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Research Article

An Iot Based Environmental Controlled Poultry Farm with Cloud Storage

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ABSTRACT

Poultry one of the leading and vibrant agricultural segment in Pakistan poultry production, with a total contribution of 31% is one of the most important part of our economy. In the latest survey, Gross investment in this sector currently exceeds Rs.700.00 billion (Pakistan Economic Survey, 2016). The current per capita supply of protein from animal sources like beef in Pakistan, The average quantities of mutton, poultry and fish are 11grams a day. The focus of the daily dietary protein supply of the animal source is extremely less then recommended at W.H.O.26-gram (World Health Organization standards). The inner ecosystem of poultry sheds are polluted by ammonia from droppings in extensive grill sheds, the enormous size of the bird flock may otherwise cause inadequate ventilation of birds, this situation a single wave of heat may be harms in this situation, in a short period, high amount of chicken will be die. The Pakistan poultry association (PPA) reported a loss of several million rupees per year from this sector due to increased production costs simply because environmental control was not proper management. The current work is focus on the best developing a system that can monitor and control the poultry farm shed. In this research, focus on low cost indigenous intelligent solution to the efficient control of the medium-sized poultry farms will be provided for this project. The middle-class poultry farm can easily implement this system.

Keywords: PIC microcontroller, Wireless Sensor Network, IoT

1. INTRODUCTION

The ability to monitor environmental parameters is critical and requires good research work in different field in the poultry sector, In terms of environmental parameter. The major goal of this work is to design a system that can monitor and control the smart poultry farms internal environment. Where the individual who control the poultry farm will able to sense all the environmental parameter that play an important role in smart poultry farm. These are the main factors that effect on the poultry farm. In which temperature, moisture, CO2 level, Oxygen level, light Intensity, etc., which parameter are most Important than others (Handigolkar et al., 2016). The air humidity, shed temperature, Oxygen level and ammonia in air due to drop-off the bird flock traditional to control shed must be monitored and controlled. These parameters are most important for any controlled shed like, water level, feeding system, and light intensity. Researcher will make effort to design a best system and implementation as a prototype framework. A healthy chicken could provide us with healthy food, it is only depend upon we provide the clean environment. When we compare the system to money, it is too much higher at the start up price. Then the manual system, after installation the management of this system is very simple and reliable (Culibrina and Dadios, 2016) The research area focus on controlling the environmental

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parameter using different sensor and traditional poultry form convert into smart poultry form. It will provide the easier and coordinate farmers work in the effective management of poultry farming. Chickens' health depends entirely on the climate of poultry farm. The most important part of the poultry farm climate is to specify the chicken health. The chicken health is depending upon the poultry farm climate. This system will provide the facility to farmer to reduce overall bird flock production costs, which will definitely have an effect on country economy as a whole (Kanjilal et al., 2014).

So-In et al., (2013) explained that advanced technology are not used in education and entertainment. It is also used in the health care and agricultural industries, has huge impact on human society. In this paper, discuss the use of smart poultry farm through EVAP system the used mobile and wireless sensor network with a shared sensor network. The system administrators may observe environmental parameters additional feature are include when unexpected climate change in poultry farm changes in the configured thresholds. This research paper complete detail of the tools and components used to build the system Kanjilal et al., (2014) reported that technology may be change with the passage of time. It was great impact on society because everyone wished the system-working automatic the time is very short automation in all system are efficient over manual systems, are energy consuming and decrease the efficiency of other systems. The automation decreases the workers. Agriculture are main part of every country they play a vital rule in economic. It is very important to automatic the all the systems to enhance the efficiency. A poultry farm may manual required a large amount of labor. The farmer can easily maintain the poultry farm with automatic system provide the efficient results. The main concept of smart farming automation system is increased in wide area

in agricultural where we include controlled the environmental parameter and automated in auto-irrigation system and controlled the farm products (Uchinuno et al., 2013). In this research paper author complete discuss and implemented automatic system, fire sprinkler system, control the house temperature and monitor the poultry farm. The devices were work when the required temperature and security and monitored. That was reason the system is efficient. The farm automation is the major need of poultry industry where the poultry industry main part of economy. Chetan-Dwarkani et al., (2015) explained that in present agriculture a very important role is played by the process of automation in this research paper author is focus on the control environmental parameter and which sensor provide the best result in a smart poultry farm. The sensor will warn us about the temperature and humidity in the poultry farms by sending to the given mobile number. When the person receives the message then the person in charge can take an action by replying a command message back, if the system was not receiving the command it will automatically do the program action at the specific time. The basic focus of this work is to look after the temperature and for controlling the environment of the poultry farm. The major purpose of this research is to design a system that is highly efficient and implement the agriculture monitoring system. Culibrina and Dadios, (2016) describe the wireless sensor network use in farming for very efficient all-season quality farm products. The research work using was WSN techniques to collect the data in different environment parameter to perform some action and data send to the control action to manage the farm power distribution and a control the irrigation system. The main conclusion of this research the system is accurate and reliable. Handigolkar et al., (2016) describe the goal of present work is to provide a

