KENYATTA UNIVERSITY

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SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

BACHELOR OF SCIENCE IN ELECTRICAL AND ELECTRONICS ENGINEERING

AUTOMATED POULTRY FEEDER WITH SMS NOTIFICATION

BY

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REG NO J174/4644/2016

ENGINEERING PROJECT

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Project report submitted in partial fulfillment of the requirements for the award of Bachelor of science Degree in Electrical and Electronics Engineering.

February 14th 2022

Declaration

I hereby declare that this project report submitted for the degree of bachelor of science in Electrical and electronics engineering at Kenyatta university is entirely my own knowledge. If there is any coincidence with any other resources it should be known that nothing of such was intended.

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Dedication

I dedicate this work to my loving family Mrs Alice Ombui, Dr. Benard and brother Gerrald for the financial support they offered to me. I also dedicate this work to my classmates who made it possible through their support in doing this project.

Acknowledgement

I would like to sincerely thank Emmanuel Mwanik for his assistance and support he offered during the period of implementation of the project. Most of all the Almighty God for the guidance and care throughout the period of visualization, actuating and implementation of this project prototype.

Glossary

GND-Ground

IC- Integrated Circuit

IDE- Integrated Development Environment

LCD-Liquid Crystal Display

I2C-Inter-Integrated circuit

SPI-Serial Peripheral Interface

VCC- Voltage Common Collector

GSM- Global System for Mobile Communication

SMS-Short Message Service

DHT-Digital Humidity and Temperature

DC-Direct Current

SDA-Serial Data

SCL-Serial Clock

Abstract

The SMS Notification Automated Poultry Feeder is an automatic feeding and watering device for poultry. The project's main objective is to significantly reduce human labor requirements within the poultry structure. This will create fewer disturbances to the chicken and reduce the causes of bacteria inversion as humans are the main carrier of bacteria to the poultry area. This project develops a prototype to convey the remaining feed weight to the user with SMS notifications, allowing the user to specify the time to feed the poultry. In addition, it develops a prototype to automate the watering system and feedings.

The user will handle poultry more quickly and efficiently in this project. It is made up of automated equipment such as Arduino Uno microcontroller, which will be interfaced with sensors such as Load cell, GSM module, Liquid Crystal Display, DHT11 temperature and humidity sensor, Keypad and servo motor. The DHT11 temperature and humidity sensor will measure the temperature and humidity of the structure and fluctuations dealt with manually.

Automated SMS poultry feeder is more efficient than the poultry feeding manual technique. The project thereby reduces the time for feeding the poultry and increases the production of the poultry.

CHAPTER 1.

1.0 INTRODUCTION

The increased consumer demand for chicken products has emphasized the importance of poultry farmers to improve their practices in order to meet that demand, as they supply the majority of the chicken products. Market requirement, particularly in developing countries, requires the production of birds that adhere to market requirements within the fastest time possible without impairing the farmer's productivity. Navaneeth (2015)

The purpose of this project is to design a cost effective and less manual automated chicken feeder that optimizes bird feeding. Numerous automated equipment exists for chicken feeding in large-scale poultry operations. However, it is difficult or impossible to incorporate large-scale technology into small or medium-sized poultry operations which are the types of poultry being practiced mostly in the developing countries. In small and medium-sized poultry operations, chickens are fed via a feeder that requires frequent replenishment of food. This requires additional effort and time, hence raising farmers' expenses. To make feeding chicken in small and medium-sized poultry operations easier and more efficient, this project aims to design and build an automated poultry feeding mechanism.

To realize a boost in the production, the environment in which the birds are reared must be maintained at a certain optimal lever i.e., the temperature and humidity inside the chicken structure must be well calibrated so that pathogens and disease carrying microorganisms or bacteria do not thrive inside the structure. Diseases such as Newcastle, Gumboro and infectious coryza are deadly once they attack. In addition, young birds require temperatures slightly above 25^{o} C since they do not have maximum feathers for warmth. Therefore, mechanisms should be put in place to ensure proper and controllable hygiene inside the poultry structure. Temperature monitoring and humidity regulations are some of the measures which must be well taken care of for the safety of the birds and enhancing their maturity.

Poultry is a lucrative sector with a lot of potential, particularly in developing countries, Reyes et al. (2015) The manner of feeding chickens must be examined, as chickens must be fed on a consistent basis in order to increase their production which in turn generates more revenue. The usual way of feeding chicken entails the necessity to offer food continually, to be vigilant and aware of food that is remaining in feeding troughs, and to feed the chickens at the appropriate time to minimize productivity drop. Being raised in a family of poultry enthusiasts, feeding chickens manually and providing adequate water supply comes with a lot of challenges, for example forgetting to feed the chicken regularly at the right time because of commitments elsewhere. Chicken production is directly related to the regularity of feeding the chicken. The more the chickens are fed the higher the production and the lower the feeding rate the production deteriorates at high percentages.

The automated poultry feeder will minimize wastage, reduce the time of feeding and to save on labor costs. In small scale and medium scare this technique has been opted to instead of conventional feeding mechanisms in order to realize increased production at reduced labor, time and cost. Umogbai (2013).

Time and effort will be saved by automating poultry. Feeding efficiency has a significant impact on chicken output. This Automated Chickens Feeder with SMS Notification will completely automate the feeding and watering of poultry. The project utilized Arduino Uno microcontroller, GSM module to send message once the feeds fall below a certain set minimum, Keypad to set the time of feeding, Servo motor to actuate the feeding process, Submersible DC water pump to pump water, temperature and humidity sensor DHT11 to monitor the temperature of the surrounding for appropriate action to ensure safety of the birds from infections and diseases and Liquid Crystal Display to display the set time, Temperature and Humidity.

1.1 Problem Statement

One of the primary issues with chicken feeding is the user's manual technique of utilizing a container for watering and a tray for feeding. This technique is very time consuming and is incapable of maintaining the regular poultry feeding. Also, the increased consumer demand for chicken products has emphasized the importance of poultry farmers to improve their practices in order to meet that demand, as they supply the majority of the chicken products thus a mechanism needs to be developed to automate and reduce time and cost of production.

1.2 The Project's Objectives

In general, the project will manage poultry and automate chicken feeding.

It sought to accomplish the following specific goals:

1. The project will develop a prototype to monitor the watering and feeding system;

2. The prototype will deliver SMS notifications once the quantity of the remaining feed falls below a certain set minimum.

3. The project will develop a mechanism to tell undesired temperature and humidity within the poultry structure.

4.The Prototype will sound an alarm once the temperature or humidity exceeds the set maximum range.

1.3 The significance of the Project.

This project will assist small scale and medium scale poultry farmers in meeting their daily needs since a simplified, easy to operate mechanism rather than their conventional means will be employed. It will enable the user to make accountable monetary decisions in order to maximize the profitability of poultry.

The initiative enables the farmers to enhance their knowledge and abilities in poultry rearing. The method will not only provide consistent feeding but also is critical for the development of poultry and ensure continuous production

1.4 Scope of the Project

Upon implementation of the project, it will be capable of feeding the chicken according to the set time and be able to communicate with the end user without using manual approach. It will measure the temperature of the structure and the weight of the remaining feeds and transmit the data to the desired user. The user is only required to place the feeds and water in the designated tray and the prototype will perform the remaining tasks.

1.5 Project Justification

The purpose of this project was to design a system that's labor effective, time effective and cost efficient that reduces the manual works in the poultry structure. It monitors the temperature and humidity within the poultry structure and informs the user if temperature or humidity deviates from the set conditions.

1.6 Limitation of the project

The project is to take care of small scale to medium scale automated poultry feeding but does not account for large scale poultry feeding systems. This is as a result of financial constraints. Furthermore, the project accounts for only birds which are caged and not reared in free range as it will be difficult to maintain proper temperature and humidity in free range.

CHAPTER 2

2.0 LITERATURE REVIEW

Automated poultry feeding mechanism is a system that incorporates a feeding trough and controlling device that allows the feeds to fall down the dropping tube to the feeding trough during appropriate time set by the user. There exists a barrier between the chicken habitat and the feeder. The feeder comprises a trough and an elevated fence. The fence is designed with several feeding holes. The barrier member's outer border is flush with the inner wall of the trough and the fence. The control device is used to raise or lower the barrier component within the feeding trough. It blocks the feed inside the trough when the barrier member is not raised to an appropriate height thus preventing the chicken from stretching into the feeder to eat. When it is raised to an appropriate height, the chicken can stretch into the trough to eat from their designated feeding openings, Shu-Hui-Hung (2012)

Feeders, particularly for poultry, includes a rectangular feeding trough which has a base, side walls extending from the base. The side walls bound the feeders outside the peripheral edge, which is composed of a multiplicity of almost straight exterior edges. In comparison to a circular feeder with a radial peripheral, the feeder provides greater feeding area and feed volume (Cottam and Ermerins, 2012).

