

# Smart Poultry Farming

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**Abstract:-** Poultry farming production is in demand now a days because of the increasing population around the world. Monitoring of a chicken farm could be very helpful to produce a great number of chicken meat and to meet the demand of the people. However, there are different environmental factors that are affecting the growth of a chicken that also affects the production of chicken meat for food consumption. This study aimed to determine the different sensors and materials that can be included in the system architecture for smart chicken farming which focus on the monitoring of the environmental parameter.

## 1. INTRODUCTION:

The goal of this project is to produce healthy and sustainable poultry meat and also data analysis for qualitative and quantitative research, where people can get fresh meat with profit. 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 labour-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.

The Cloud computing technique is employed and sensors has been developed and found to be an efficient and intelligent method of remote control for the farmers, which highly reduces cost, time and man power. This in turn provides improved productivity and profit for the farmers.

S. Arunkumaret. al. 2018 [1]. The development of an automatic chicken feeding machine can be very useful to the growth of the poultry industry.

Shubham Mitkari et. al.2019 [2]. Smart control system for poultry farm with their factors and the drawbacks of the previous techniques that are used in the smart control systems.

Mohammad R. Ahmadi, et. al.2018 [3]. Wireless sensors and general pocket radio service network system provides an efficient automated poultry farm monitoring system to monitor the healthy atmosphere for chickens in poultry farm without human interference.

Geetanjali A. Choukidaret. al.2017 [4]. Automation of poultry farm by using wireless sensor network and mobile communication provides automated poultry, reduces man power and increases production of healthy chicken.

Ayyappan. V et. al.2017 [5]. Automated system initiates the action automatically to control the environmental parameters such as humidity, temperature, ammonia gas and will decrease the environmental diseases affecting chicken and increase the productivity and eliminate a lot of manpower.

Eric Hitimana et. al.2018 [6]. Field programmable gate array system by using internet of thing will automatically initiate the action to verify the environmental parameters in case of sudden climatic changes. In addition, the control of the water level and the food control mechanism are controlled and controlled with the help of the sensor. This system provides an efficient automated system for monitoring poultry farms to monitor the healthy atmosphere of chickens in poultry farming without human interference.

Ramgirwar S.S. et. al.2018 [7]. Using the better system a farmer will management remotely his poultry farms through time period observation with a private laptop and cell phone.

Junho Bang et. al.2014 [8]. Wireless sensors and mobile system network to control and remotely monitor environmental parameters in a poultry farm, the system provides an efficient automated agriculture monitoring system.

K. Sravanth Goud et. al.2015 [9]. Internet of issue based mostly sensible poultry farm can provides a trouble free and higher observation expertise to the user of the poultry farm. This method can create use of the sensors and microcontroller unit to perform the same operations of feeding, water system and temperature- humidness observation that area unit the most causes for any reasonably epidemic or diseases for poultry birds.

Sakshi Mishra et. al.2019 [10]. Technology based solution for low cost, asset saving, quality oriented and productive management of chicken framing, by utilizing an intelligent systemwhich used an embedded framework and smart phone for watching farm to regulate environmental parameters victimization good devices and technologies.

Rupali B. Mahale et. al.2016 [11]. Use of an intelligent system which used an embedded framework and a wise Phone for monitoring farm to manage environmental parameters using smart devices and technologies.

B. Balasaheb Phalke et. al.2020 [12]. Automation of poultry farm using internet of thing technology to perform various management related things. T The environmental factors that have an effect on the health of chicken like temperature, humidity, light and ammonia gas square measure monitored and also the manual jobs like food feeding, installation system, cleanliness square measure managed.

Shruthi B Gowda et. al.2020 [13]. The management and monitoring of the farm can also be done through a web based system. Which keeps track of the management of poultry farm from anywhere and at any time.

