An Effective Automated Monitoring and Controlling of Poultry Farm using IoT

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Abstract - *Poultry is one of the most important growing economic segments of agricultural and commercial sector in India today. Nowadays automation plays very important role in our life, where the combination of wireless and mobile network is used to remotely monitor and maintain poultry farm. The project focuses on automation of poultry farm using IoT technology to perform various management related things like maintaining room temperature, feeding chicken. If all these parameters are maintained, the production and quality of chicken increases. In addition to that the chicken's health can be observe through motion sensors by setting threshold temperature of the chicken also load cell sensor is implemented using a controller to monitor the weight of the chicken. And disposal of chicken's waste by using servo motor.*

Key Words: Esp32 microcontroller, IoT, Automation, Food feeder, Temperature

1. Introduction

IoT is essentially a platform where embedded devices are connected to the internet, so they can collect and exchange data from an android app .Thus automation is increasingly important in modern agriculture, reducing dependence on constant labor work, increasing management scale and efficiency, fulfilling the precision and consistency of product control, enabling enforceable traceability enhancing food safety – all of which may help achieve agricultural sustainability.

Poultry farming is the process of raising domesticated birds such as chickens for the purpose of farming meat, most of the businessmen and farmers use traditional poultry farming methods. The traditional poultry farms lack proper and effective management to maintain health and growth of chicken. All the poultry activities like filling the water tank, time to time feeding of chicken, cleaning the chicken waste and light control in the farm are done manually. Hence a large manpower is required. In order to replace manual Activities and poultry work easier with making smart poultry farm.

System is designed in such way that user can remotely monitor to the system through android mobile application. Using this prototype Human work is also reducible and smart work will be done. Within this paper, the parameters, like temperature, food feeder, movement of chickens, weighing chickens and disposal of chicken's waste are monitored and controlled using microcontroller. The transmitted data is received by receiver and then transmitted to the ESP32 module through the microcontroller. Data is saved on blynk cloud for better analysis. Thus, the person-in-charge of the poultry farm can monitor the internal environmental situation of poultry farm through mobile phone or PC using the internet.

2. Related works

The system helps to the farmer to monitor the poultry farm and controlling the operations of poultry farm. System is a combination of wireless sensors and mobile system to manage and monitor the poultry's work easier. The environmental parameters like temperature, light intensity and ammonia gas are also monitored and controlled automatically [1]. Internet is linked together to the devices to communicate between thing and the people. The intelligent system can reduce cost, time and labors.

The system replaces the human labor to feeding food into container. It overcome the labor problems in the poultry industry and it also involves mainly two sections first to feed the food into particular contained and the second one is to control the temperature sensor to the freshness of chicken food [2]. It improves poultry's climate and reduce labor cost and save food and chicken feeding on time and avoid contaminated food from insects.

In this study, a wireless sensor network technology is designed which monitor and control the climate of poultry farm and also humidity. A computer network technology is useful to the farmers for human work. It becomes an automation technology

[3]. The automation system improves quality of meat production and then it will impact for the ecosystem balance. The poultry management system uses hardware and open source software. It also includes temperature, humidity, light intensity and also quality of air. System focus to provide the setup like IOT, low cost hardware and open source software. System detects many problems faced by poultry industry

[4]. It saves time, dependency of labor and improve healthy environment, also increases poultry production. The focus of this research paper is to monitoring and controlling the poultry environment using a wireless sensor's GPRS network and also to take a correct action. Using this system user can monitor and also to control the climate of poultry farm, and help to form a healthy food to

the chickens [5]. This system reduce cost, time of labor, the system monitors environmental parameters such as temperature, humidity, ammonia gases, water level and maintain a healthy environment.

3. Problem Statement

Smart poultry farm is monitored successfully using IoT based system which supports food feeder to the chickens system is able to maintain the temperature and also system will monitor and control movement of Chickens weight of the chickens and disposal of its waste which is helpful to monitor health and proper growth of chickens and maintaining the cleanness of poultry farm.

4. Existing system

Most of the businessmen and farmers use traditional poultry farming methods. The traditional poultry farms lack proper and effective management to maintain health and growth of chicken. All the poultry activities like filling the water tank, time to time feeding of chicken, cleaning the chicken waste and light control in the farm are done manually. Hence a large manpower is required and chicken proper growth is decreases.

5. Proposed system

In the proposed system, environmental parameters such as temperature, light and manual works like food feeding is monitored and a fully automated system is designed to perform these activities. In additional to that, chicken health can be observed using motion sensor to check if the chicken is dead or alive, waste disposal is manually maintained and also load cell sensor is implemented using a controller to monitor chicken's weight. This system reduces manpower, improves health and growth of chicken.
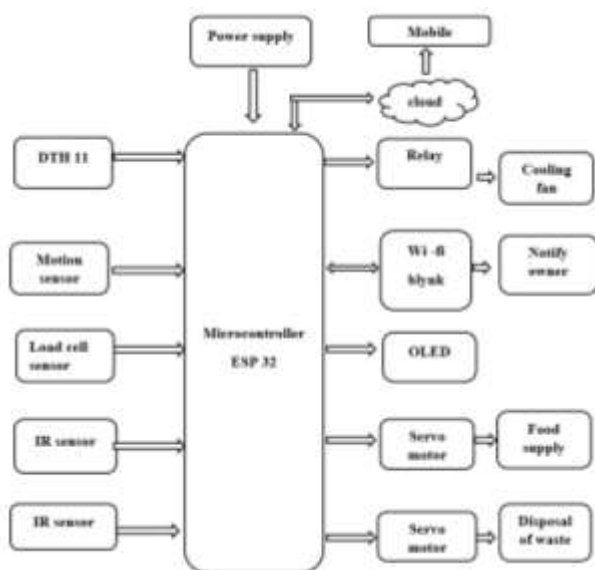