Chicken is the most widely farmed animal, for instance, in 2016, over 55 billion chickens were raised for meat, Butterworth (2018). Three elements have shaped the history of chicken intensification. The migration of people from rural areas to towns and cities, which results in the centralization of poultry production: The increased use of electricity to ventilate poultry houses, which enabled large chicken farming structures to increase the number reared, and the use of fossil fuel, which enabled feed materials to be sourced from all over the world and poultry meat to be transported to great distances. Around 75% of poultry meat is acquired from chicken reared in cages and their movements constricted i.e., reared inside build structure, and of the 25% that are not, the majority are farmed locally or at subsistence level, and a small fraction in free range or organic poultry. Butterworth (2018)

The growing consumer demand for chicken products has emphasized the importance of small and medium-scale poultry farmers meeting that demand, as they supply the bulk of the market's needs, particularly in developing countries. There is a necessity to produce chickens according to set market requirements in the shortest amount of time possible without putting the farmer's time, money, and energy at risk. Navaneeth (2015)

The purpose of this project is to design a system that's labor effective, time effective and cost efficient that reduces the manual works in the poultry structure. Numerous automated equipment exists to feed birds in large-scale poultry operations. However, it is difficult or impossible to incorporate large-scale technology into small to medium-sized poultry operations. Typically, small and medium-scale poultry operations are handled by rural farmers. In small and medium-sized poultry operations, birds are fed via a feeder that requires frequent replenishment of food. This requires additional effort and time, hence raising farmers' expenses. To make feeding hens in small and medium-sized poultry operations easier and more efficient, it was proposed to design and build a mechanism that achieves such an objective

The feed level sensor for a chicken feeding system placed inside the dropper tube of the container regulates the amount of feed that passes through to the trough. The sensor includes an illuminating device or a photodiode pair for sensing when the quantity of feed in the dropper drops below a preset minimum quantity level and another illuminating device or photodiode pair for sensing when the level of feed in the dropper tube reaches a set maximum level. When feed in the control feed dropper tube goes down below the minimum level, the sensor emits a start signal to engage a drive to supply feed to the feeders via a feed line. When feed in the control feed dropper tube reaches the maximum level, the sensor produces a stop signal to stop the drive from supplying more feeds.

According to Fowler et al., (2014), a chicken feed system is given that includes many feeders where feeds are placed and are majorly installed on the chicken structure floor.

Temperature more than 26.7°C paired with a high relative humidity has a detrimental effect on the feed efficiency, feathering, pigmentation, and weight increase of chicken. Furthermore, independent of the change in relative humidity, the chicken performs poorly at an internal temperature range of 35–37.8°C. This indicates that increased humidity can help birds perform better at lower temperatures. Humidity, on the other hand, must be regulated since it might serve as a habitat for microbes, exposing the birds to the possibility of diseases and infections. The connection between relative humidity and temperature change is rather significant. Internal relative humidity may be low or excessively low during the brooding period, particularly in the early weeks, due to the amount of heat required by the chicken at that age, or when the chicks are thirsty or born at a higher temperature. Within a short period of time, the internal relative humidity increases due to the water vapor created by the chicken's evaporative cooling act to maintain a constant body temperature as they develop. As a result, ages three weeks and above are important in chicken production, Oloyo (2017)

CHAPTER 3

3.0 METHODOLOGY

3.1 Technicality of the Study

One of the primary issues with chicken feeding is the user's manual technique of utilizing a container for watering and a tray for feeding. This technique is very time consuming and is incapable of maintaining the regular poultry feeding. From a hardware standpoint, Automated Poultry Feeder with SMS Notification utilized a weight sensor to measure the chicken's feeding weight. When the sensor recognizes that the food supply is running low, it will transmit data to the GSM which alerts the end-user. It incorporated Arduino Uno microcontroller, load cell for measuring weight, servo motor for actuating the feeding process, DHT11 sensor for temperature and Humidity measurement and LCD for display. This system was concerned with the feeding and maintenance of the fundamentals principles within the poultry structure to enhance quality and increased production. It was capable of actuating poultry feeding at the appropriate time and also displayed the correct temperature and humidity within the structure. Software such as Arduino IDE was used to program and create commands for the microcontroller.

3.2 Specifications of the Technologies Employed

The Automated Poultry Feeder with SMS Notification project incorporated the following hardware and software elements: Arduino Uno R3 was used to control feeding, watering, temperature and humidity. It had the capability of commanding the related actuators to take appropriate action according to signals sent by various related sensors. The sensors used include, Load cell for measuring weight, DHT 11 for measuring temperature and a GSM module for sending message to the user on the quantity of remaining feeds. C++ programming was used to create codes. The Global System for Mobile Communication (GSM) Module was linked to the Arduino Uno and was capable of sending SMS to the end user. Additionally, a SIM card was put into the GSM module, which received data from it and transmitted it to the phone of the end-user. To regulate the feeding, a servo motor was employed which was actuated when commanded so by the Arduino Uno microcontroller. Arduino IDE software was used to program, upload, and compile the commands for the Arduino Uno R3 board. A submersible water pump was used to pump water to the water designated areas within the poultry structure at the specific set time.

LOAD CELL

Load cell is a transducer that transforms force into an electrical output that can be measured and analyzed. HX711 is an analog to digital converter (ADC) IC with a 24-bit resolution. It has a built-in preamplifier for amplifying low-voltage signals. The HX711 chip receives voltage signals and converts them to digital values. Low voltages are handled by the preamplifier. It interfaces directly with a bridge sensor, making it ideal for use in weighing scales. It is specifically designed for amplification of signals from the load cell and transmission of those signals to the microcontroller.

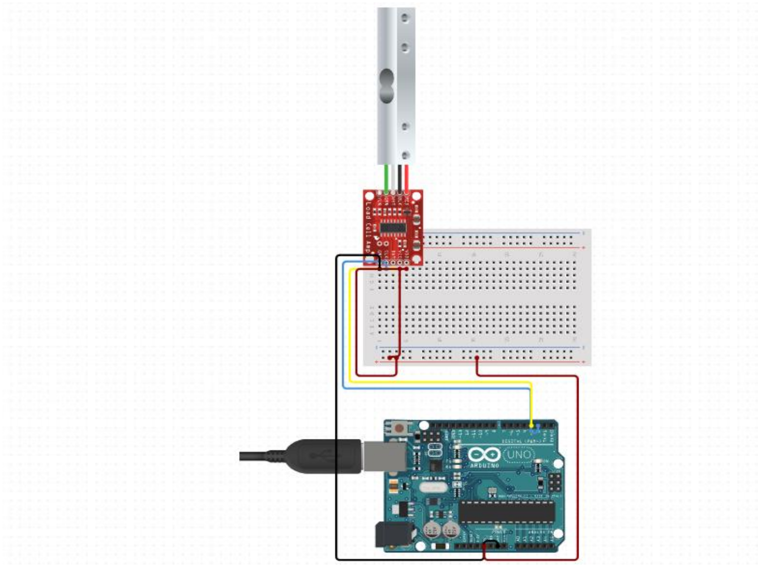


Figure 1. Interfacing the loadcell with Arduino Uno microcontroller

Keypad

The 4x3 matrix keypad was used to set the precise time for feeding. Once the set time elapsed the feeding was done automatically by the microcontroller.

Figure2. 4x3 Keypad

DHT11 Humidity and Temperature sensor.

DHT11 sensor consists of a capacitive humidity sensing element and a thermistor for sensing temperature

It was used to mornitor the temperature of the poultry structure to ensure that the set conditions are edhered to for safety of the poultry.

DHT 11 Pinout

The DHT11 sensor has four pins: VCC, DATA, GND, and one pin that is not used.

GSM Module

SIM800L is a tiny cellular module that supports GPRS transfer, SMS transmission, and voice calls.

