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Title

Implementation of Smart Eggs Incubator System

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Abstract

The intelligent systems in the agricultural field have become one of the most prevalent fields in the field of technologies. The intelligent system is a network of electronic circuits, sensors, and software connected to a network that enables these things to share information between them. Our project aims to use smart grid to create what is called intelligent incubator or Smart Snore This incubator has the ability to turn fertilized eggs into chicks without the intervention of the mother by providing optimal climatic conditions through the provision of facilities such as ventilation, cooling and heating. This incubator functions by performing many automatic and automatic tasks. The hatching conditions can also be controlled and modified by simple application in the mobile phone, depending on the type of egg in the incubator.

Keywords: smart_ incubator, eggs hatching, Ardwino

Résumé

Les systèmes intelligents dans le domaine agricole sont devenus l'un des domaines les plus répandus dans le domaine des technologies. Le système intelligent est un réseau de circuits électroniques, de capteurs et de logiciels connectés à un réseau qui permet à ces objets de partager des informations entre eux. Notre projet vise à utiliser Smart Grid pour créer ce qu'on appelle un incubateur intelligent ou Smart Snore. Cet incubateur a la capacité de transformer des œufs fertilisés en poussins sans intervention de la mère en fournissant des conditions climatiques optimales grâce à des installations telles que ventilation, refroidissement et chauffage. Cet incubateur fonctionne en effectuant de nombreuses tâches automatiques. Les conditions d'éclosion peuvent également être contrôlées et modifiées par une simple application dans le téléphone mobile, en fonction du type d'œuf dans l'incubateur.

ots-cls: incubateur intelligent,eggs , closions des œufs, Ardwino

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ملخص

لقد أصبح تدخل الأنظمة الذكية في المجال الزرعي واحد من أكتر المجالات انتشارا في مجال الاتصال و التكنولوجيات الحديثه ، النظام الذكي هي شبكه من دوائر الإلكترونية ، وأجهزة الاستشعار ، والبرمجيات متصلة بشبكة والتي تمكن هذه الأشياء من تبادل المعلومات فيما بينها يهدف مشروعنا لاستخدام نضام ذكي لإنشاء مايسمى بحاضنه ذكيه او مفرخه ذكيه

لهذه المحظنه القدره على تحويل البيض المخصب إلى أفراخ (أصيصان) دون تدخل الأم وذلك بتوفير الظروف المناخيه المثاليه من خلال توفير مرافق مثل التهوية والتبريد والتسخين

تفوم هذه المحضنة بعمل العديد من المهام التلقائية والأتوماتكيه كما يمكن التحكم ب شروط التف قيس والتعديل عليها عبر تطبيق بسيط في الهاتف النقال وهذ على حسب نوع البيض الموضوع في الحاضنه

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I would like to express (whatever feelings I have) to:

It has been a great opportunity to gain lots of experience in real time projects, followed by the knowledge of how to actually design and analyse real projects. First, praise to the Almighty Allah for helping us to complete this project. Thanks to all the people who made it possible for students like us, special thanks to our graduation project supervisors **Dr. Fatima Zohra LAALLAM** and **Dr. Houssem Eddine DEGHA** for the efforts they did to provide us with all useful information and making the path clear for us to implement all the education periods in real- time project design and analysis. For their patience and guidance along the semester, and for their continuous encouragement and support. The members of the examination committee of taking a time to evaluate our project. Special thanks to Mr. **ABANNI Menaour** (Engineer of electronic University of Ouargla) for his time in order to help us in electronic part.

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In addition, we would like to express our appreciation to our families for their support. At last, we would like to thank all the people who helped, supported and encouraged us to successfully finish our project.

Dedication

- My Parents
- My family and friends
- My supervisor
- My second supervisor
- My teachers
- My colleagues

Contents

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1.1 General Introduction

Smart systems incorporate functions of sensing, actuation, and control in order to describe and analyze a situation, and make decisions based on the available data in a predictive or adaptive manner, thereby performing smart actions. In most cases the smartness of the system can be attributed to autonomous operation based on closed loop control, energy efficiency, and networking capabilities. This explains the large role of the smart system in the agricultural field, where sensors are used to collect evidence. Each sensor will monitor a specific situation such as location, vibration, movement and temperature. They will be able to understand and provide information from the sensor. Things that are able to communicate and will share information about the situation and the environment with people, software and other machines. it is an technology that provides opportunity for farmers to transforming eggs to chickens. It was a simple method easy and smart and hatching is in large quantities compared to traditional hatching. Moreover, it does not require much space or effort, the temperature and humidity control shall be controlled in such a way as to ensure the safety of the climate to be provided to the eggs. Also, there is movement to the eggs to maintain its integrity and not to damage it.

