Smart Poultry Farm & Fishing System Using Arduino

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***Abstract*— Advancement in technology has made regular life more easy and convenient. In every aspect of life, it is essential to be updated that ensures that progress of mass interest. With the growing demand, automated poultry farming has become eminent that contributes enormously in economic growth. Smart poultry farms can emancipate the farmers from the traditionally tedious procedures which were outdated and time consuming. In preliminary stage, a smart poultry farm shows many distinctive features such as, automated food and water supply, egg collection, anti thief feature which ensures an overall surveillance of the farm has been incorporated etc. In this paper, we work on environmental factors which is mainly work on to control the temperature and water situation on poultry farm. Here we use temperature sensor to measure the inside temperature of the poultry farm. If there temperature is more then 40°c then automatically fan will be on. Similarly when the room temperature will decrease under 36°C then light will be On automatically to produce heat inside of poultry farm. It also maintain the food quantity and water position of poultry farm. When the food quantity is getting down then automatic food feeding system supply food from a container and also when water level is low then pump will on and supply limited water. This all kind of automation will done by Arduino UNO Micro-controller. All these distinguished features have been realized and observed with very perfection and it can be concluded the proposed project work has taken the poultry farming into next level of advancement.**

***Keywords*—** automatic poultry farm, Fish Farming, Automatic poultry feeding, Measure water pH, Automatic temperature management.

1.1 Introduction

Nowadays, chicken poultry industry is an important industry for sustainable food supply in our country. The development of an automatic chicken feeding machine can be very useful to the growth of the poultry industry, the Soil mixture for healthy environment and also water sprinkler for control the temperature is most important task and labor-intensive task. These manual processes are needed in normal poultry farm. In order to replace manual Activities and poultry work easier with making smart poultry farm. For implementation of smart poultry farm to use one kind of smart system for Automatic Food Feeder in container and water sprinkler for control the temperature of environment and also use the soil mixture for reducing the Gas in poultry environment. System is designed in such way that user can remotely control to the system through android mobile application. Using this prototype Human work is also reducible and smart work will be done. Advancement in technology has made regular life easier and more convenient. In every aspect of life, it is essential to be updated that ensures that progress of mass interest. Smart poultry farms can emancipate the farmers from the traditionally tedious procedures which were outdated and time consuming. In preliminary stage, a smart poultry farm shows many distinctive features such as, automated food and water supply, egg collection, maintaining precise environmental factors etc. In this paper, we work on environmental factors which is mainly work on to control the temperature and water situation on poultry farm. Here we use temperature sensor to measure the inside temperature of the poultry farm. If their temperature is more than 40°c then automatically fan will be on. Similarly, when the room temperature will decrease under 36°C then light will be on automatically to produce heat inside of poultry farm. It also maintains the food quantity and water position of poultry farm. 2 When the food quantity is getting down then automatic food feeding system supply food from a container and also when water level is low then pump will on and supply limited water. This all kind of automation will do by Arduino UNO Micro-controller. All these distinguished features have been realized and observed with very perfection and it can be concluded the proposed project work has taken the poultry farming into next level of advancement.

1.2 Objective

The main objective of this project is to develop a Smart Poultry Farm and Fishing System, which maintains the inner temperature of the poultry farm. Our objectives are pointed out below: λ To design and construct of a Smart Poultry Farm and Fishing system. λ Automatic temperature measure and food supply. λ Automatic water pH measuring fa or better fishing system. λ To take necessary notes from the project for future.

1.3 Motivation

We have to be modern with the times. This will make daily life much easier. Earlier all work in poultry and fishing firm was done manually. It caused a lot of problems. Chicks die due to low-temperature rises in farms. It does a lot of damage. Also, when the water in the fisheries system is difficult for the fish. Our system has sensors measuring the temperature of the farm which measures the temperature inside and informs the minister. Also, when food is needed on the farm, food will be given automatically. Again, when water is needed in the Fishery system, water will be supplied automatically. We are motivated to create this system to solve