It was interfaced with Arduino Uno microcontroller to send an SMS once the feed level goes below the set minimum so that the user can be notified to purchase more feeds.

Fig3. GSM 800l module

Liquid Crystal Display

It was useful in time setting and displaying the set time, humidity and temperature so that the user is updated fully on the condition of the structure as well as the feeding schedule.

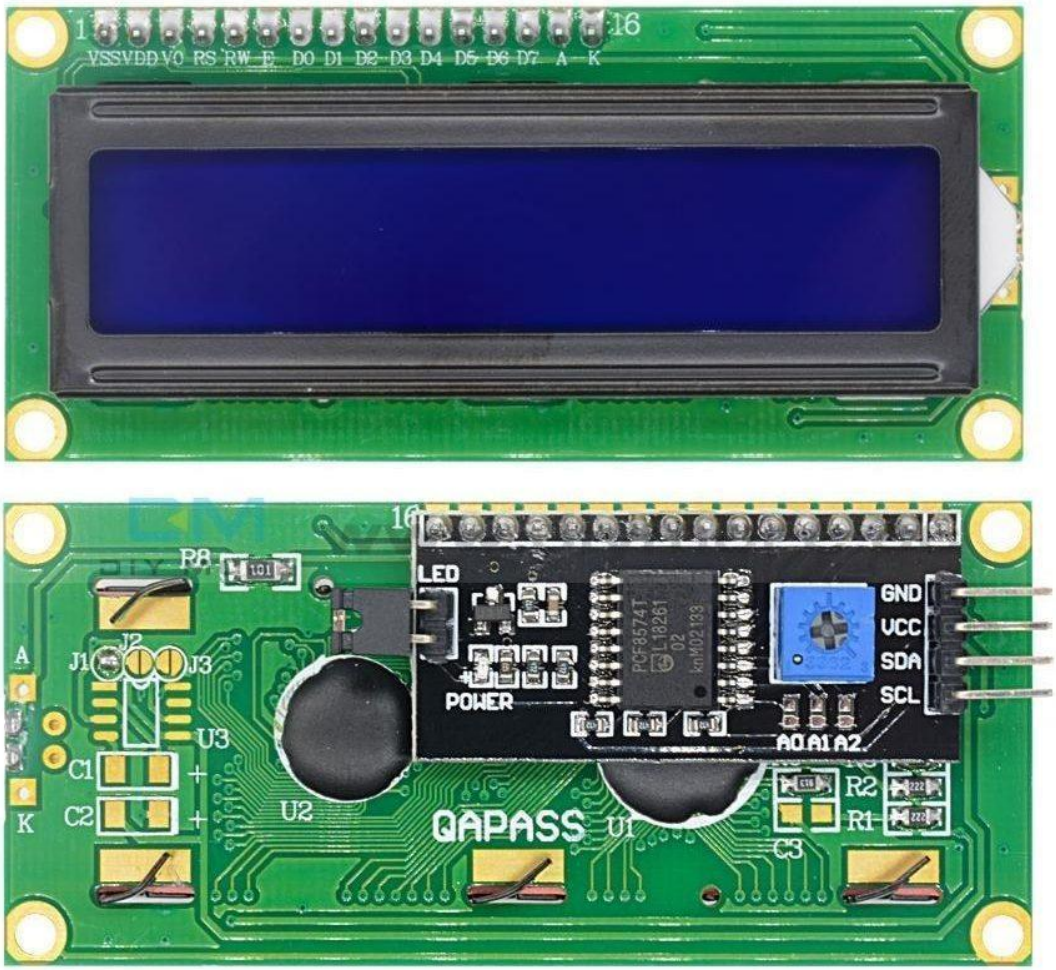


Fig4. LCD I2C module.

LCD I2C Pinout.

Connecting an I2C LCD is easier than connecting a regular LCD. Instead of 12 pins, it has four pins. VIN pin which will be connected to Arduino's 5V output and the GND pin will be connected to ground. The pins that are used for I2C communication at this i.e., SDA and SCL are connected to A4 and A5 of the Arduino board respectively.

Arduino Uno microcontroller

Arduino Uno microcontroller is a compressed microcomputer that is used to operate the functions of embedded systems in office equipment, robotics, household appliances, motor vehicles, and a variety of other devices. Here, it was used to control the feeding of the poultry, monitoring the temperature and humidity and also enabling the GSM to send an SMS once the feed level fell below the set minimum.

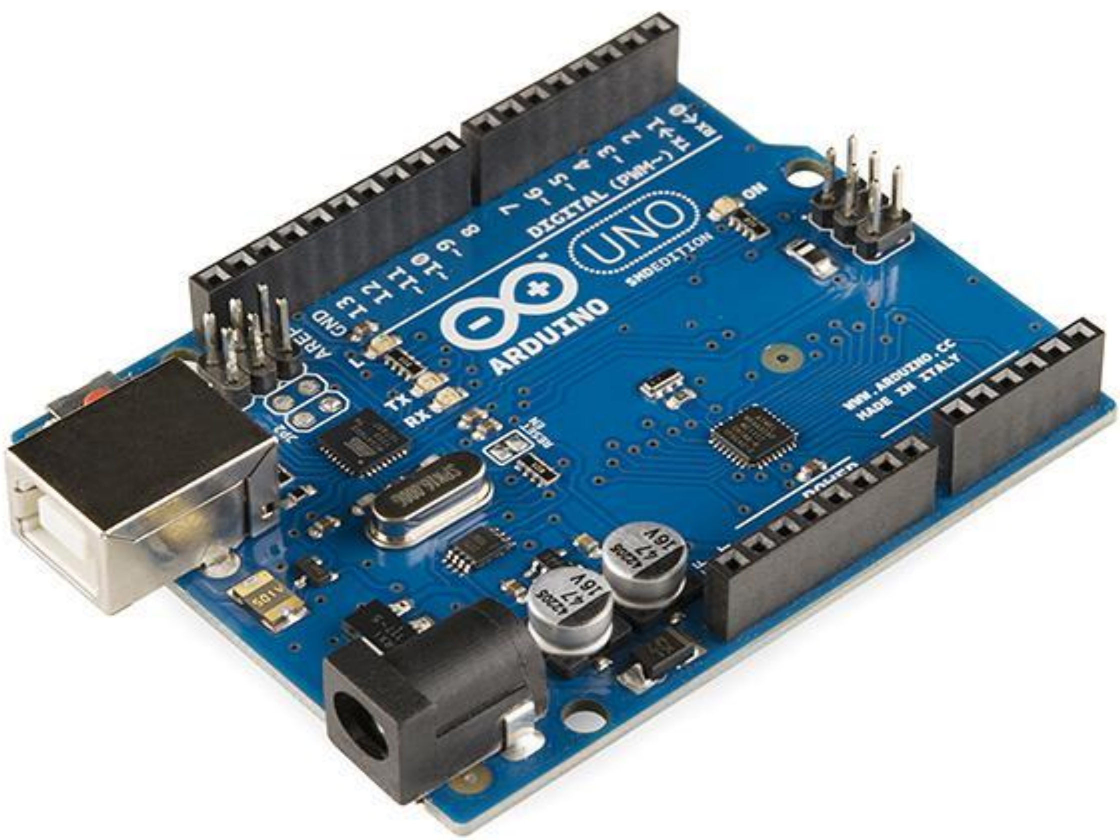


Fig5. Arduino Uno microcontroller.

CHAPTER 4. Results and Discussion.

3.3 Data and Processing Model.

The system's input-process-output sequence is depicted in Figure 6 below. The system's input is the duration and temperature monitoring, while the procedure is to monitor feeding times and weights. The result is the SMS Notification that the end-user will get. The user will set the time and pour the feeds so that the gadget can track the time feeding and weigh the feeds. If the measured value is lower than the required quantity, an SMS message will be issued to the end user to notify him/her that he/she is running out of stock.

