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Automated Poultry Farming Observance System Using IOT

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***Abstract*—** Poultry farming is a profitable business, as it produces protein-rich food resources like meat and eggs. However a healthy environment is required for the growth of chicken. To ensure the production of healthy birds, a step was taken to move from manual farming to smart farming. The poultry farm observance system is a solution to constantly monitor the ideal environmental conditions like temperature, humidity and water level. In this paper we have designed an IOT based automated smart poultry farming to monitor the environment and trigger an alarm to control the unfavorable conditions for the growth of the bird.

***Keywords*—** Raspberry Pi 3B+, MQ -135, DHT11 , IOT, Smart Poultry

I. INTRODUCTION

Agriculture is the main source of livelihood in India. With respect to animal agriculture poultry farming is an important sector in India. As the poultry farming produces chicken meat and eggs which are rich in protein. Chicken is the most broadly acknowledged meat in India. The health of chicken depends on the environment in the poultry farm. If the environment isn't unfavorable then there could also be downside with growth of the chicken and may even lead to health problems. Healthy birds have good demand in the market. Poultry farms are designed in such way that, environmental conditions can be altered by providing facilities like ventilation and cooling. IOT allows interaction between devices and humans. Earlier data invaders had to travel long distance to collect data after which the interpretation was done. This was lengthy and time consuming procedure. But now, sensors and microcontrollers are connected to the internet to track the environmental conditions, it thus makes monitoring more accurate, flexible and less time consuming. The environment is monitored with devices and sensors and alerts are generated to take corrective actions. In this model, we are using a Raspberry Pi 3B+ microcontroller, which will have sensors such as MQ135, mic, DHT11 that are interfaced with Arduino to get the data. This Arduino communicates and interacts with Raspberry Pi that captures the readings and sends alerts during undesired environmental conditions.

Section I provides the introduction to the poultry system, Section II contain the related works related to IOT and poultry farming. Section III contain the methodology implemented for achieving the smart poultry system, Section IV discusses the results. Finally we have concluded the paper and provided future directions in Section V.

II. RELATED WORK

In [1], the author proposes a monitoring technique using a ZigBee wireless sensor network to monitor the various environmental parameters. It uses RFID to store and retrieve data through electromagnetic transmission to integrated circuit.

To monitor air and noise pollution in urban and rural areas, especially near schools and hospitals, [2] has used a GPRS/GSM module and a web server to efficiently monitor the various pollution levels at real time. In this paper the smoke sensor and noise sensor will upload the data to the server or cloud at every instant of time so that the pollution level can be monitored using the internet.

In [3], they have planned a system that uses air and sound sensors to watch the info perpetually and so transmit the info. A Raspberry Pi module interacts with different sensors and analyse, processes the data thereby transmitting it to the application. [4] have proposed the concept of a smart city. Communication and Technology are the basis of any smart city. Various sensors and modules have also been used to monitor the various environmental parameters. This system uses sound and air sensors to monitor the data and then upload the data on the cloud server as digital data. The cloud services analyse the data and gives notification accordingly

[5] have proposed the design of a cost effective environmental monitoring device using Raspberry pi. The information is collected by the sensors and uploaded to the internet where it could be accessed anytime. The system was found to be good in terms of measuring humidity, Temperature

III. METHODOLOGY

Raspberry Pi 2 is designed as IOT core small computer installed with Linux and windows operating system. Raspberry pi contains GPIO pin which can be used as digital input and output. In smart poultry system, Raspberry pi is used to interface with Arduino board for the transmission of data. Arduino is an open-source microcontroller board with serial port interface, digital I/O pins, USB ports. To monitor the environment of the poultry farming, the Arduino board will be fixed at various places and can be used for collecting the readings from the various sensors to Raspberry Pi.

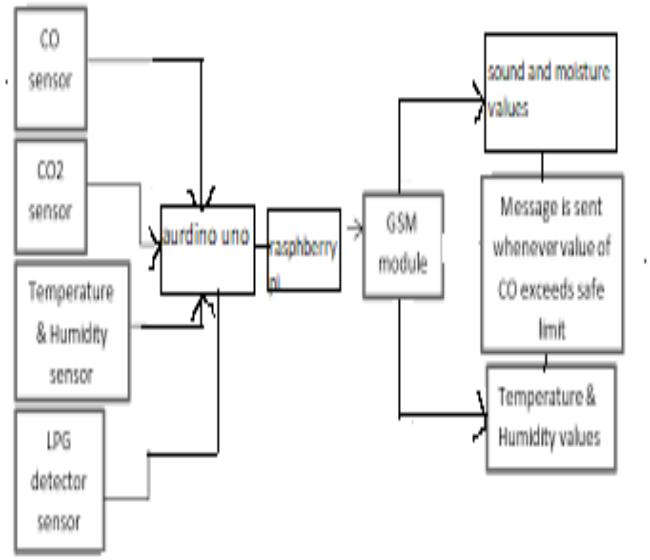

Fig 1 : Various modules in Smart Poultry

The DHT11 temperature and humidity sensor is used to measure the humidity and temperature inside poultry farm, which protects the chicken from the various diseases. The system receives measuring temperature and humidity through the microcontroller. The gas sensor is used to measure NH3, CO, CO2, Benzene level inside the poultry farm. MG811 sensor is used to detect CO2 including air quality monitoring. MQ-7 is used to detect carbon monoxide (CO). The various modules involved in Smart poultry farming is depicted in Fig 1.