2. Literature review

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 labours. The system replace the human labour to feeding food into container. It overcome the labour 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 chickens food [2]. It improves poultry's climate and reduce labour cost and save food and chicken feeding on time and avoid contaminated food from insects. The Poultry farm uses a computer network technology. 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 labour's 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 Sensors 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 labour's ,the system monitor environmental parameters such as temperature, humidity, ammonia gases, water level and maintain a healthy environment. The paper focus on automation of poultry farm using wireless sensor network and mobile communication system. This paper also focuses on environmental parameters like temperature, humidity, ammonia gas these are monitored and controlled fully automatically [6]. By using this automation quality of meat production is improved and growth. The smart poultry farm is fully focus on climate so the quality of chickens will be improved. The climate of poultry farm becomes fully automated. The system's aim is to provide to build an automated environment controlled poultry management system. The system study the physical parameters about poultry house it includes temperature, humidity, moisture content, air and also the quality of the air. System not only monitored the poultry house but also regulates these parameters properly [7]. The whole system access and control through remotely using handheld mobile devices. The system reduces labours, saves times. The paper focus to provide the desired climate conditions in poultry house and also to control the performance. The proper method of controlling poultry house the ventilation system is use and it is also include a main factor is air temperature, air humidity [8]. The uncertainty of system is also reduced and also this mode contras the system in hierarchical manner this project not only reduce production cost but improved health of animals. The paper focuses to the integration of wireless sensors and GPRS network to control and monitor the environmental parameters in the poultry farm. The environmental parameters like temperature, humidity, ammonia gas etc. System takes immediate action to control these environmental parameters. Food and water level is also controlled and monitor using automated system [9]. Smart helps to the farmers or labour's to monitor and remotely access to the whole system. One of the main benefit is to provide food and water level time to time without wastage The paper reduce labour's manual work with labour's cost. It improves the meal production in poultry farm. By using wireless sensor data is collected from poultry's environment and it is combined to the sensors. So, controlling and monitoring poultry's climate is easily accessible to the user [10]. This system provides a monitoring system and which is useful to the owner to receive the information from poultry farm and also to control wirelessly. So this system is able to gather the data and operate automatically and helps to maintain the temperature in poultry farm. Moroccan poultry contributes in the national food security. It focuses on facing obstacles to climate conditions it includes heat in summer and cold waves in winter. The heat losses in the summer in terms of mortality and the cold waves increase the efficiency of the food. i.e. means quality of food is consumed [11]. In this paper to study to saving, cooling and heating in poultry house by using earth-air heat exchanger. The paper includes to improve the poultry farm's production, quality and also economy. Using wireless sensor network, the poultry's growth improves that becomes it is a complete solution for poultry farming. The temperature is also maintained by using this wireless sensor network. By using this system quality and quantity of chickens is improved with human health is also improved [12]. The wireless sensor node would be very useful for early detection of status or health of chickens, and that's why production and economy is achieved. The research paper focuses to development of the wireless sensor node. Wireless system can reduce the public risk and economic cost of the avian-influenza is become to the least. Influenza infection can be detected according to the temperature and monitoring is done at a very early stage [13]. In order to meet the requirements of low power consumption and higher sensitivity, new micro temperature sensor technology was developed. This paper's aim is to determine minimum functions but enough for the practical monitoring. Wireless sensor node and temperature sensor detects infected chickens with the highly pathogenic avian influenza (HPAI) viruses in poultry farms. In early stage wireless sensor node shows weakness and never of the infected chickens. A global avian influenza surveillance system

monitored the health of chickens using wireless sensor nodes with poultry farm [14]. System reports to a user of health conditions obtained by sensor like as fever and weakness. Wireless sensor node has developed to reduce the power consumption of a device.

Methodology

3.1 Introduction

The project objectives, methods, literature evaluation, and other details were all clarified in the preceding chapter. The block diagram, circuit diagram, operating principle, and final project instrument cost analysis will all be covered in this chapter.

3.2 Block Diagram

Here is the block diagram of the Smart Poultry Farm and Fishing System with all the essential components. All of the components are shown in below as a block in this diagram. Here we use Arduino for main micro-controller which is operate the system automatically and use node mcu for get online information of our project. Other equipment's are attached with this micro-controller and work together for perform as our desire outcome.

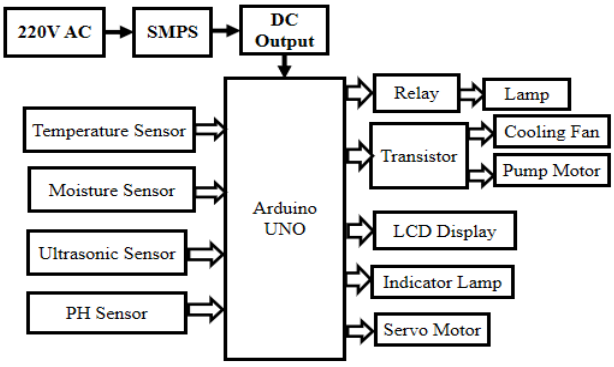


Figure 3.1: Block Diagram of Our Project

3.3 Circuit Diagram

In this part we show our project circuit design and connect out instrument through standard wire.