K.A. Sitaram et. al.2018 [14]. Automated environment controlled poultry management system performs many operations for the usage of the farm efficiently, it monitors the temperature and humidity continuously and also monitors the food level in the container and indicate the owner using a mobile application by the help of a wifimodule,this system reduces the human effort and also increases the poultry production,

R. Sekar et. al.2019 [15]. Poultry birds are generally reared in the litter system so it requires adequate space and related equipment facilities for the proper management of the flock. Modern poultry houses are fully automated with fans linked to sensors to maintain the required environment

Glatz and Pym, 2006 [16]. Automation of poultry farms help to reduce the labour cost, increase farm efficiency, improve the productivity, and production rate of meat and egg.

## 2. PROPOSED SYSTEM:

The smart poultry farm greatly enhances the traditional farm by making it fully automated and sending timely feedback to the operator as and when required. Its advantages over the existing system are as follows:

1. A single dashboard is available for real-time monitoring of the farm as well as control of actuators wirelessly from anywhere in the world.
2. Different sensors are available for real-time monitoring of hazardous gases in the farm like ammonia and methane. Proper ventilation is available whenever the level of these gases is high.
3. The temperature and humidity in the farm can be monitored and suitable actuators are available to maintain their optimum level.
4. Water supply to the farm is fully automated.
5. Real time updates are sent to the farm owners about the status of the far

### 3. METHODOLOGY:

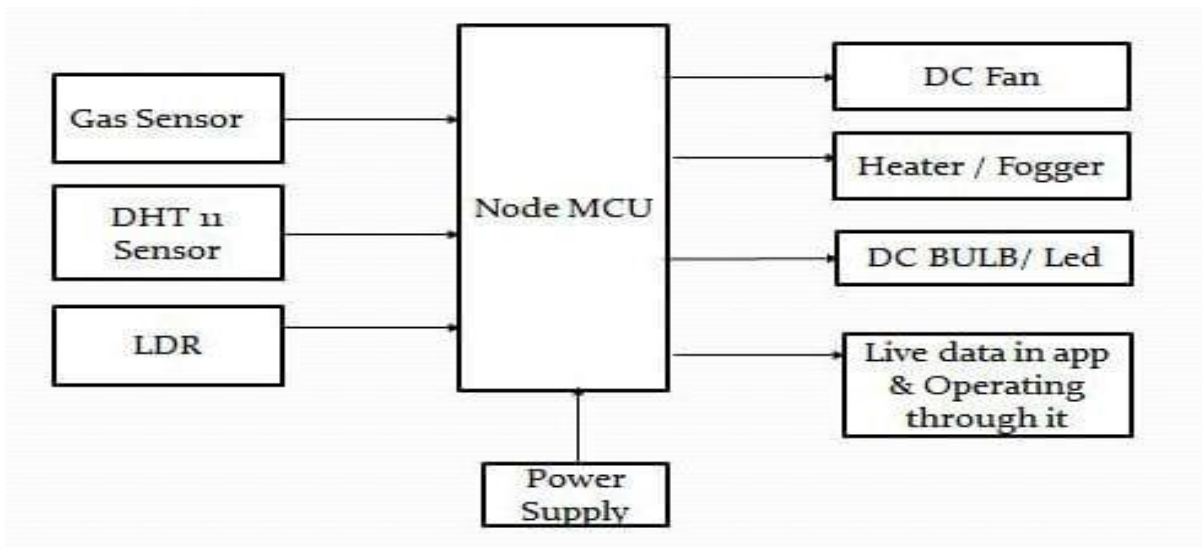


Fig-1: Block diagram for smart poultry farming

The results of the Gas sensor , DHT 11 sensor and LDR are the sensor which acts as the inputs of the system and Senses the data . And we will observe the data of them in things speak applet and we will automatically observe the values and we will control them as per the requirement needed .

#### 3.1 Power Supply:

To supply power to the vehicle, rechargeable batteries are usually the best ones. A standard 300-500 rpm motors run well between 9 to 12 volts. Alkaline batteries, lithium-ion, nickel cadmium, or zinc carbon batteries can be used. The appropriate series-parallel combination can be used to provide more power than a standard battery can provide.

#### 3.2 Arduino UNO:

The Arduino Uno is **an open-source microcontroller board** based on the Microchip ATmega328P microcontroller and developed by Arduino. cc. The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced with various expansion boards (shields) and other circuits.