Fig 1: Proposed block diagram

6. Methodology

Fig 2: Architecture of poultry farm

A. IR Sensor

Infrared Sensor is also used for obstacle avoiding. IR sensor consists of an on-board red LED which is used to detect the reflected light from its own LED and indicate the presence of an object. Sensing range is adjustable with inbuilt variable resistor.

B. Load cell sensor

The straight bar load cell (sometimes called a strain gauge) can translate up to 3kg of pressure (force) into an electrical signal. Each load cell is in a position to live the electric resistance that changes in response to, and proportional of, the strain (e.g. pressure or force) applied to the bar. With this gauge you'll be ready to tell just how heavy an object is, if an object's weight changes over time, or if you merely got to sense whether an object is present or not by measuring strain or load applied to a surface.

C. Relay module

The relay module is an electrically operated switch that permits you to show on or off a circuit using voltage and/or current much above a microcontroller could handle. There is no connection between the low voltage circuit operated by the microcontroller and therefore the high-power circuit. The relay protects each circuit from each other. The each channel within the module has three connections named NC, COM, and NO. Depending on the input trigger mode, the jumper cap are often placed at high level effective mode which 'closes' the normally open (NO) switch at high level input and at low level effective mode which operates an equivalent but at low level input.

D.   OLED Display

An organic light-emitting diode (OLED or Organic LED), also referred to as an organic EL diode, is LED during which the emissive electroluminescent layer may be a film of compound that emits light in response to an electric current. OLEDs are used to create digital displays in devices like television screens, computer monitors, portable systems like smart phones and PDAs.

E.   Motion sensor

A motion detector is a device that detects moving objects, particularly people and living things. Such a tool is usually integrated as a component of a system that automatically performs a task or alerts a user of motion in a neighborhood.

F.   Servo motor

A servo motor is a linear actuator that allows for precise control of angular or linear position. It consists of a motor coupled to a sensor for position feedback.

7. Result analysis

Fig 3: Side and Top view of the Integrated device

Figure 3 shows the side and top of the integrated system. The system is capable of monitoring the real-time data like temperature, food supply, movement of chickens, weight of chicken and disposal of waste. Whenever temperature crosses the threshold, the fan turns on and when the IR sensor detects the chicken near the food track it supplies food automatically.

The motion sensor that can be used to check movement of chicken, a threshold time will be set, within that time if there is no chicken movement then pop up message is sent to farmer. Load cell sensor is used for checking the weight, such that threshold value is set, if the value obtained is low then it is considered as chicken is not healthy. Disposal of waste is done using IR sensor which detects the waste and instructs the servo motor to clean the waste. All these data are monitored and stored in the cloud;

messages are sent to farmer through blynk network parallelly to that all the messages are displayed in OLED.

As shown in figure 4, the person in charge of farm will receive information of the poultry farm environment such as temperature, food supply, movement and weight of chickens and disposal of waste. The user holds an account in the blynk app with an authentication number which receives alert messages to his mobile.
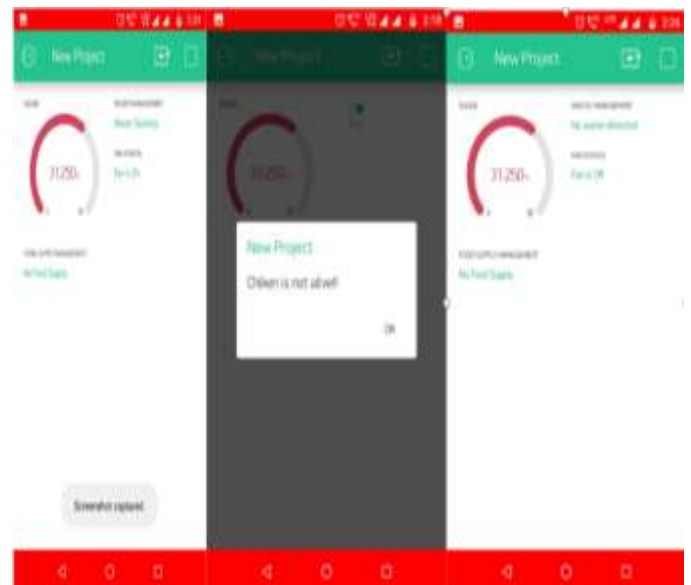

Fig 4: few sample results of system control and intimation

All the data will be loaded into the cloud and messages will be sent to him.

8. Conclusion

IoT is an innovative technology for condition management especially poultry farming which may be changed from the routine traditional farm into smart automated poultry farm. Various parameters like movement and weight of chickens and disposal of waste have been continuously monitored to improve health and growth of chicks and chicken.

9. Future enhancement

The system is fully an automatic system to monitor movement and weight of chickens and controls disposal of waste continuously. This paper can be extended by automatically detecting the diseases.

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