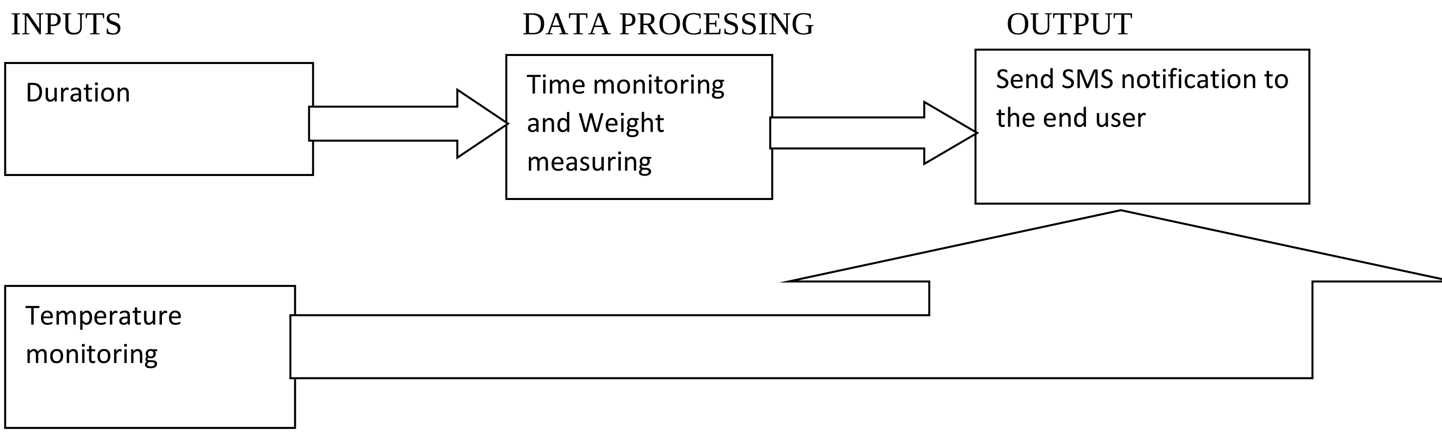


Figure 6. System input output process sequence

3.4 SYSTEM FUNCTIONALITY

The system's functions are depicted in Figures 7 and 8 below. It begins by monitoring the time and, if it is feeding time, it measures the feeds. If the feeds are sufficient, the feeding process will begin and it will begin pumping water. When the sensor detects that the food supply is running short, it processes the data and transmits it to the GSM module, which notifies the end user by SMS. It also monitors the temperature and humidity and constantly notify the end user.

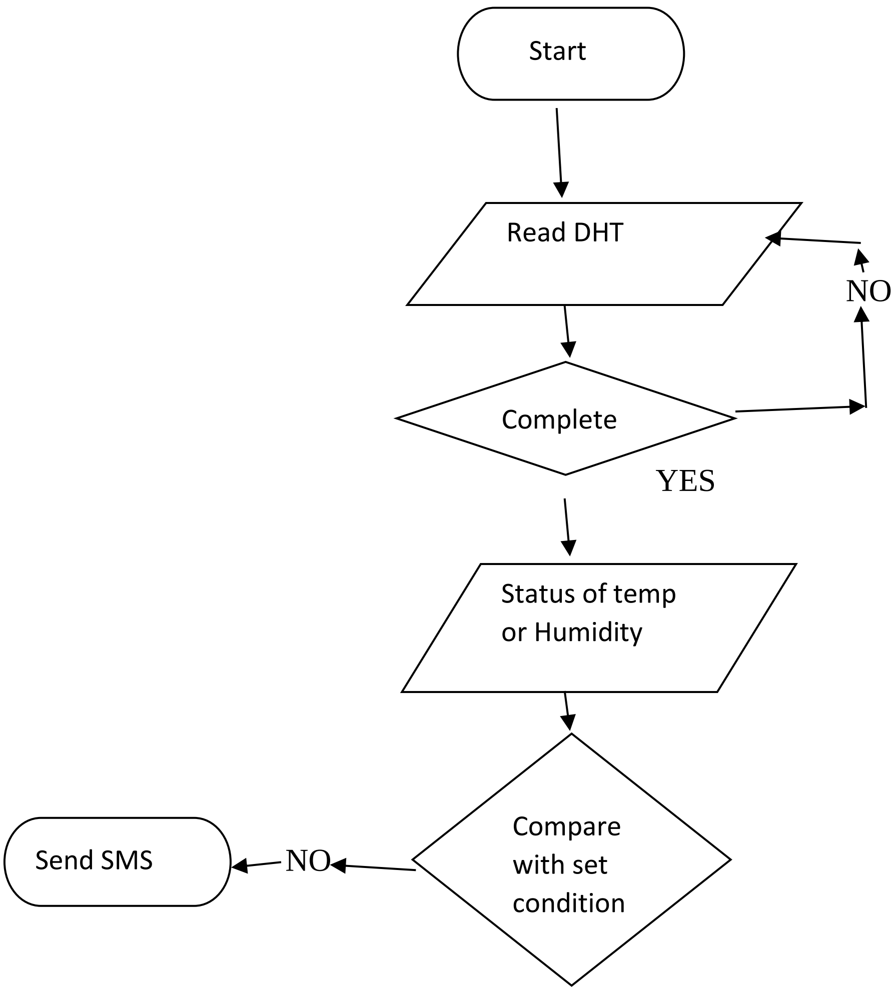
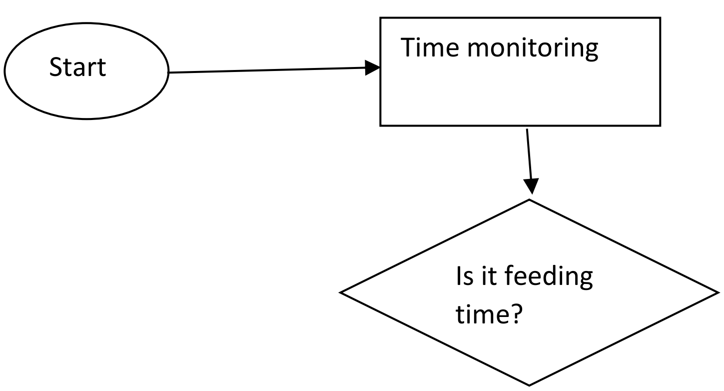


Figure 7: Temperature and Humidity flow chart.



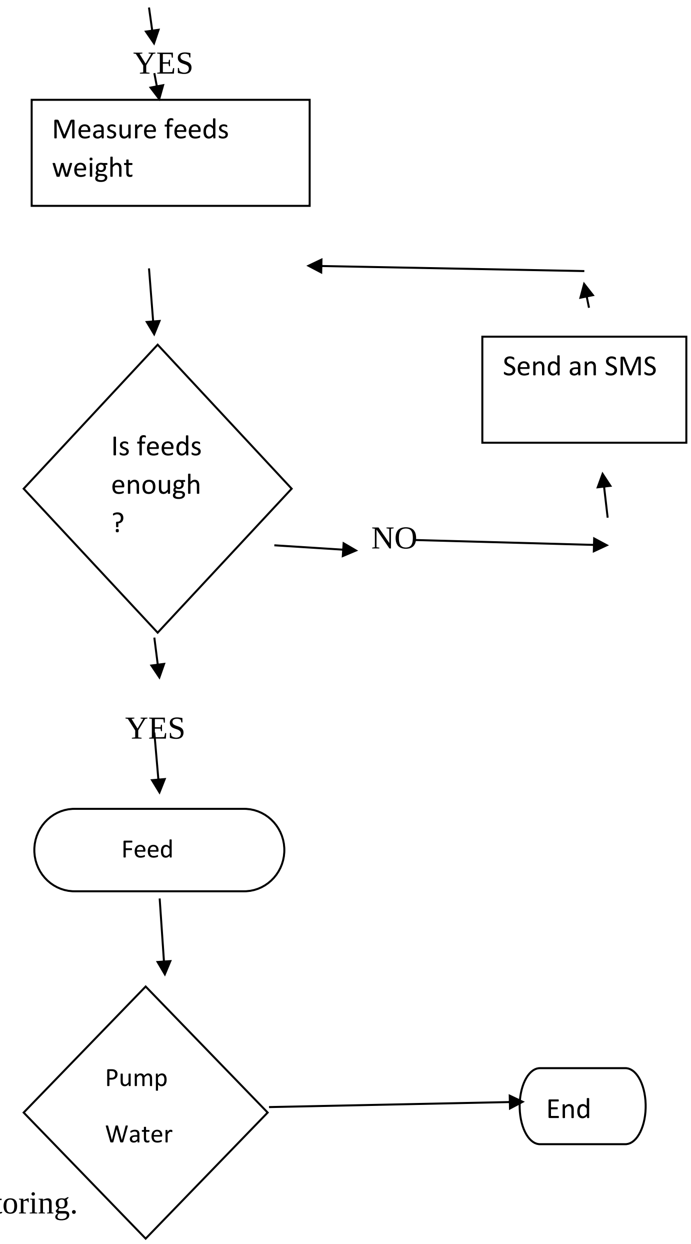


Figure 8: Feed monitoring.