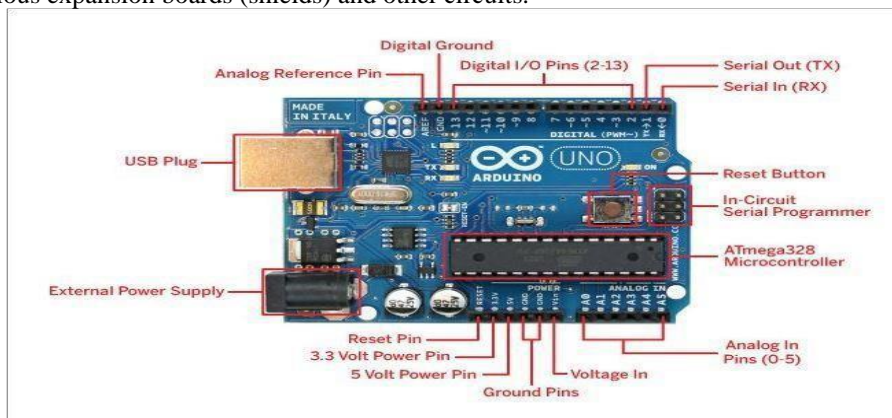


Fig-2: Board of Arduino-Uno

#### 3.3 LDR(LIGHT DEPENDENT RESISTOR)

An LDR or light dependent resistor is also known as photo resistor, photocell, photoconductor. It is a one type of resistor whose resistance varies depending on the amount of light falling on its surface. When the light falls on the resistor, then the resistance changes.For instance, when the LDR is in darkness, then it can be used to turn ON a light or to turn OFF a light when it is in the light.



Fig-3:LDR

### 3.4 DHT11 Sensor

DHT11 is a low-cost digital sensor for sensing temperature and humidity. This sensor can be easily interfaced with any micro-controller such as Arduino, Raspberry Pi etc... to measure humidity and temperature instantaneously.

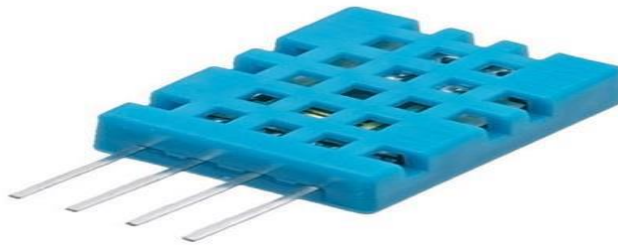


Fig-4: DHT11 Sensor

### 3.5 MQ-4 Sensor

MQ4 methane gas sensor is a MOS (metal oxide semiconductor) type sensor, used to detect the methane gas concentration within the air at either home or industries & generates output like analog voltage by reading it. Here, the range of concentration for sensing ranges from 300 pm – 10,000 ppm which is appropriate for the detection of a leak. This gas sensor mainly includes a detecting element like ceramic based on aluminum-oxide ( $Al_2O_3$ ), coated with Tin dioxide ( $SnO_2$ ) and arranged within a stainless-steel mesh.



Fig-5: MQ-4 Sensor

### 3.6 Liquid Crystal Display (LCD) module

A liquid-crystal display (LCD) is a flat-panel display or other electronically modulated optical device that uses the light-modulating properties of liquid crystals combined with polarizers. Liquid crystals do not emit light directly but instead use a back light or reflector. The LCDs are used to supports small and low-profile sizes. LCD module is shown in below figure-5.



Fig-6: Liquid Crystal Display Module

### 3.7 NODE MCU -WIFI MODULE (ESP8266)

The **ESP8266** is a low-cost Wi-Fi microchip, with built-in TCP/IP networking software, and microcontroller capability, produced by Espressif Systems in Shanghai, China.

The chip was popularized in the English-speaking maker community in August 2014 via the **ESP-01** module, made by a third-party manufacturer Ai-Thinker. This small module allows microcontrollers to connect to a Wi-Fi network and make simple TCP/IP connections using Hayes-style commands. However, at first, there was almost no English-language documentation on the chip and the commands it accepted. The very low price and the fact that there were very few external components on the module, which suggested that it could eventually be very inexpensive in volume, attracted many hackers to explore the module, the chip, and the software on it, as well as to translate the Chinese documentation.