comprehensive solution for controlled poultry farm management System and development by use low cost hardware and open software. A system was build using Arduino-Microcontroller and Raspberry Pi, for interface various sensor node. The system deeply investigated for effective poultry farm management, it includes temperature, humidity, and air quality in the open air. Through this system, effectively manage these parameters.

2. MATERIALS AND METHODS

2.1. Overview of Existing Methodologies

There are a variety of various methodologies use to build a high-quality poultry farm system. These systems overcome the current problems of poultry farms. Automation plays a critical role in the contemporary world. We developed the smart poultry farm with totally base on an automatic system. The poultry farm automation through used mobile network device and wireless sensor network some of adopted best methodology for build a great system for poultry farm.

2.2. Current work

The design includes a web-based system including a remote sensor and used the Node MCU is an open-source microcontroller. The system is provided with the real-time results in real-time environment notification, such as the monitor the temperature, humidity and air quality light dependent resistor and detect the digital ultrasonic testing detect the object. The system also monitors the water level with regulating the environment.

2.2.1. Scope of work

1. The system is changed to the traditional to smart farms.
2. It is providing farmer easier, more accurate data on different parameters.
3. The system is designed low prices, save many and effective operations of the chicken field.

4. Design intelligent system detects and tracking of different factors, such as temperature, humidity light, object detection and moisture.

2.3. Development Phases

It is used the manual or automated data analyzed to develop the system. The more accurate research we can focus on developed the environmental controlled poultry farm using the IoT microcontroller (MCU). Node MCU is an open-source controller developed for ESP8266 wifi chip. ESP8266 has a very low cost and strong usability making. It is suitable for the system. It is used in any application to send data any cloud and measure the temperature, humidity, and oxygen level.

2.4. Prototype development Model

After analysis, the previous develop system a prototype was developed for proof of concept. The prototype was based on the raw material that represents the intelligent poultry farm. This system uses relays to adjust current AC or DC devices, the output of which relays attach to cooling fans, lights bulbs, heaters etc. The electronic environment provides the reliability and flexibility in the world, at the time of installation of this device we must turn heavy load.

2.5. Web-Based Interface

A graphical user interface provides the best solution for monitoring and controls the environment the GUI is a web-based interface. we used our own domain and web hosting to build it in a true sense in order to improve the industrial standards and develop a system in a systematic way. It must be met with the industrial requirement because different related industries have been visiting for assessment purpose.

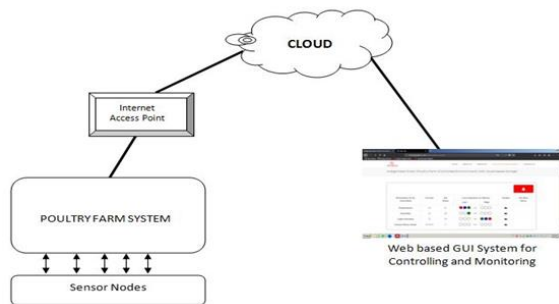
2.6. Design and Implementation of Poultry Farm Architectural Model.

A model was developed for monitoring the controlled shed with the

complete study. We have developed the GUI system all the sensor data show the graphical user interface monitors the system efficiently. All the sensor nodes connect the device with the data are sent to the cloud. The sensor values are store in the cloud framework and the server is connected to the cloud schema via API. The graphical user interface is developed in the PHP JQueryes. we manage the system with domain and database hosting server to use this system.

2.7. Germination trial

Ten sterilized seeds of each maize genotype were inoculated with PGPR as per treatment keeping an uninoculated seed set as control on a moist filter paper in Petri plates. The treatments were replicated thrice. Inoculated and uninoculated seeds were incubated in germinator at ambient temperature $26\pm 1^{\circ}\text{C}$ for 7 days. The moisture of the plates was maintained as per the requirement. The germination data was collected on daily basis.