Figure 9 below shows the block diagram for feeding. It consists of an Arduino Uno microcontroller connected to the OLED display, Load cell, Servo motor and DHT sensors and a GSM module.

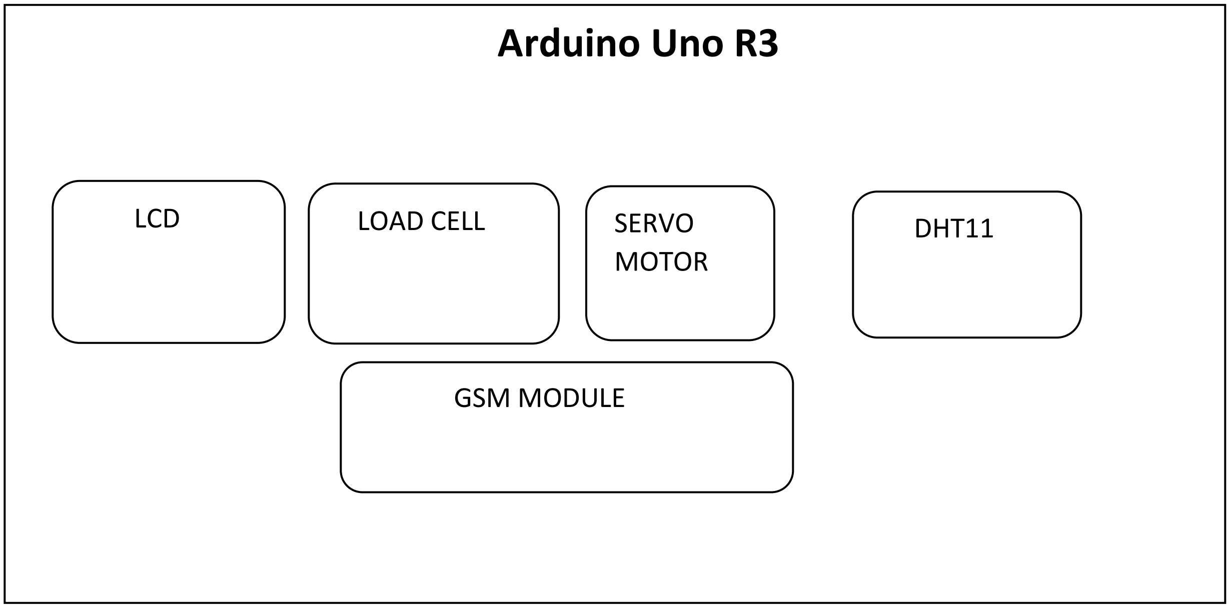


Figure 9: Feeding block diagram

HX711 and Loadcell signal conditioner.

It is an analog to digital converter made specifically for weighing scale.

Resolution of HX711 = $5/2^{10}$=0.2984V.

To use the HX711 with the load cell bar, the white and green wires of the bar were connected to A+ and A- pins respectively. The power or excitation was supplied to the bridge by connecting the Red and Black wire to E+ and E- pins respectively as shown in the figure below.

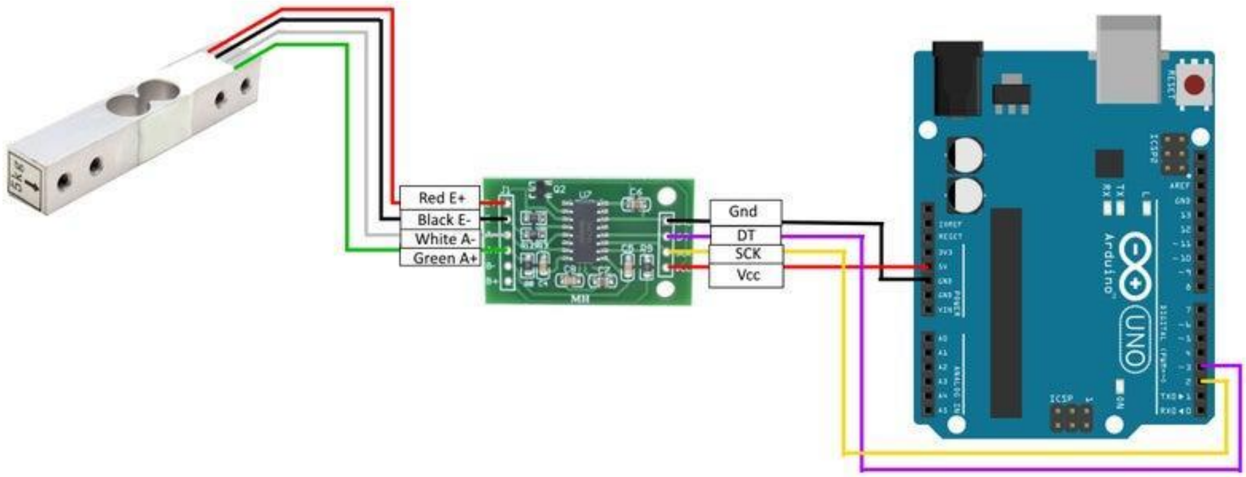


Fig10. Load cell and HX711 with Arduino

Calibration and Testing of the load cell

The readings from the Load cell were calibrated with the help of a known weight. First the load cell through HX711 was connected to the Arduino Uno pins 2 and 3 i.e., DT pin to pin 2 and SCK pin to pin 3 of the Arduino as shown in the figure above. The calibration was done as follows:

1.The Serial monitor values were noted when nothing was placed on the load cell.

2.A household item of known weight was placed on the load cell and its weight as displayed on the serial monitor noted.

3. A rough average of these values was taken and a linear equation was used to calibrate the load cell as follows:

$Y=mx + c$

Serial monitor reading at 0 grams= 25400 (estimate)

Serial monitor reading when fx-82MS (92.5g) scientific calculator was placed on the load cell= 50000 (estimate)

M= change in y/change in x

= (92.5-0)/ (50000-25400)

=0.003760g

But Y= MX+ C

Then 0.00376= (Y-92.5)/ (X-50000)

Y=0.00376X+280.5

Thus, to get the correct weight as measured by the load cell the calibration was made using the above equation.

System Circuit.

The circuit was designed using Eagle software. Through which a printable circuit board was designed too.

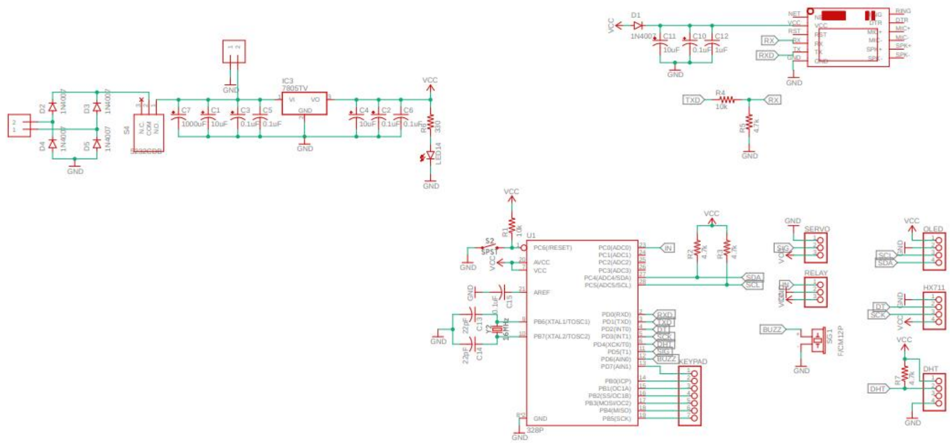


Fig11. System circuit as designed in Eagle.