The **ESP8285** is a similar chip with a built-in 1 MiB flash memory, allowing the design of single-chip devices capable of connecting via Wi-Fi.

These microcontroller chips have been succeeded by the ESP32 family of devices.

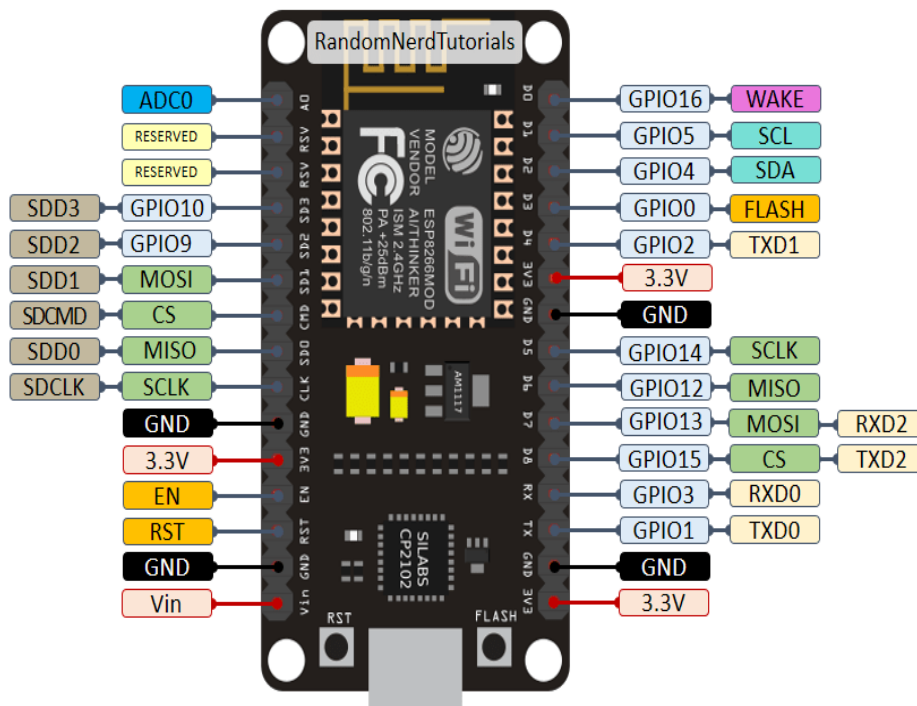


Fig-7:ESP8266 Wi-Fi Module

### 3.8 L293D MOTOR DRIVER

L293D is a basic motor driver integrated chip (IC) that enables us to drive a DC motor in either direction and also control the speed of the motor. The L293D is a 16 pin IC, with 8 pins on each side, allowing us to control the motor. It means that we can

use a single L293D to run up to two DC motors. L293D consist of two H-bridge circuit. H-bridge is the simplest circuit for changing polarity across the load connected to it.

There are 2 OUTPUT pins, 2 INPUT pins, and 1 ENABLE pin for driving each motor. It is designed to drive inductive loads such as solenoids, relays, DC motors, and bipolar stepper motors, as well as other high-current/high-voltage loads.



Fig-8:L293D motor driver

### 3.9DC-FAN / EXHAUST FAN

A DC, or direct current fan, uses a power source that is connected to a transformer. The transformer then converts the energy to direct current, or a one-way current. As a result, the quantity of power utilised is ultimately decreased.



Fig-9:5V DC Fan

### 3.10LED (Light Emitting Diode)

A light-emitting diode (LED) is a semiconductor device that emits light when current flows through it. Electrons in the semiconductor recombine with electron holes, releasing energy in the form of photons. The colour of the light (corresponding to the energy of the photons) is determined by the energy required for electrons to cross the band gap of the semiconductor. White light is obtained by using multiple semiconductors or a layer of light-emitting phosphor on the semiconductor device.