Chapter 1

Background Theory

1.2 Introduction

Today, the smart systems vision has expanded to connect everything from industrial equipment to everyday things. The counters can include live creatures such as plants and farm animals (hatching eggs).

This explains the large role of the smart system in the agricultural field, where sensors are used to collect evidence. Each sensor will monitor a specific situation such as location, vibration, movement and temperature. In the intranet, these sensors will arrive at each other. In addition, they will be able to understand and provide information from the sensor. New to the owner of the farm.

1.3 Explain the problem

It is now common for us to approve projects on hatcheries or hatching centers for whites, but in traditional methods that do not match the times and do not withstand the climatic conditions and environment in which these projects are located. It is clear to us that we have to invent a modern technological way (to keep pace with the digital age in which we are) to hatch eggs and care for chicks until their growth while ensuring high productivity. This is why we have to accomplish technology based on Smart system Ensuring the highest possible productivity so many question can be s- What is the new mechanism to embody the project?

To what extent can we develop and improve productivity compared to traditional methods?

1.4 Our objective:

Is To built an incubator with automatic controlling the humidity and temperature. Improper control means that the temperature or humidity is too high or too low for a sufficient length of time that it interferes with

To built the incubator that able to incubate various types of egg. Making an egg incubator that user friendly will produce more valuable production and available for many types of egg

1.5 Smart system for in eggs hatching

When preparing fertilized eggs and ensure the specifications required in it and carry out all the necessary procedures for cleaning and storage of the appropriate period of not more than a week in any case must be provided during the period of incubation all the factors not the heat only

1.6 Ideal conditions for hatching eggs

1.6.1 Temperature

The temperature range between 37 - 38 degrees Celsius to ensure the growth and development of chickens and this degree depends on the type of hatchery and the type of machine itself. In general, the appropriate temperature for egg spawning in the Roman is about 37.5 C and in the ducks ranges from 37 to 37.8 C. For science, any rise or decrease in temperature for a long time leads to many problems in the hatching process and eventually ends with a low hatching rate In the first period of hatchery, but during the last 3 days in hatchery of any type, the temperature should be reduced by one degree Celsius because of the heat resulting from metabolism processes that are carried out inside the eggs by the embryos and usually the temperature in the last period Hatching ranges from 36.5 to 37.3 degrees percentage .

Figure 1.1: Table showing hatching values for all eggs[1]

Species	Incub. Period (days)	Temp (F.)[1]	Humidity (F.)[2]	Do not turn after	Humidity Last 3 days[2]	Open vent more
Chicken	21	100	85-87	18th day	90	18th day
Turkey	28	99	84-86	25th day	90	25th day
Duck	28	100	85-86	25th day	90	25th day
Muscovy Duck	35-37	100	85-86	31st day	90	30th day
Goose	28-34	99	86-88	25th day	90	25th day
Guinea Fowl	28	100	85-87	25th day	90	24th day
Pheasant	23-28	100	86-88	21st day	92	20th day
Peafowl	28-30	99	84-86	25th day	90	25th day
Bobwhite Quail	23-24	100	84-87	20th day	90	20th day

1.6.2 Humidity

A source of moisture (water) must be provided in the hatchery to compensate for the evapora- tion that occurs to the water inside the eggs during incubation of the eggs, in order to obtain

a chick of high quality and quality. The humidity of the chicken eggs is 50 - 60 And 70in the case of incubation of duck eggs, especially in the first two weeks of hatchery, during the first period of incubation, which is 18 days in chickens, 24 days in Romi and 26 days in ducks and geese. 80 - 85 during the last 3 days of hatching in chickens and in ducks and geese increased to 90 - 95during the last 3 days of a hatchery.