Printable Circuit Board as designed in Eagle Cad

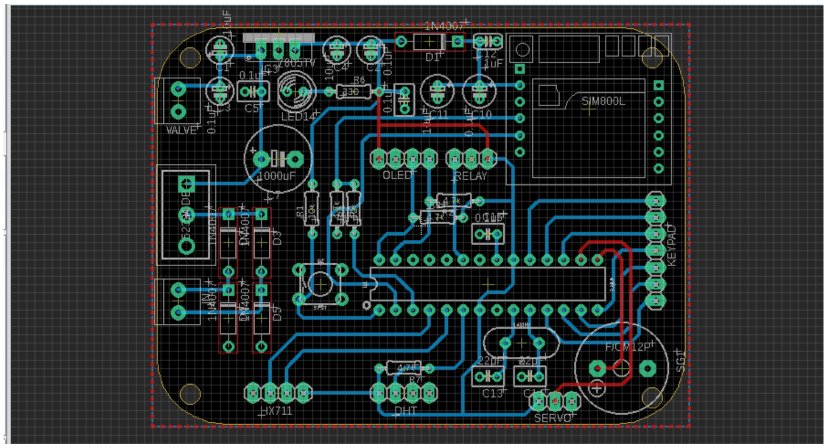


Fig 12. PCB Design

Project Simulation.

The Circuit was designed in proteus. The code compiled in Arduino IDE and then the hex file was copied and pasted to Arduino. The simulation was run-on real time. The figures below show the simulation.

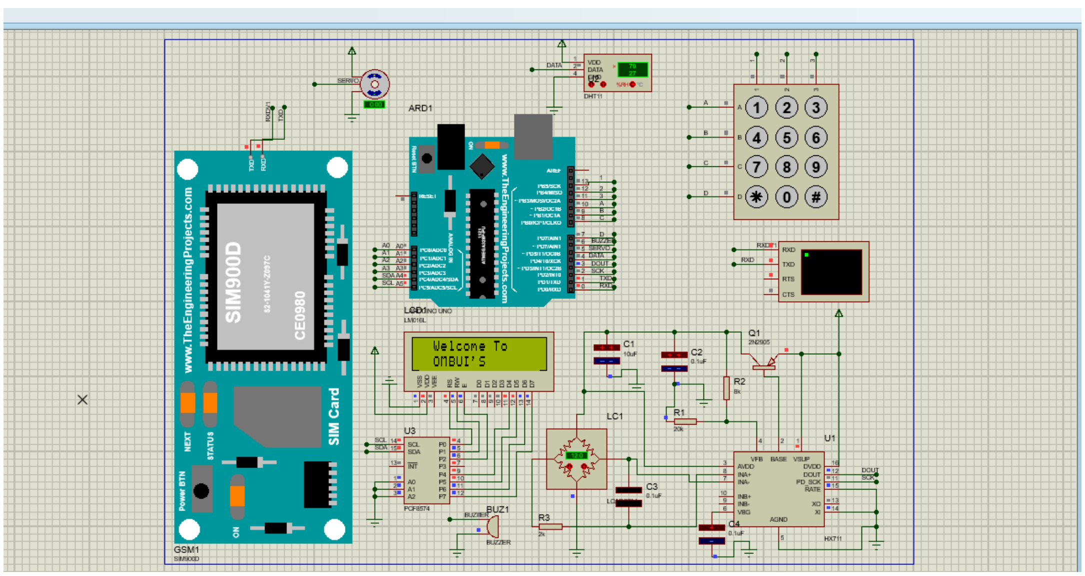


Fig 13. Proteus simulation welcoming Note.

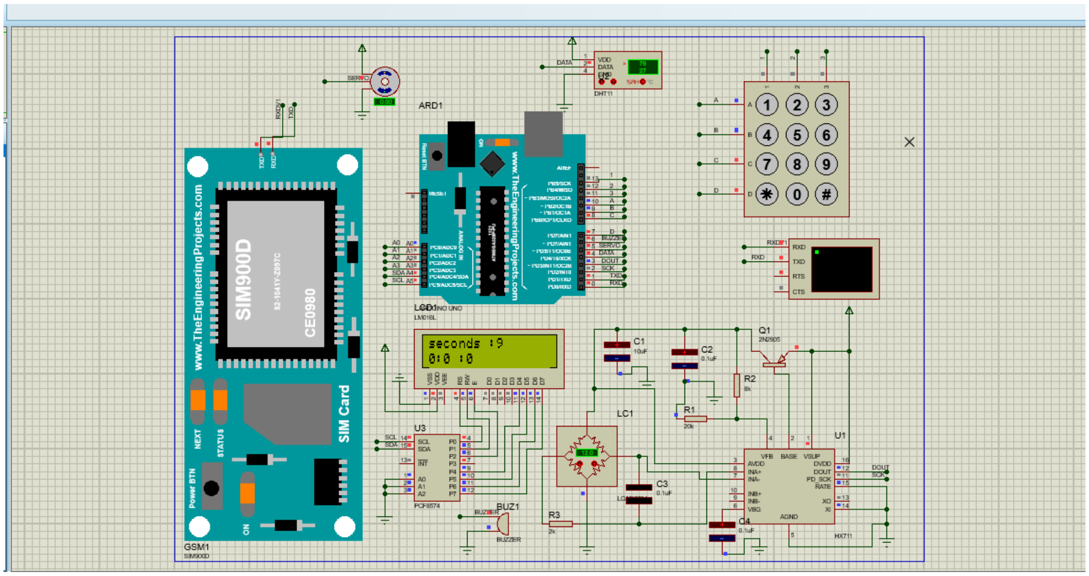


Fig 14. Time Setting Simulation

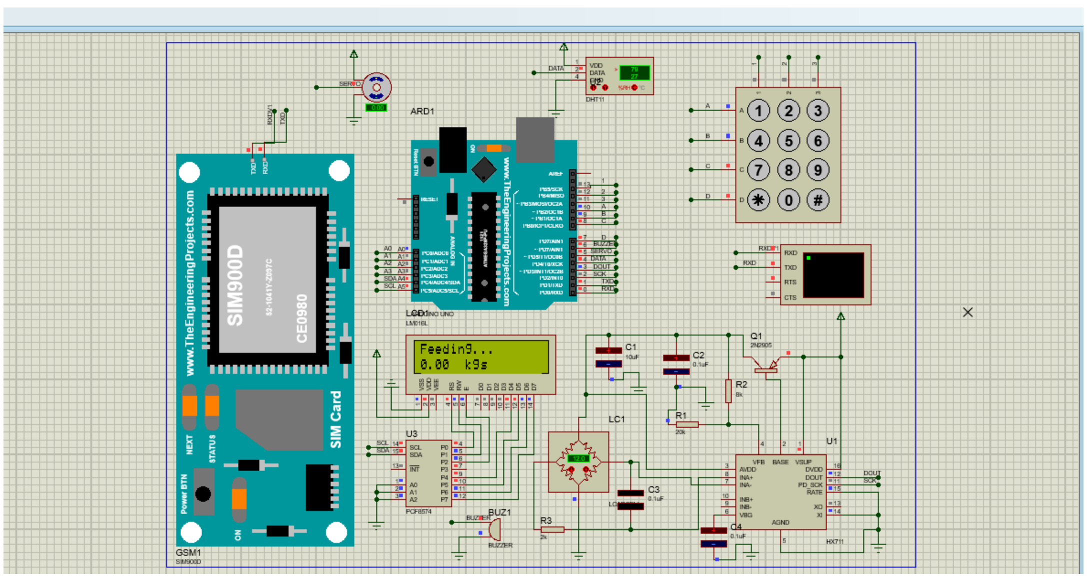


Fig 15. Feeding and measurement of weight simulation.

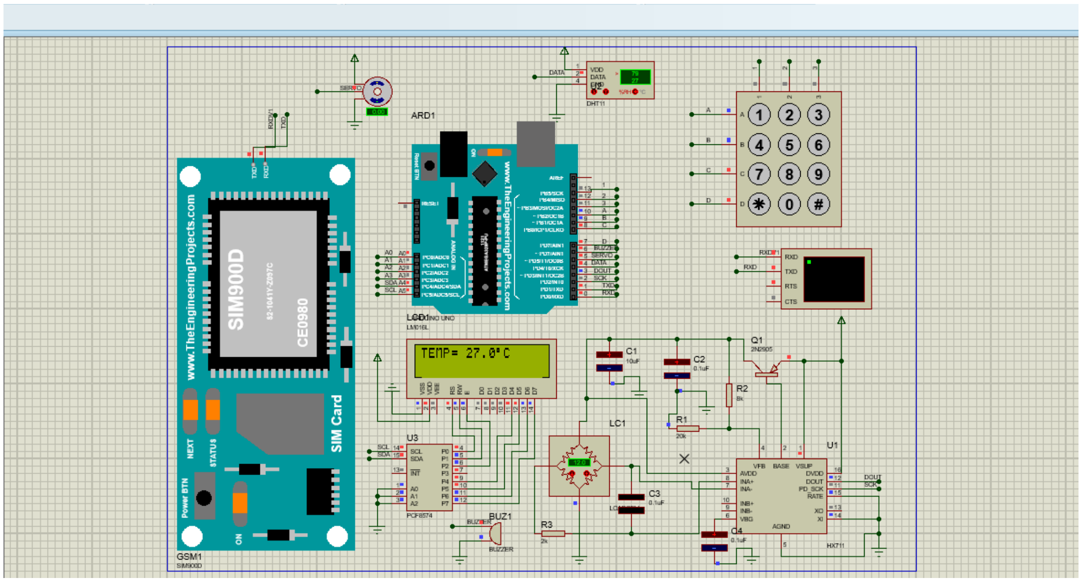


Fig 16. Temperature Simulation Proteus.