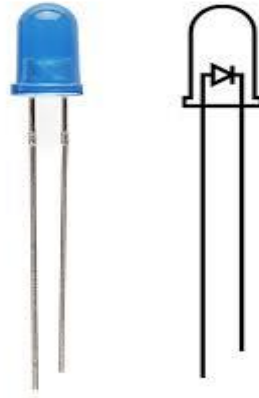


Fig-10:LED

### 3.11BUZZER

An audio signaling device like a beeper or buzzer may be electromechanical or piezoelectric or mechanical type. The main function of this is to convert the signal from audio to sound. Generally, it is powered through DC voltage and used in timers, alarm devices, printers, alarms, computers, etc. Based on the various designs, it can generate different sounds like alarm, music, bell & siren.



Fig-11:Buzzer

## 4. RESULTS AND DISCUSSION

The hardware setup has been constructed using the sensors coupled with Arduino board for controlling the parameters. The humidity, Temperature, Gas and light sensors are connected to Arduino via jumper wires. In the programming part, a threshold value has been set for each sensors. Whenever the values sensed exceeds far or falls below the threshold value, suitable action is initiated automatically.

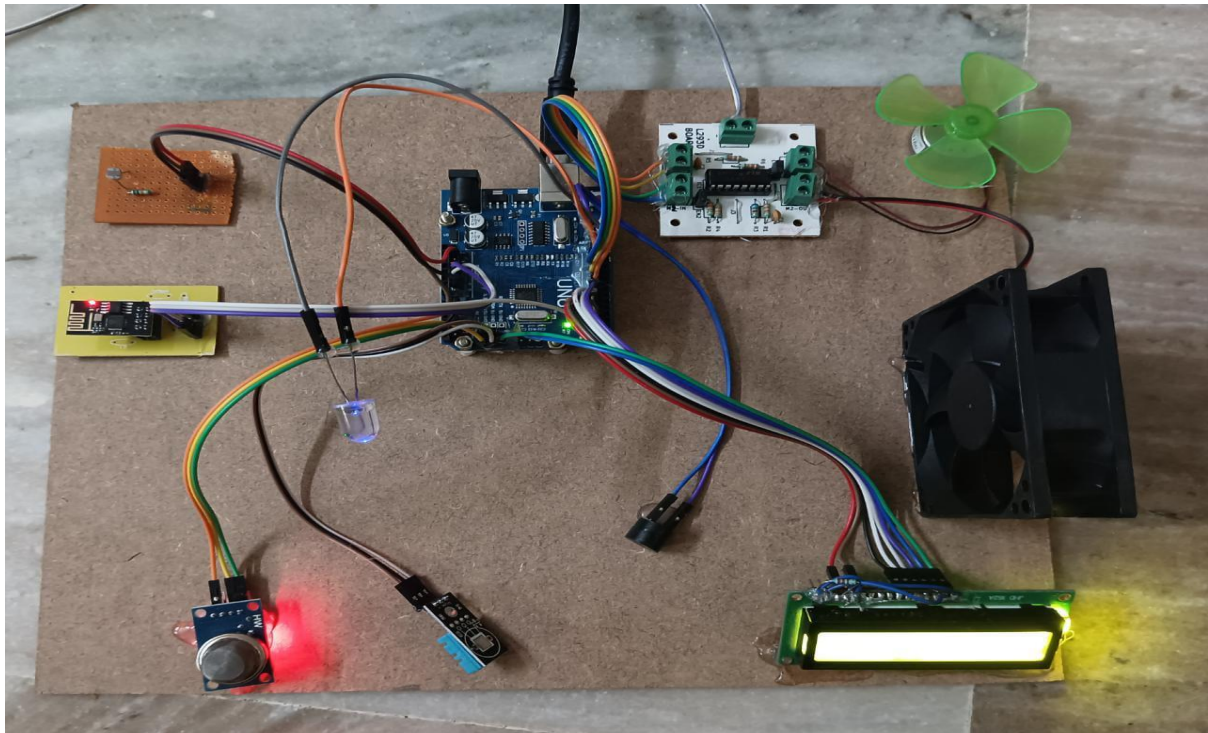


Fig-8: Hardware Prototype Module

If the value of ammonia gas content or temperature sensed is beyond the set value, Arduino will send HIGH command to the Fan port, thus turning ON the Fan.