2.8. ThingSpeak IOT Cloud Network

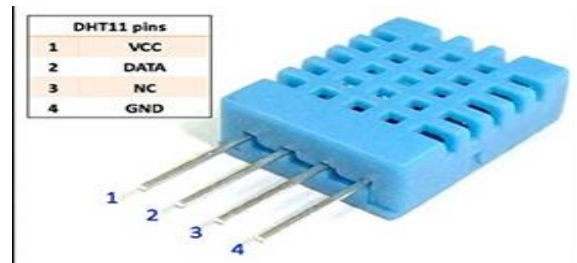
ThingSpeak IoT cloud network used to monitor and control the environmental poultry farm system. ThingSpeak performs online analysis and process data as a cloud framework. ThingSpeak builds the system without setting up serves and web software. ThingSpeak cloud network provides the 3 million free emails that are valid for one year. All the items are monitor and controlled by the different ID channel. Two separate API Key Is used by certain app users to write and read the server.

2.9. Environmental Monitoring Sensors

The DHT-II sensor is used to senses both the temperature and humidity and regulate hut, and humidity can also be sensed using the sensor schedule with the exception of the PT-100 and a thermocouple sensor. The detect the O₂ used the grove-gas sensor has been used. Because several different gases from waste chickens are a mixture of distinct forms of dangerous gases, including methane gas, co₂ gas and certain other highly hazardous gases, in a controlled poultry farm, potential structures which be increased according to the moment necessary. Therefore, the user may require hardware and implementation. The scheme is constructed with the web programming and computer technology and digital logic design combined with the scheme. The IoT system monitor 24 hours and control all the environmental parameter continuous monitoring. Castello, (2010) also carried out study on monitoring environment with wireless sensors.

2.9.1.DHT-11 SENSOR

The DHT-11 the sensor is used to measure the humidity and temperature. The sensor price in the market very cheap and easily available. The sensor required 5 volts max 2.5 mA. The DHT-11 sensor measures the humidity level 15-80% with the accuracy of $\pm 1\%$. The sensor also measures the temperature 0°C to 50°C with the accuracy of ± 1 . This is the 4-pin sensor the distance between these 0. 1 (Bogdan, 2017).



Evaluation of a soil moisture index is studied in (Eric, 2008)

Figure DHT-11 Temperature and Humidity Sensor

2.9.2. CARBON MONOXIDE SENSOR-MQ-7

Carbon Monoxide sensor (CO) is a simple sensor sensing CO in the air. The carbon Monoxide sensor detects the CO gas range to 10 to 500 PPM. The sensor has a sensitivity and very fast work. The output of this sensor is Analog resistance. The drive circuit is simple and must to be attached to an ADC, because the heating coil with 5 volts, add load resistance.



Figure MQ-7 Carbon Monoxide Sensor

2.10. Node MCU ESP8266

Node MCU is an open-source Lua firmware development board IOT based application used. The NodeMcu connects to the USB port and is powered by a 3.3V board. The microprocessor supports RTOS basic operates on 80 MHz to 160 MHz adjust the clock frequency. NodeMcu has 4 Mb memory and 128kb RAM the memory to store data and programs. It is work very fastly and high processing power with the build-in WI-FI Bluetooth and completing the operating features. We can also digital data continuous storage in the NodeMcu. The NodeMcu has 16 general-purpose input and output pins on its board. The Node MCU has 12c functionality support.



Figure Node MCU ESP8266

2.11. ARDUINO IDE

We used the Arduino Ide as a platform to upload as the written program to microcontrollers Arduino IDE is to the Node MCU hardware compiler and interpreted. The Arduino ide search for any library where the thousands of Arduino library store in the respository that is written an authentic people. Arduino IDE has different functionality It performs a different function based on the library system. Arduino IDE has used to writing and uploading a program for the microcontroller. Arduino IDE as work of compiler /assembler and graphical user interface. it is the backend performs the converted the C Language code in binaries. We can provide a very effective environment write program easily in Arduino IDE.

3. Results and Discussion

The smart poultry farm is designed to control the environment of the poultry farm. In this research, we used the different sensor for monitoring the environment in a precision manner. The semi-controlled sheds the diagram used to monitor and control this parameter humidity temperature, light intensity and detect the carbon monoxide level. when the carbon monoxide level increases the fan automatic on and fan 12DC is mounted a cooling pad. When the temperature s high then 12-colt 2NOS is on to handle the event. If the temperature is not handled, then the other cooling fan is on and control the temperature. The diagram shows the provide GUI graphical is created to monitor and control the smart poultry farm. In GUI system create a webpage the used of IoT cloud API's, the API is used to send data to the cloud server. Thingspeak cloud shows different channel which is monitoring and control the environment via the channel. The poultry farm is controlled via the scenario. To achieve our aim of various logic we developed the smart poultry farm. The live sensor measurement of the parameter in thingspeak cloud server. The following

parameter is the measure, and 4 parameters are regulated through the graphical user interface it is a web-based. The first parameter was measured the temperature status, and second, was measure the humidity level in the air and third measure light intensity and the fourth was measure the carbon monoxide. These are built in the thingspeak cloud network and it is shown in the web-based graphical user interface through the API's. The diagram shows the actual form of the thing speaks cloud network.

