if there is authorised access to server, output temperature, humidity and gas content are monitored by authorized person and then stop process to get out of the application.

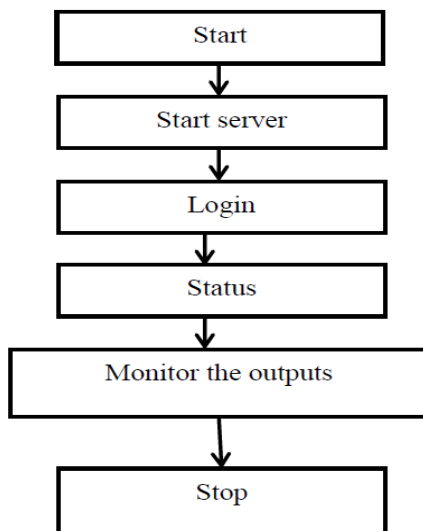


Fig.5 Proposed method Procedure flow chart

In the dashboard we have an update button .By clicking on it we directly go to the update page here we can change the readings of the different parameters.

As shown in the figure above we can set the limits from minimum to maximum according to the instrument used.

Advantages of Proposed Method

There are many advantages of proposed system found in industrial applications like it has easy and user-friendly monitoring. Unauthorised access can be avoided. Even there is low power consumption in this application with real time monitoring of data.

Gas sensor importance

Gas sensor plays important role in poultry industries. Harmful gases are released in poultry industries such as carbon mono oxide, ammonia, sulphur etc. Mq2 gas sensor has ability to sense these harmful gases and turn the exhaust fan otherwise birds will suffer from respiratory infection.

Proposed model has main 5 blocks as shown in figure 5 are

- a) Microcontroller (NodeMCU)
- b) DHT sensor, MQ2 Sensor
- c) Power Supply
- d) Cloud (IoT Monitoring)
- e) Buzzer
- f) motor

Proposed method uses DHT-11 sensor for monitoring Temperature as well as Humidity from the industrial environment. Microcontroller NodeMCU is used with the help of Wi-Fi Protocol data can be transferred using ESP8266 and platform which is open source. For cloud (IOT) dashboard is created using python and HTML which gives access and monitoring option from remote places. Buzzer is used to alert based on if the industrial parameters cross the threshold value and also if there is any unauthorised access. Power supply provides power to the drive complete circuit.

- Dashboard shown in Figure 7 consists of the temperature, humidity, gas, and displays the rpm of the motor.
- Here motor can be manually turned on and
- As hardware is powered on the readings are directly displayed on to the screen.
- Dashboard has an update button by clicking on it we reach to second page where we can change the limits of the parameters from min to max.



