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A Survey on Smart Poultry Farm Automation and Monitoring System

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ABSTRACT: We focus on the integration of wireless sensors and GPRS network to control and automatically monitor environmental parameters in a poultry farm. The environmental parameters like temperature, humidity, ammonia gas control etc. The person in-charge can able to get the internal environmental situation of poultry farm by receiving a message on registered mobile number. System will initiate the action automatically to control the environmental parameters when there is a sudden change in climate. Water level control and food control mechanism is also monitored and controlled with the help of sensor. All the sensors are connected with the raspberry pi which can control and monitor all data. The detail record of poultry farm with environmental condition is later viewed on a webpage. Thus the system design provides an efficient automated poultry farm monitoring system to monitor the healthy atmosphere for chickens in poultry farm without human interference.

KEYWORDS: Intelligent farm, wireless sensors, microcontroller

I. INTRODUCTION

Day by day automation technologies come up with new and innovative ideas. This research focused on modern technologies for a poultry farming to control all environmental parameters like temperature, humidity, ammonia gas which effects on the growth of the chickens. If the environmental condition is not up to the mark then there may be harmful for digestive, respiratory and behavioral change in the chickens. If chickens may get suitable atmosphere and proper food then it may grow rapidly and health of chickens will be good so the weight of the chickens will be increases. Climate plays very important role in the growth of the chicken. Smart Poultry farm designed in way so that the climate can be changed by ventilations, cooling and heater. Now monitoring and controlling of NH₃ that is ammonia gas. The parameters, Ammonia gas, Water Level, Humidity and Temperature are monitored and controlled using microcontroller. The transmitted data should be receive by receiver and then transmitted to the GPRS through the microcontroller. Data will be saved and update on the webpage. The ability to monitor environmental conditions is crucial and it demands a good level of research in fields ranging from the change in climate conditions in agriculture. This research focuses on the wireless sensor and GPRS network with a well-known sensor integration platform using automatic sensing. Smart Sensing Platform is used to monitor the environmental Parameters in poultry farm. This will make work easier and efficient in poultry farm management. On the climate of poultry houses the health of chickens is totally dependent. If climate conditions are not up to the mark then there may be a danger of digestive, respiratory, and behavioral disorders causes to the chickens. Healthy chicken take more feed and grew rapidly. Poultry houses designed in such way that the climate can be altered by ventilation, cooling, and lighting insulation of roof, walls and floor. The birds are directly surrounded by the microclimate. Micro-climate is the most important for health of birds. Shed's climate may be good but it may not be suitable for bird's surroundings. Take an example CO₂ is a heavy gas and level is higher near the ground near the bird's micro climate.

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Chickens usually have a long life animal which accepts light stimulation to continue the spawning process. The direct effects of light to chickens stimulate endocrine organs to either delay or boost maturity during the brooding period. Most important part in chicken farming is feed. Feeding high quality, fresh and nutritious food always ensures good health, proper growth and high production. So, it is important to feed chickens healthy and nutritious feeds. It is necessary to add required vitamins and minerals to their feed. Different types of Commercial poultry feeds are easily available in the market. You can easily feed it to your birds. Along with feeding your birds high quality and nutritious feeds, always serve them sufficient amount of fresh and clean water according to their demand. The nutrient intake of birds may vary from place to place according to the seasons and climatic changes. Whenever chickens are restricted from consuming the amount of feed they desire, egg production will cease. An average laying hen will require ¼ pound of feed per day, depending on factors such as size of the chicken, weather conditions, and level of productivity. Now day's modern technologies overcome on the traditional method which is very suitable for the chicken growth. Using Wireless sensor network and DC motor system has design a food control modem for chicken. So food should not get waste and man power has reduced. Water management for poultry farm operations is a subject of much conversation between veterinarians and live production personnel. The usage of water acidification as a preventive or treatment for disease of chickens or to improve chickens performance is probably one of the most poorly understood areas of poultry.

Water acidification protocols for the prevention or management of certain bacterial diseases had been developed. Drinking water pH at bird level is 4.0 or below it. Poultry farm water treatment through acidification of the drinking water acidifies the crop. Water quality management in poultry farm is very important for chicken's performance. Constant and continuous monitoring of poultry is required not necessary when problems are observed but for checking regular activities inside the poultry farm. Water nutrient have not received attention until a problem arises. Owners of poultry make an effort to provide clean and adequate water quantity to the chickens in farm. Owners should also know details about the water that will be flowing through the water pipe lines.