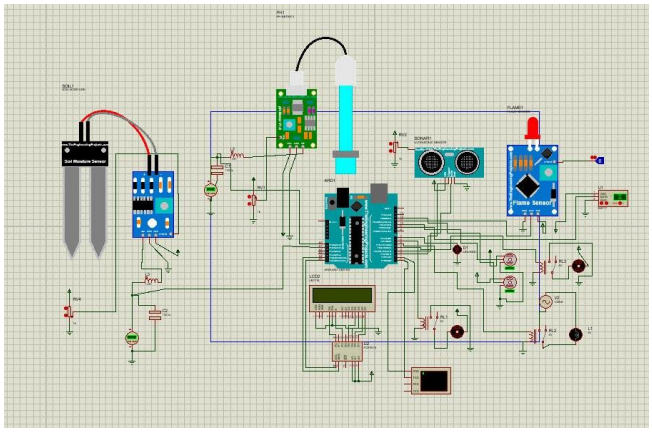
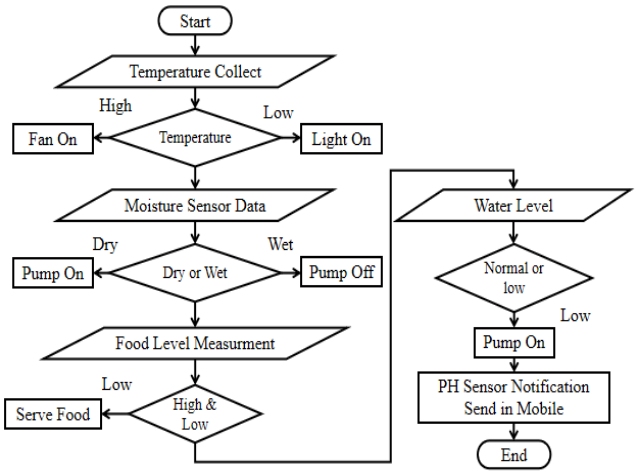


Figure 3.2: Project Circuit Diagram of Our System

3.4 Flow Chart



3.5 Working Principle

Connecting with the controller here is AC 220 volts coming to the circuit by converting to 5volts DC via SMPS. Which is safe for our project equipment. This project we use Arduino UNO micro-controller for controlling this project. Here also use a Temperature sensor, Moisture Sensor, Ultrasonic Sensor, Servo Motor, Relay, Transistor, Pump Motor, Lamp and Fan .The system will work if our project is connected to power and switched on. At this moment, if the temperature inside the farm is less than 36 degrees then a light will be turned on through the micro-controller relay. So that the temperature of the firm rises. This will protect the farm's animals from the cold. A temperature sensor has been installed here to measure the temperature. If the temperature rises above 40 degrees, the lights will go off and the fan will turn on automatically. This will help the temperature of the firm to return to normal. In addition to this, When the food limit is getting down then automatic food feeding system supply food from a container and also when water level is low then pump will on and supply limited water. Food limit will be checked by a ultrasonic Sensor and water level will monitored by a soil moisture sensor. This is the main purpose of our project.

3.6 List of Components

Arduino UNO
SMPS
Ultrasonic Sensor
Temperature Sensor
Moisture Sensor
Relay
Pump Motor
Servo Motor
Transistor
Cooling Fan
Lamp
Holder

3.7 Arduino UNO

The Arduino Uno is a micro-controller board based on the ATmega328 (data sheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the micro-controller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega8U2 programmed as a USB-to-serial converter. "Uno" means one in Italian and is named to mark the upcoming release of Arduino 1.0. The Uno and version 1.0 will be the reference versions of Arduino, moving forward. The Uno is the latest in a series of USB Arduino boards, and the reference model for the Arduino platform; for a comparison with previous versions, see the index of Arduino boards.