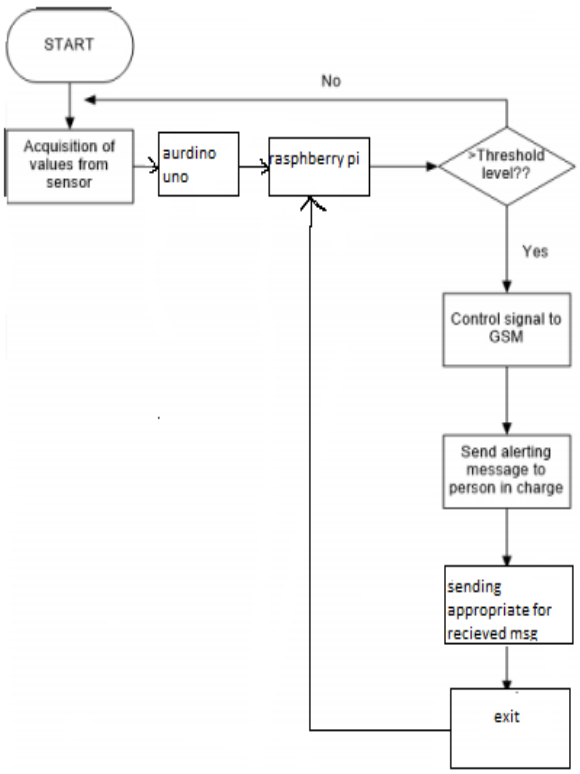

Fig 2: Information flow in smart poultry

The below design comprises internet based system which includes remote sensors, Arduino UNO microcontroller and Raspberry Pi. Here Raspberry Pi takes the values which has been sent from the Arduino. In smart poultry farming, several Arduino boards have been fixed at various places with the particular sensors. As in the Below fig 3 and 4 humidity and temperature values has been collected by Arduino uno from various places and the values has been transferred to the Raspberry Pi of which has been placed at a particular place in the poultry farm. The complete flow of information is depicted in Fig 2. The detailed steps involved are defined in the Algorithm 1.

As in fig2, if the values exceeds the threshold value and it will send notification to the GSM module to the authorized person through SMS. So, the user can monitor the poultry. The sequence of steps involved in designing a smart poultry system is defined in Algorithm 1.

Step 1: Install the Arduino boards at various places in the poultry Farm.
Step 2 : Collect the values of various parameters from Arduino board
Step 3 : The values are sent to the Raspberry Pi using Arduino interface
Step 4 : If it crosses the threshold value , the Raspberry Pi will send the information to the GSM module, go to step 5. Else repeat step2
Step 5: The GSM module will send the notification to the concern poultry staff via an SMS
Step 6: The poultry staff will take the necessary action to maintain the environmental condition.

Algorithm 1: Sequence of steps involved

IV. RESULTS AND DISCUSSION

In order to maintain a healthy environment in poultry, the following thresholds has been defined. In the Poultry by this parameters [fig 4].x axis belongs to time interval and y axis belongs to temperature, the red line indicates the high value of the temperature and blue line indicates the low temperature as shown in fig3.In this graph x-axis belongs to time and y-axis belongs to humidity units .By this an appropriate measures can be taken by the farmer.

PARAMETERS	THRESHOLD VALUE
temperature	>20 c
humidity	>60
sound	>20 db

Table 1: Defined Threshold values

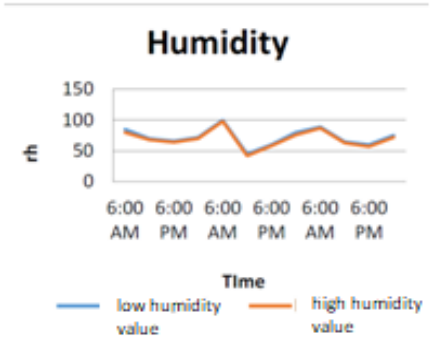

Fig 3: Humidity values

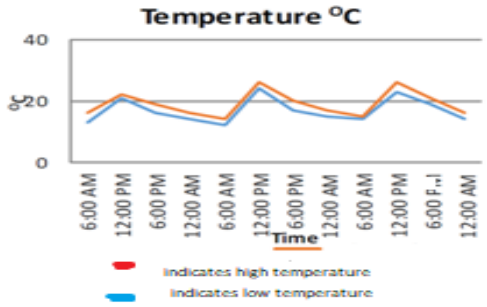

Fig 4: Temperature values

V. CONCLUSION AND FUTURE SCOPE

The traditional way of chicken farming is replaced with the smart and intelligent chicken farming using embedded system. It helps the farmers real time controlled and monitoring environmental aware context parameters such as temperature, humidity, air quality. This smart system can effectively controlled the farm from any location and reduces cost, time and man power. This will improve productivity and quality of chickens in poultry farming. In the future advanced IOT based technologies should be used for monitoring and controlling health related parameters of chicken to improve quality and productivity of chicken farming, which results profits to farmers and quality food for human being.

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