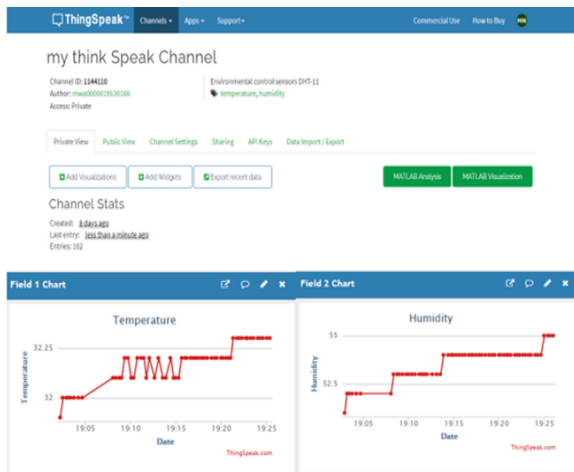


Figure Shown In IOT Cloud Server

A notification system is built when the valves are small when the notification symbol is red and write is the figure below and notification is checked activated. The physical warning is only awake when the values are high the notification light also indicates the red alert and show the physical warning.



Figure Notification System

The main component of this method is the internet of things and each warning period in zero and one type document in this scheme. When the alarm value is 1 the IoT cloud network alarm is value is 0 when the

alarm is one of the values. The GUI system is controlled on the 1 value in the cloud when the alarm is zero it is switched off.

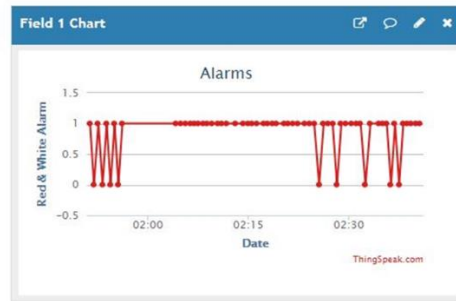


Figure Notification System

4. Conclusion

Poultry one of the leading and vibrant agricultural segment in Pakistan, poultry production is one of the most important parts of our economy. The actual number of 21900 poultry farm most of the lacking equipment without automation and follow the traditional way that is not enhancing the output quality of a product, the chicken we consume thousands of tones every day. First, we will improve the traditional poultry in smart poultry, secondly change in the commercial poultry we have follow the traditional poultry farm in the rural, Where we must change in smart poultry farms control every aspect with human presence and human assistance. We have used a different kind of electronic sensor that measures the poultry farm internal environment. These sensors measure the environment and monitor and control the poultry farm system. in addition, we have also completely monitored and control the environment with a completely automated system is implemented in a commercial poultry farm in this system the presence of the user is not important when we compare the Traditional poultry farm system. The less manpower is required for the automated poultry farm system when we compare the traditional poultry farm system. These systems are very expensive, and their production quality is low in traditional poultry farming the labour pay are heavy

duties. We have developed our own smart poultry farm with monitor and control the environment parameter. All of the parameters are humidity, temperature, carbon monoxide, LDR sensor, light intensity. We have developed the prototype model these are detected the parameters. In this prototype, we used locally accessible sensors to achieve our main objective. This is very easily available in the market. We create embedded hardware to build an open-source system, Node MCU. Node MCU nowadays is the most significant and efficient microcontroller tool. Microcontrollers based Node MCU are really available in the local market and it is easy to handle. We have to build a smart farm using the Node MCU which is control and monitors this parameter using IOT cloud network nowadays it is a hot subject and it is also a need of time we define the parameter and communicated according to their needs. We implemented the IoT complete framework to control and monitor the dedicated internet site, to control our poultry shed. We develop the prototype user can see all information via the internet in a dedicated domain and hosting. All the information is accessible easily. We have all the existing parameter values in the web-based graphical user interface. We have two activates level: First, the reduce part of the defined parameter and second the greatest part of the specific parameter is limit. The setting of the IoT cloud for storage 15second the time interval in the loop is defined in IoT cloud storage show the graph/legends with control environmental parameter values of the moment of data and time. We used the IoT cloud framework that provides the user facilities to control the environment and monitor the value with the API. In addition, we have a singular channel number with some channel API for these API. There is a unique channel with the unique API distinctive identity. We have designed a smart poultry farm with full automation

combination of the IoT technology and cloud storage.

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