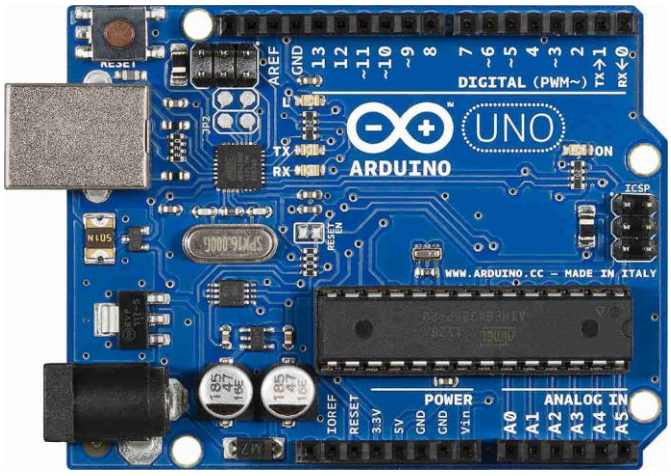


Figure 3.3: Arduino UNO

3.8 Switch Mode Power Supply (SMPS)

A switched-mode power supply (switching-mode power supply, switch-mode power supply, switched power supply, SMPS, or switcher) is an electronic power supply that incorporates a switching regulator to convert electrical power efficiently. Like other power supplies, an SMPS transfers power from a DC or AC source (often mains power) to DC loads, such as a personal computer, while converting voltage and current characteristics. Unlike a linear power supply, the pass transistor of a switching-mode supply continually switches between low-dissipation, full-on and full-off states, and spends very little time in the high dissipation transitions, which minimizes wasted energy. A hypothetical ideal switched-mode power supply dissipates no power. Voltage regulation is achieved by varying the ratio of on-to-off time (also known as duty cycles). In contrast, a linear power supply regulates the output voltage by continually dissipating power in the pass transistor. This higher power conversion efficiency is an important advantage of a switched-mode power supply. Switched-mode power supplies may also be substantially smaller and lighter than a linear supply due to the smaller transformer size and weight.

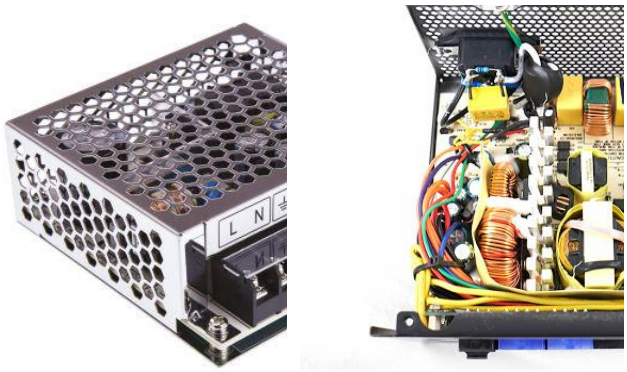


Figure 3.5: SMPS

3.9 Servo Motor

A servomotor is a closed-loop servomechanism that uses position feedback to control its motion and final position. The input to its control is a signal (either analogue or digital) representing the position commanded for the output shaft. The motor is paired with some type of position encoder to provide position and speed feedback. In the simplest case, only the position is measured. The measured position of the output is compared to the command position, the external input to the controller. If the output position differs from that required, an error signal is generated which then causes the motor to rotate in either direction, as needed to bring the output shaft to the appropriate position. As the positions approach, the error signal reduces to zero and the motor stops.

The very simplest servomotors use position-only sensing via a potentiometer and bang-bang control of their motor; the motor always rotates at full speed (or is stopped). This type of servomotor is not widely used in industrial motion control, but it forms the basis of the simple and cheap servos used for radio-controlled models. More sophisticated servomotors use optical rotary encoders to measure the speed of the output shaft and a variable-speed drive to control the motor speed. Both of these enhancements, usually in combination with a PID control algorithm, allow the servomotor to be brought to its commanded position more quickly and more precisely, with less overshooting.

Figure 3.8: Servo Moto

4. RESULT ANALYSIS

4.1 Result Analysis

Now, it's time to talk about the results. We have written our commands using the Arduino IDE and the following things can happen:

- When this project is run then it will sense the environmental temperature and water condition in farm.
- If the temperature is below 34 degrees, then light will be on and All condition will see in LCD Display.
- If their temperature is more the 40 degrees then light will off and turn on the fan. These will control with the help of controller.
- This system also has a ultrasonic sensor. This sensor will measure the food quantity. If there need food then controller automatically supply food from container.

• Week	Temperature(Celcius)	Fan	Light
1	T > 31	On	Off
2	T<25	Off	On
3	T>31	On	Off
4	T>31	On	Off

Fig : Temperature and Fan Light Control for Poultry Birds

Week	Ultra Sonic Sensor (D max = 7cm)	Status of Smart Feeder
1	D >7	OPEN
2	D<7	CLOSE
3	D<5	CLOSE
4	D>6	OPEN

Fig : Smart Feeder For Poultry

Week	Ph	Status
1	Ph =7	Ph Normal
2	Ph =6	Ph Normal
3	Ph =5.7	Ph Normal
4	Ph = 4.5	Ph Abnormal

Fig: Working Principal of Ph sensor

Week	Fire sensor	Status (Buzzer)
1	0	No Alert
2	0	No Alert
3	0	No Alert
4	1	Alert Fire Detected