The status of the temperature, humidity and ammonia gas in the poultry farm is updated by instant by instant in the serial monitor window.

In order to log all the data sensed and actions taken, the Arduino is connected to a webpage, exclusively designed for this project via ESP8266 Wi-Fi Module. The webpage used for this purpose is [www.thingspeak.com](http://www.thingspeak.com). It is an open source application based on Internet of Things (IoT) which uses HTTP protocol over the internet. All the sensor values at each and every instant are displayed graphically in the webpage. These can also be obtained in Android Mobile via Virtuino applications.

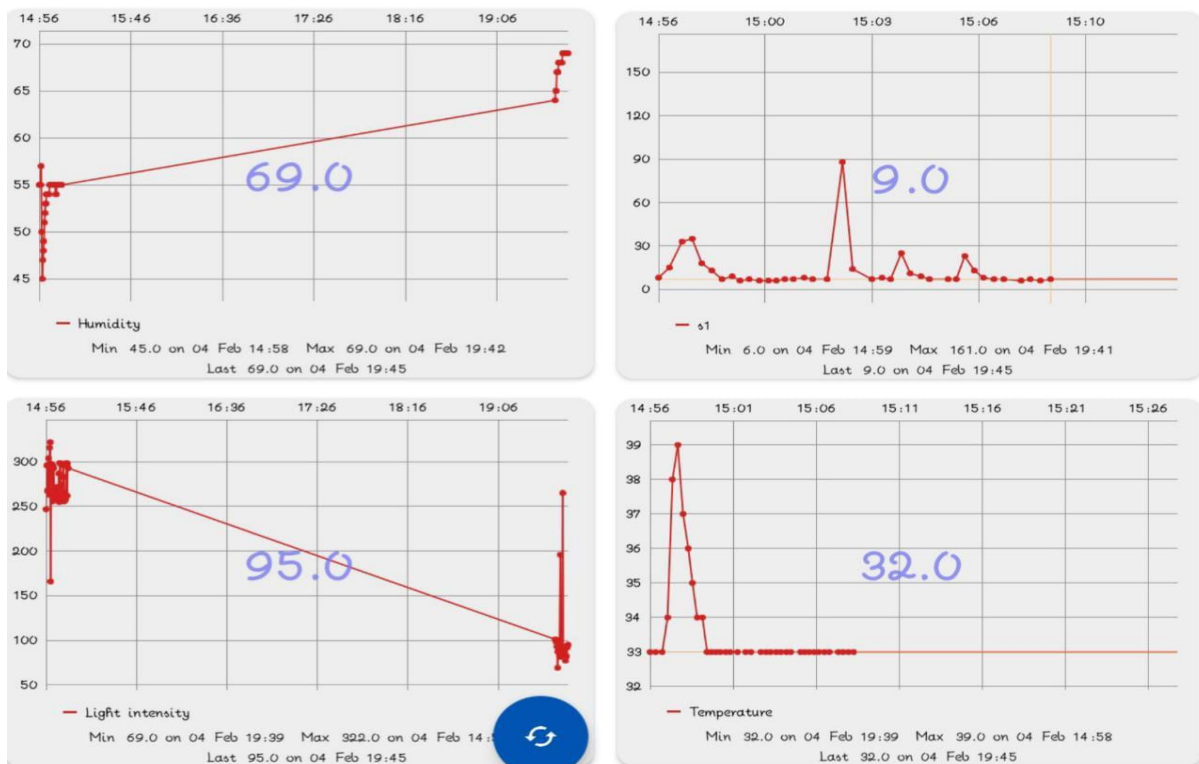


Fig-: Poultry Farm Status in the Webpage



## 5. CONCLUSION AND FUTURE SCOPE

This project has devised an innovative solution for smart poultry farming. It not only monitors the environmental conditions of the farm in real-time but can also automate activities like water supply. Besides it provides both the manual and automate modes of operation which can be used alternatively. The history of data is stored in cloud which can be used for future reference. In this way, the system provides an efficient and cost-effective solution for poultry farm management.

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