1.6.3 Ventilation

To provide oxygen and to put carbon dioxide out of the hatchery machine because there is no significant mortality in the embryos and the concentration of oxygen must be about 21, or in concentration in the normal air, but carbon dioxide not to exceed the proportion of 90 part of carbon dioxide Per 10,000 parts of the air and not to increase it for the lack of suffocation of embryos and low hatching rate. The percentage of CO2 suitable for the growth and development of embryos is 0.4 - 0.5.

1.6.4 Egg Flipping

Simulate the chicken in natural spawning by multiplying eggs several times a day. Where egg whipping several times Yuba to improve the hatching rate. The egg whip prevents embryonic membranes from sticking together and allows the fetus to take a proper position within the egg and provide adequate distribution of food, air, and heat to the fetus. In addition, the regular flipping habit prevents the embryo from adhering to the eggshell. The flocculation continues till today 18 of the hatching of the chicken eggs and the flop stops thereafter and the foo eggs stop stirring at day 24 of the hatching, the ducks and geese at day 26 and the ostriches after day 38 and in the quail after 15 days from the beginning of the hatching.

1.6 Type of incubator

There are two famous types of incubators

1.6.1 Forced Air Incubator

This type of incubator has fans that circulate the air in the incubator and around the eggs; the effect of force air is to ensure air incubating temperature which varies from 37.36C to 37.56C and an humidity which varies from 28.3C to 31.1C (wet bulb).

1.6.2 Incubator Still-Air

A still air incubator consists of a box or container with appropriate dimension (30.50cm x 30.5cm x 40.5cm). There is a 0.95cm inlet at each end between the level of the eggs and the water pan, two outlets 0.95cm in size are provided by

pushing tape over half of the hole to restrict the rate of air flow. Heat source is provided by the use of two 40w light bulb, and connected to thermostat in series for the controlled of the temperature. Humidity is supplied from a part half the size on the floor area placed at the bottom of the incubator, when the eggs are hatched the type placed over half of the hole is removed to increase the flow or air it common. A simple egg tray made from 0.64cm hardware cloth or wedded wire, and is placed on a platform above the cake pan containing the water. Ventilation is provided through small holes on the side of the ice chest. A total of about 16 holes approbably 0.64cm in diameter was provided. The holes are made on two sides side of the chest so that on one side four holes in series are drilled at about 5.1cm from the top of the chest and another series of four holes are spaced 10.16cm apart. A window made of glass is placed at the top of the chest is provided for observation without removing or opening the chest causing on temperature or humidity. The incubator is provided with a thermostat placed on the egg tray so that the bulb is about 2.57cm above the egg tray. This is to ensure that the temperature around the egg is taken [4].

1.7 Related works

1.7.1 Pas reform integrated hatching solution:

Figure 1.2: -Pas reform integrated hatching solution

Pas Reform is an international company, which has specialized in the development of innovative hatchery technologies for the poultry sector since 1919. Today, the company is the worlds only single-source supplier of fully integrated hatchery solutions.

1.7.2 Magicfly Digital Mini Fully Automatic Egg Incubator 12 Eggs Poultry Hatch

Figure 1.3: Magicfly Digital Mini Fully Automatic Egg Incubator 12 Eggs Poultry

Nowadays this is the most popular device for those who don't need a huge incubator. In terms of dimensions and shape this device resembles more of a lunch box than of a full=scale new life cultivation device. This is for the best, as it wont take up much space. The price is also affordable taking into account the fact that this is an automated egg incubator First of all, there is automatic temperature control, so you wont have to set it manually. An egg turner is also available, so you wont have to do that either. The top lid of the device is equipped with an LED screen showing various indices. By the way, the device is suitable for hatching not only chicken, but also eggs, fowl and goose eggs. Such versatility is crucial for a compact device as youre likely to try it all in the beginning of your poultry farming career.

Number of Eggs 12 Compatibilitychicken, duck, geese AutomationTemperature control, egg turner

1.7.3 Manufacturing 1602N Hova-Bator Incubator

This is a simple large incubator with minimum equipment for the price of 59.79.*Itisdefinitelyunsuitablef o* thermometer, without which you will hardly be able to incubate anything. Do take into account the fact that the device has been devised for 50 chicken eggs. Youll be able to fit half as many goose eggs and twice as many quail eggs. Should you disregard the drawbacks of the manual operation, youll find that this is the most affordable 50 egg incubator.