II. LITERATURE SURVEY

Here author has divide poultry farming in two types (1) Production of Egg and (2) Production of Meat. By using the application of wireless sensor network quality of chicken can be improve ultimately lead to improve the human health. In this paper author says that wearable wireless sensor can detect the infected chickens. the overall production, quality and economy can be improved by the system.[1] the advanced technique of wireless sensor network and mobile network to control n automatically monitor environmental parameters of poultry. Person can able to monitor environmental parameters by sending SMS back to the system. Parameters like temperature and humidity.[2] If system doesn't receive command from register mobile number, then it will automatically perform its action. Hence by using this modern technique system can provide a modern technique for farm automation. To solve the problem author as used Raspberry Pi and Arduino Uno. This system should monitor the surrounding parameters of poultry environment including humidity, temperature, climate quality, the filter fan switches. This system is found very simple and useful for formers, as they can effectively control the poultry farm at any time and from anywhere[3]. It is observed that modern chicken farming is more easy and useful as compare to traditional chicken farming. With the help of modern technique it is also possible to monitor the environmental conditions like humidity and temperature. For a complete care of chicken it is important to monitor and control the environment of poultry [4]for the better growth of chickens. The Poultry sheds can be controlled 24 hours by automation. It is help to provide an optimum output by reducing man power in poultry.

III. METHODOLOGY

Currently in poultry farm hatching of eggs done by help of artificial method. There will be a light in order to maintain the temperature at certain level. Temperature can be measured in the tray for a certain interval of time. If suppose it exceeds or below the prescribed level, it will be adjusted manually. Added with this there will be a human intervention for food feeding for hens. Hence this paper will give an outline to automate all those things as mentioned above. It will

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be done by help microcontroller. Temperature and humidity sensors will be placed in the tray and then it is interfaced with control unit. There will be a cooler and heater. There also time based food feeding done automatically by incorporating real time clock (RTC) with them. There also provisional to monitor the level of water at tank. If it gets empty, valve will open automatically. Hence it reduces the manual work.