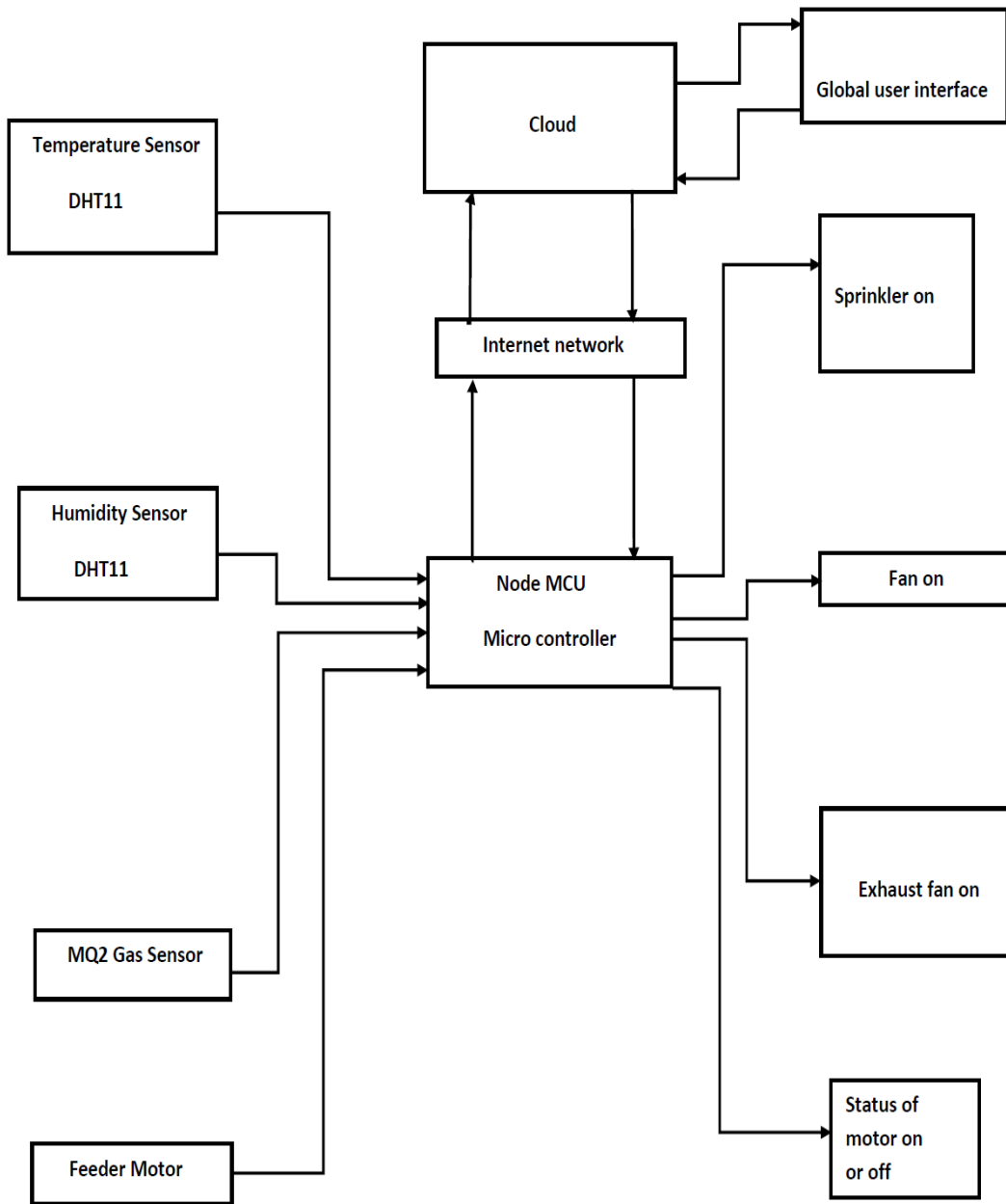


Fig.6 Block diagram of the Complete system



Figure 7. Dashboard displaying parameters

Languages in this project

a. Python

- In our project python is used to gain information or data from the field sensors
- The collected data further sent to cloud and dashboard.
- The figure shows the poultry industries integrated with exhaust fan, feeders, water sprinklers.

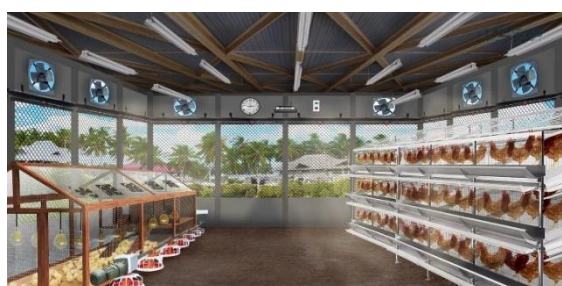
b. Html and CSS

CSS makes the front-end of an internet site shine and it creates a good user experience. While not CSS, websites would be less pleasing to the attention and sure a lot of more durable to navigate.

IV APPLICATION

It is used in poultry industries for continuous monitoring and helps to run industry efficiently for high yield.

Fig.8 showing the application in poultry



This can be integrated into many other domestic farms such as sheep, cows, etc.

In this way so many farms can be monitored globally and saving the animals to live in better environments and grow to their best part

CLOUD TECHNOLOGY

The cloud technology helps in a variety of things for gathering data from different sources.

Cloud is used in many applications to replace hardware systems.

Here we are using the cloud for storing the information received from the sensors and we can retrieve the information any time any where to any device.

There are many cloud sources available in the market. We are using the rendershare for storing the database.



V. REAL-TIME APPLICATION

We have integrated our system into a small bird cage where the temperature sensor, humidity sensor, and gas sensor are installed.

The dimensions of the cage are:

Height 5 feet

Width 2 feet

Length 3 feet

According to the user requirement, we have fitted a fan, a water pump for sprinkling water, and a buzzer.

Fan specification

RPM=1400

VOLTS=230

AMP=0.21

WORKING

As the humidity, temperature, and gas increase fan gets turned on. In the same way, if humidity decreases water pump is turned on, and wet the mats around the cage.

The following figures show the real-time application

Birdcage.



Hardware installed above the cage.

Fan installed above the cage chicken resting underneath.



Figure.9 showing Pump flushing water making mat wet.

Hardware installed above the cage.



Fan installed above the cage chicken resting underneath.



IV. RESULT

Dashboard created using python and HTML programming. Dashboard can be used by authorized person after login and used for monitoring temperature, humidity and gas level in air.

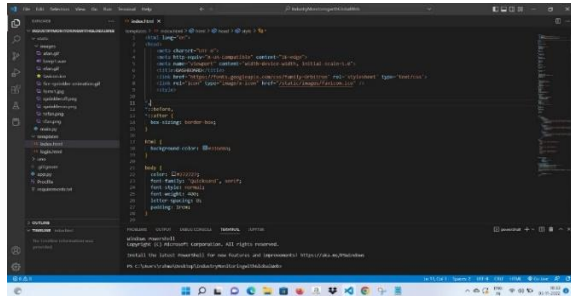


Fig.9 VS code window-1 of proposed method code

VS editor is used for understanding and analyse program. Programming is done using python and HTML which creates above dashboard and even collect the data from NodeMCU. Data can be accessed and stored from IoT devices.

CONCLUSION

Finally, we have the provided system for the poultry industry where we can monitor the parameters globally from anywhere on any device, by this birds can be properly monitored resulting in good health of it hence increasing in high yield production. This project is cost effective and can be easily affordable to small case industries. IoT is now a reality, thanks to technological advancements in a variety of fields. Sensor networks, which are envisioned to be an important part of our lives, must adhere to design constraints in order to be realised. Many sensors, such as DHT-11, MQ2 are used for parameters in this system, and the fire is quenched using a water pump attached to the system. Likewise, the system will take extra safeguards. If the current and voltage above the threshold value, and gas leakage

is detected by gas sensors, the speech module plays an audio note to notify industrial workers to the presence of gas and fire. We can remotely monitor via IoT and Dashboard created using python and HTML.

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