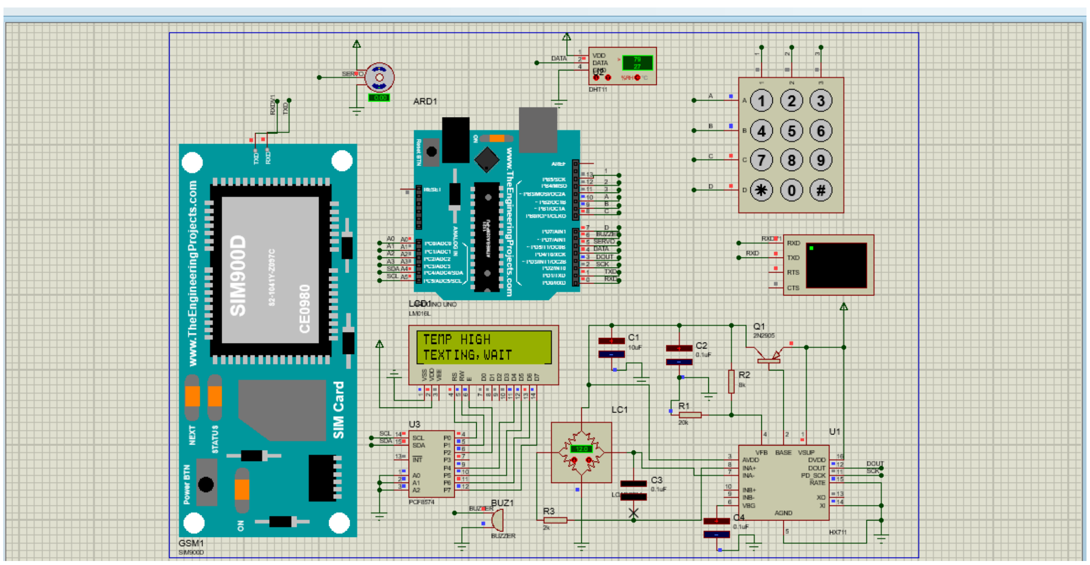


Fig 17. Sending SMS when Temperature is High simulation

3.5 Budget feasibility of the project.

Item description	Quantity	Price	Amount
DHT module	1	450.00	450.00
Servo motor	1	250.00	250.00
Sim800L	1	1,000.00	1000.00
5v relay	1	100.00	100.00
Load cell 5kg including HX711 amplifier	1	500.00	500.00
Electronic components	1	1,000.00	1000,00
4X4 keypad	1	450.00	450.00
PCB	1	1200.00	1200.00
LCD I2C module	1	600.00	600.00
Total			**Ksh.5550.00**

Table 1. Budged Feasibility

3.6 Time schedule feasibility.

Task	Date Start	Duration in Days
Research	4-Oct-21	20
Gather relevant information	25-Oct-21	5
Device purchase	26-Oct-21	1
Familiarizing with the sensors	31-Oct-21	10
PCB designing	10-Nov-21	15
PCB printing	26-Nov-21	10
Coding	10-Nov-21	30
Devices assembly	12-Dec-21	3
Code uploading andProject simulation	16-Dec-21	1

Table 2. Time schedule Feasibility

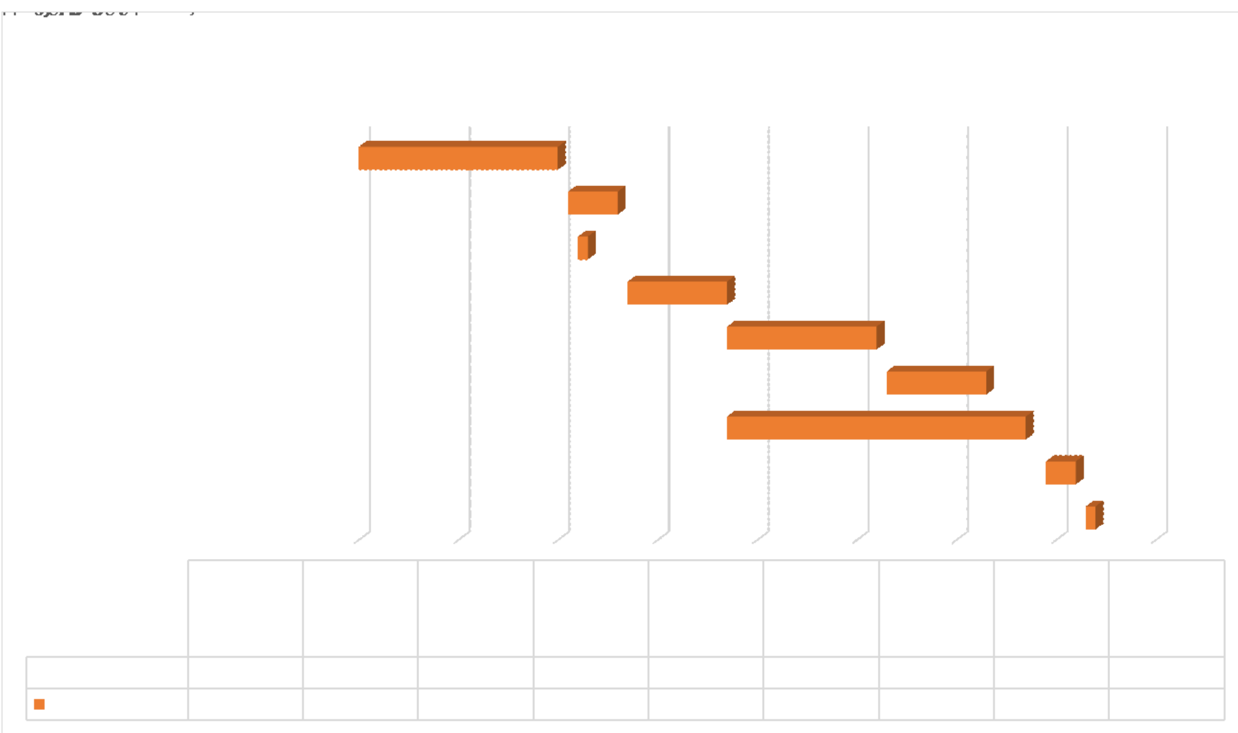


Table 3. Grant chart of time schedule feasibility

Fig 18. Project prototype

Fig 19. Time setting on the Prototype

Fig 20. Weight Measuring and Feeding

CHAPTER 5.

Summary, Conclusion and recommendation.

Summary

The goal of the project was to produce a prototype that will automate the manual way of feeding and watering the chicken that now exists. The project created a prototype that was capable of sending SMS Notifications to the user informing them of the remaining feed weight and allowing the user to specify the time when the poultry should be fed. A prototype that can automate the feeding and watering of the poultry was developed. In addition, the prototype monitors the temperature of the poultry structure.

The Automated Poultry Feeder with SMS Notification provides a great deal of assistance to the customer in terms of poultry automation. This project is more efficient than the manual poultry feeding procedure currently in use.

CONCLUSION

The Project Automated poultry feeder will enhance the small scale and medium scale farming. A prototype developed will meet the objectives which are to develop a prototype for poultry that will automate the feeding and watering system. The project can send SMS notifications for the remaining amount of feeds weight. The prototype is capable of monitoring the temperature of the structure. The time required to feed the poultry will be shortened when using this project as compared to the conventional methods. The project is very essential for both small and medium scale faming and will help in improving the productivity of poultry.