Block Diagram

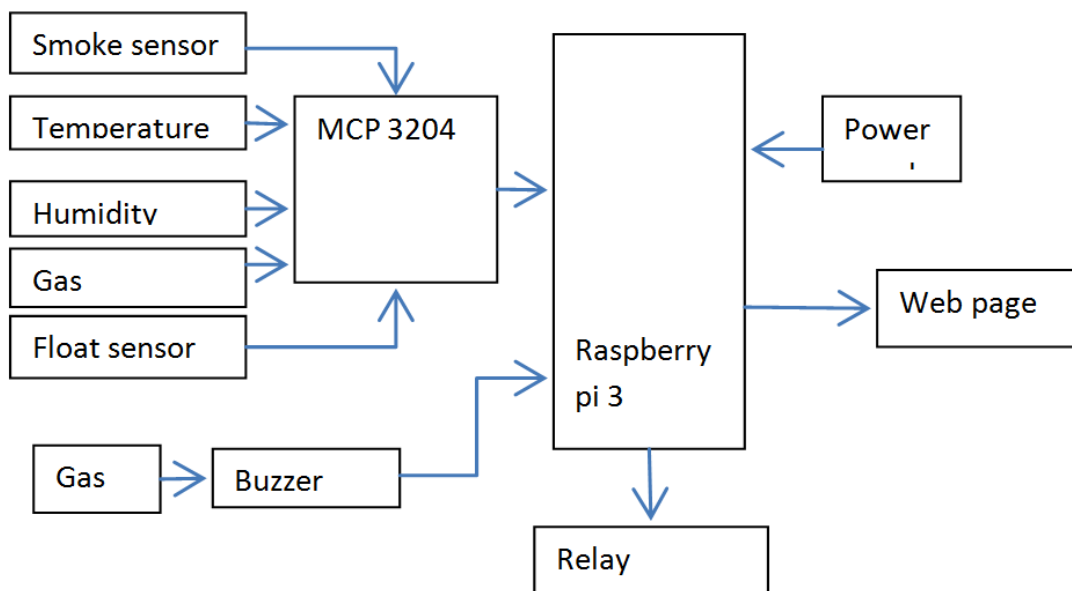


Fig1.Smart Poultry Automation and Management System

The system can able to monitor real-time data monitoring of environmental parameters like highest or lowest temperature, humidity, climate quality of surrounding farm, water level, percentage of ammonia gas etc. Food supply and Water supply control and monitor using the advanced technology of wireless sensor without human interference. System sends current information of all parameters through message on register mobile number. Daily record of poultry has maintained on a webpage. Sensors has been read the environmental data in poultry farm and the details of environmental parameters like temperature, humidity, ammonia gas and current water level has displayed on LCD screen. A container has been full of food, whenever it receives a command for system it should be dropped food in to the plate of chickens as per the requirement. If the food is already present in the container and though system receives command for food drop, system will sense the current amount of food which already present in a plate, if it is enough then container will not drop food and if it is less, it will only drop the food required amount of food in to plate. Water plays very important role in poultry, chickens daily required clean and sufficient amount of water. Water quality management has designed to improve the performance of the chickens in poultry; it also helps to monitor health of the chickens. In level sensor has been fixed to the water container, so whenever the level of water goes down below the threshold value of water, it gives indication on screen as well as on register mobile number. We are able to receive information of the change in environment of chicken poultry farm on our mobile number. Similarly, we are able to maintain the record of poultry environmental parameters on web portal for a study and guideline purpose for future.

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IV.COMBINING SOFTWARE AND HARDWARE TO DEVELOPMENT

Developing a smart poultry management system involves

1. Development of software
2. Integration of software with hardware for ensuring accurate monitoring

4.1. Development of software

Software is integral part of smart poultry management system, a web page is created using MySQL, PHP. We installed and set up two software programs: the Apache web server with PHP, and the MySQL database server, to work with MySQL databases using Structured Query Language (SQL). Customized pages are generated using server-side language PHP. By using server-side code we have reduced load of running scripts and thus the client can use system on slower computers as well. For storage of data in organized formats, we have used MySQL.

4.2. Development of hardware

For developing a Smart Poultry Management System, we have used following hardware components, which complement our software. We have used Raspberry Pi , a high performance, low power processor. This project uses regulated 5V & 3.3V, 1A power supply. 7805 three terminal voltage regulator is used for voltage regulation. Bridge type full wave rectifier is used to rectify the ac output of secondary of 230/12V step down transformer. We have also used various sensors for developing this system which help us automate various tasks. Temperature Sensor LM35 - LM35 is a common temperature sensor. It is easily available in market. Voltage range is 4v to 30v. Here we have provided 5v. Range of temperature is between -55°C to $+150^{\circ}\text{C}$. it is easily suitable for remote application. Humidity Sensor SY-HS-220 - This humidity sensor operates on DC. Range of this humidity sensor is 30-90° c RH. Humidity sensor is an analog sensor and gives the output into form of analog signal. This signal is feed to ADC which will convert it into digital form. Once converted into analog form, the microcontroller can process the digital humidity signal as per the application. This sensor gives the value of change in humidity in the atmosphere.

Sensor MQ135 is used for detecting Ammonia Gas.

MQ Smoke Sensor is used to detect smoke.

Level Sensor is used for monitoring level of water.

Soil Moisture sensor is used to measure water content in soil.

Analog-to-Digital Converter (ADC) MCP3204 is used for converting signals received from different sensors mentioned above.

V.CONCLUSION

The embedded system is innovative for chicken farming, which changes a traditional farm to a “Smart Farm” or “Intelligent Farm”. In addition, the system could work on the application of the smart phones helping the owner to monitor real time environmental contexts such as temperature, humidity, ammonia gas, water level. In this system describes an Integrated Solution for Smart Poultry Monitoring Using WSN (wireless Sensor Network) and GPRS Network. Monitoring environmental parameters in a real time industry are crucial. Various environmental parameters for effective growth of chickens have been identified and defined. It also explains the method of Water Level Control Mechanism and Food Control Mechanism for a poultry farm. Threshold values of temperature, humidity, ammonia gas and water level are monitor and control by the microcontroller. As well as remote monitoring is done and with the help

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of this facility, the person in-charge can observe the situation of internal structure of poultry by sitting in a one room as data will be display on a web portal. The intelligent system can reduce cost, time, and labor is highly user friendly to the farmers. This ideal system will improve the human food requirements by improving quality and quantity of chicken. This system will also help in decreasing environment pollution and improving health of poultry labor and chicken consumer.

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