Fig : Working Principal of Fire alarm sensor

4.2 Project Prototype Image

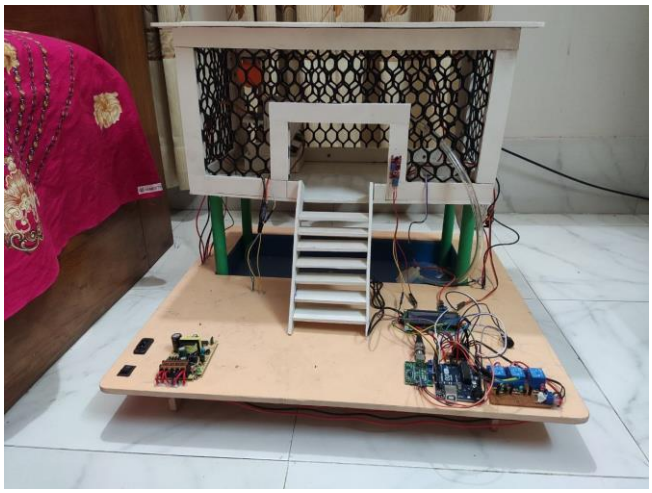
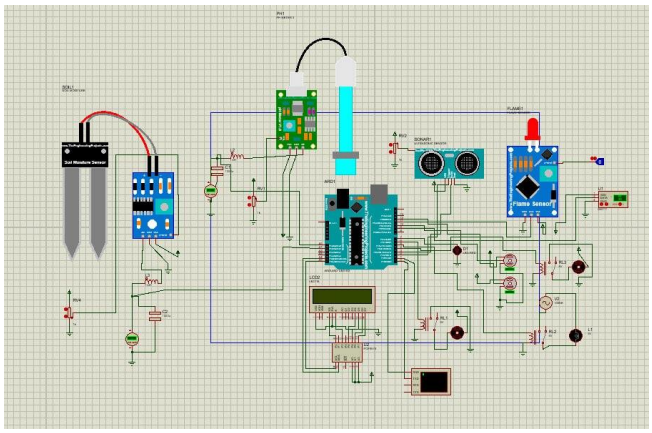


Figure 4.1: Project Image

4.3 Project Simulation



4.4 Project Cost Analysis

In the below table we have summarized our project expenditure.

5. FUTURE WORK AND CONCLUSION

5.1 Advantages

There are certainly many advantages of our project and some of the major ones have been given below:

- Able to Check inner temperature automatically.
- It able to reduce temperature automatically.
- Water can supply automatically when water need.
- Also able to supply food when it need.
- No Oil consumption.
- The project is compact, cheap and user friendly.
- The whole system consumes very little energy.
- Less skill technicians is sufficient to operate.

5.2 Applications

TThis project has applications in many fields due its necessity. We have selected a few of them and they are given below:

- It can be used for Smart Poultry Farm work.
- It can be used for maintain inner temperature automatically.

5.3 Limitations

No project is without its limitations and ours is no exception from that but the final output we received from our project is quite satisfactory. Listed below, are some of the limitations we have:

- It may take time when it is start.
- It will provide 99% correct reading in this project.
- To get all notification mobile and project must be connected with the internet.

5.4 Conclusion

Innovative technology for Zoology environmental condition management especially poultry and fish farming which can be changed from the routine traditional farm into smart automated poultry farm. Water control mechanism helps to provide time to time water supply to the chickens as well as help to avoid the wastage of water. Usage of helps the farmer to monitor the internal environment of poultry farm and also get all details about the farm from anywhere and anytime. The usage of mobile devices especially smart phone can help the farmers to monitor the internal environmental condition of poultry.

5.5 Future Scope of Work

As we have already discussed about the limitations of our project so definitely there's room for improvement and thus, we have lots of future scope of work available to us for this project. Some of these are listed below:

- In future, we are thinking about adding record for save some data.
- In future, we are thinking about 100% accuracy.
- In future development this project can be develop by more gas sensor, thermal image sensing, camera etc. for security.
- In the future we will use anti thief alarming system.

Sl. No	Particulars	Specification	Qty.	Unit Price (TAKA)	Total Price (TAKA)
01	Arduino UNO	ATMega 328P	1	1150	1150
02	Temperature Sensor	DHT11	1	400	400
03	Moisture Sensor		1	250	250
04	Servo Motor	SG90	2	300	600
05	Pump Motor	5V DC	1	250	250
06	Cooling Fan		1	150	150
07	Lamp		1	100	100
08	Ph Meter		1	3000	3000
09	Ultrasonic Sensor	HC-SR04	1	350	350
10	Others				1650
				TOTAL =	7900/=

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