Recommendation

After successful implementation of the prototype, I would like to recommend the following.

1. Measures should be put in place to return the temperature and humidity to equilibrium once a shift is detected.

2. Automatic feeding by using a phone.

3. Adding conveyor belts to the system to feed large stock of poultry.

4. Linking the device with a Database to keep track of the daily quantity of feeds consumed.

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Appendix

```
#include <Keypad.h>

#include <Servo.h>

#include<Wire.h>

#include <LiquidCrystal_I2C.h>

#include<SPI.h>

#include<DHT.h>

#include <HX711_ADC.h>

#define HX711_dout 2 //HX711 dout pin

#define HX711_sck 3 //HX711 sck

#define DHTTYPE DHT11

#define DHTPIN 4


HX711_ADC LoadCell(HX711_dout, HX711_sck); // create object of the LoadCell

LiquidCrystal_I2C lcd(0x27, 16, 2);// create an object of ld

DHT dht(DHTPIN, DHTTYPE);

Servo myservo;


float calibrationValue = 696.00; // calibration value

unsigned long stabilizingtime = 2000; //  to improve preciscion right after power-up  by adding a
        few seconds of stabilizing time
```

```
float k;

float t;

float r;


const byte ROWS = 4; //four rows

const byte COLS = 3; //four columns

char hexaKeys[ROWS][COLS] = {

  {'1', '2', '3'},

  {'4', '5', '6'},

  {'7', '8', '9'},

  {'*', '0', '#'}

};

byte rowPins[ROWS] = {5, 6, 7, 8};

byte colPins[COLS] = {11, 12, 13};

Keypad customKeypad = Keypad( makeKeymap(hexaKeys), rowPins,

                              colPins, ROWS, COLS);

int intKeys = -1;

int intTime = 0;

int m = 0;

int s = 0;

int h = 0;

int servo_angle = 0;

int rpin = A0;
```

```
int servopin = 10;

int buzzer = 9;



void setup()

{


  Serial.begin(9600);

  lcd.init();

  lcd.clear();

  lcd.backlight();


  Initialize();

  dht.begin();

  pinMode(rpin, OUTPUT);

  pinMode(buzzer, OUTPUT);

  myservo.attach(servopin);


  LoadCell.begin();

  boolean _tare = true; // To perform tare

  LoadCell.start(stabilizingtime, _tare);

  LoadCell.setCalFactor(calibrationValue);

  while (!LoadCell.update());
```

```
}

void loop()
{

  char customKey = customKeypad.getKey();
  if (customKey == '1' || customKey == '2' || customKey == '3' ||
      customKey == '4' || customKey == '5' || customKey == '6' || customKey
      == '7' || customKey == '8' || customKey == '9' || customKey == '0' ) {
    lcd.setCursor(0, 1);
    lcd.print(customKey);
    intKeys = Cnum(customKey);
  }

  if ( customKey == '#')
  {
    intTime = 3600 * intKeys; // init hours
    lcd.clear();
    lcd.setCursor(0, 0);
    lcd.print(intKeys);
    lcd.setCursor(2, 0);
    lcd.print("seconds");
```

```
  lcd.setCursor(0, 1);

  lcd.print("confirmed!");

  delay(2000);

  lcd.clear();

}

if ( customKey == '*')

{

  lcd.clear();

}

if (intTime > 0)

{


  if (m > 59)

  {

    m = 0;

    h += 1;

  }


  if (s == intKeys)


  {


    if (LoadCell.update())
```

```
{
  k = LoadCell.getData();
}


if (k < 0.500)

{
  lcd.clear();
  lcd.setCursor(0, 0);
  lcd.print("less kgs left");
  delay(2000);
}
else
{
  lcd.clear();
  lcd.setCursor(0,0);
  lcd.print("Kgs left= ");
  lcd.setCursor(0, 1);
  lcd.print(k);
  lcd.setCursor(5, 1);
  lcd.print("Kgs");
  delay(2000);
```

```
}

lcd.clear();
lcd.setCursor(0, 0);
lcd.print("Feeding...");
lcd.setCursor(0, 1);
lcd.print(k);
lcd.setCursor(6, 1);
lcd.print("kgs");
SendMessage("Feeding in progress");


for (servo_angle = 0; servo_angle <= 90; servo_angle++)
{

  myservo.write(servo_angle);
  delay(50);
}
delay(7000);

for (servo_angle = 0; servo_angle >= 0; servo_angle--)
{
  myservo.write(servo_angle);
```

```
    delay(100);
  }
  digitalWrite(rpin, LOW);
  delay(5000);
  digitalWrite(rpin, HIGH);
  delay(100);
  temp();

  s = 0;
  m = 0;
  h = 0;

}
else
{
  lcd.clear();
  lcd.setCursor(0, 0);
  lcd.print("seconds : ");
  lcd.setCursor(9, 0);
  lcd.print(intKeys);
  lcd.setCursor(0, 1);
  lcd.print(h);
  lcd.setCursor(1, 1);
```

```
      lcd.print(":");
      lcd.setCursor(2, 1);
      lcd.print(m);
      lcd.setCursor(4, 1);
      lcd.print(":");
      lcd.setCursor(5, 1);
      lcd.print(s);
      if (s > 59)
      {
        s = 0;
        m += 1;
      }
      else
      {
        s += 1;
        delay(1000);
      }
    }
  }
}

void Initialize()
```

```
{
  lcd.setCursor(2, 0);
  lcd.print("Welcome To");
  lcd.setCursor(2, 1);
  lcd.print("OMBUI'S");
  delay(2000);
  lcd.clear();
  lcd.setCursor(0, 0);
  lcd.print("AutomatedPoultry");
  lcd.setCursor(1, 1);
  lcd.print("Farm");
  delay(2000);
  lcd.clear();
  lcd.setCursor(1, 0);
  lcd.print("Initializing....");
  lcd.setCursor(1, 1);
  lcd.print("Please wait..");
  delay(2000);
  lcd.clear();
  lcd.setCursor(0, 0);
  lcd.print("Enter time");
  lcd.setCursor(0, 1);
  lcd.print("in seconds");
```

```
  delay(2000);
  lcd.clear();
  lcd.setCursor(0, 0);
  lcd.print("seconds:");
}
int Cnum(char s)
{
  switch (s)
  {
    case '0':
      return 0;
      break;
    case '1':
      return 1;
      break;
    case '2':
      return 2;
      break;
    case '3':
      return 3;
      break;
    case '4':
      return 4;
```

```
      break;
    case '5':
      return 5;
      break;
    case '6':
      return 6;
      break;
    case '7':
      return 7;
      break;
    case '8':
      return 8;
      break;
    case '9':
      return 9;
      break;
  }
}
void temp()
{
  float t = dht.readTemperature();
  float r = dht.readHumidity();
```

```
lcd.clear();

lcd.setCursor(0, 0);

lcd.print("TEMP= ");

lcd.print(t, 1);

lcd.print((char)223);

lcd.print("C");

delay(3000);


if (t >= 27)

{

  lcd.clear();

  lcd.setCursor(0, 0);

  lcd.print("TEMP HIGH");

  lcd.setCursor(0, 1);

  lcd.print("TEXTING,WAIT");

  delay(2000);

  SendMessage("TEMP HIGH");

  delay(1000);


  tone(buzzer, 1000);

  delay(2000);

  noTone(buzzer);

  delay(100);
```

```
  }

  lcd.setCursor(0, 1);
  lcd.print("HUM=");
  lcd.print(r, 1);
  delay(3000);
  if (r >= 55)
  {
    lcd.clear();
    lcd.setCursor(0, 0);
    lcd.print("HUMIDITY HIGH");
    lcd.setCursor(0, 1);
    lcd.print("TEXTING,WAIT");
    delay(2000);
    SendMessage("HUMIDITY HIGH");
    delay(1000);

    tone(buzzer, 1000);
    delay(2000);
    noTone(buzzer);
    delay(100);
  }
}
```

```
void SendMessage(String sms)

{
  Serial.println("AT+CMGF=1");
  delay(100);
  Serial.println("AT+CSMP=17,167,0,0\r\n");
  delay(500);
  Serial.println("AT+CMGS=\"+254707134655\"\r");
  delay(500);
  Serial.println(sms);
  delay(500);
  Serial.println((char)26);
  delay(500);
  Serial.println();
}
```