Figure 1.4: Manufacturing 1602N Hova-Bator Incubator

Number up to 70 Eggs Compatibilitychicken, duck, geese AutomationTemperature contro qui

1.7.4 CHIMAERA 56-Egg Automatic Incubator atcher Turner with LCD Display

This is the second-large incubator of this review: the manufacturer claims it can fit 56 chicken eggs. The device is shaped as a trap, so you wont be able to lay more eggs even if were talking quail eggs. This device provides impressive volumes at the best price of 99.99. This incubator has sufficient functions: there is a large control panel for monitoring the incubation day, temperature and humidity. Such a large device is also equipped with a cooler providing for the necessary air circulation on the inside. What the gadget lacks is the possibility to watch the eggs without opening the lid: the walls are opaque and the eye cant see all the egg rows behind the matte plastic. In general, you can rely on the data output on the screen as all the necessary operations, including the turning, will be performed by the device without your help. This is it for the inexperienced poultry farmers.

Figure 1.5: CHIMAERA 56-Egg Automatic Incubator atcher Turner with LCD Display

Number 56 Egge Compatibilitychicken, duck, geese AutomationTemperature control, egg turner

1.7.5 Best Choice Products 96 Digital Clear Egg Incubator Hatcher Automatic Egg Turning Temperature Control

Here before you is a mini farm. Unlike other incubators, here two 48-egg trays are supplied. When you assemble them, youll have a kind of two-storey incubator. The device is compatible with all types of poultry and is thus versatile and multi-functional. The automation is fine as there is an auto egg turn, temperature and humidity control. In

general, there is nothing a user should worry about as everything is automated. They two-storied design raises certain

questions from the customers as there are certain air circulation issues when the necessary temperature cannot be maintained on the lower storey. This issue is fairly easy to solve: you should invest into an additional fan kit and install it on the lower level. Two coolers will keep the air circulating inside the incubator and will thus maintain stable temperature on both levels. The most essential thing is to follow the rules of laying the eggs which are stated in detail in the manual.

Figure 1.6: Best Choice Products 96 Digital Clear Egg Incubator Hatcher Automatic Egg Turning Temperature Control

Number 96 egges Compatibilitychicken, duck, geese,goose AutomationTemperature control, egg turner automatic egg turner, airflow

1.7.6 HovaBator Advanced Egg Incubator Combo Kit: includes in- cubator, fan kit, egg turner, digital thermometer/hygrometer

his is a smaller incubator, but its interior has been designed in a more convenient and versatile manner. 42 chicken or 70 quail or 28 goose eggs can fit here. This might as well be the handiest and roomiest item for those who breed quail. Despite the unsophisticated design (in comparison with its analogues), the equipment is more than satisfactory and the price tag of 128 dollar is completely justified. There is not only a built-in egg turner, but also everything else is supplied as separate devices, namely a digital thermometer/hygrometer and a powerful air circulation fan kit. The price tag has increased considerably thanks to

these devices supplied. In general, this is a noteworthy item especially for those who deal with various poultry species and need a universal produce

Number up to 70 eggs Compatibility chicken, duck, geese , quill Automation Temperature

control, digital thermometer, fan kit, automatic egg turner

Figure 1.7: HovaBator Advanced Egg Incubator

1.7.7 Yescom Mini Digital Transparent 7 Egg Incubator Clear Chicken Poultry Hatcher w/ CE Certificated

This product is the least expensive among its analogues, as it costs only 21.95 Dollar. It is not equipped with an auto egg turner; there is only temperature control available. Do you need the egg turner? It will definitely double the price, and turning 7 eggs regularly on your own isnt the most difficult task given that the tray is very expedient and your chances of accidentally cracking the egg are extremely low. This incubator is also the smallest one reviewed! A 6.7” x 6.7” x 6.7” device wont take up much space even in the most crowded space, and the price tag is also the most affordable among the items reviewed. So if youre looking for a device to try your breeding skills pick this one but dont expect too much from it.

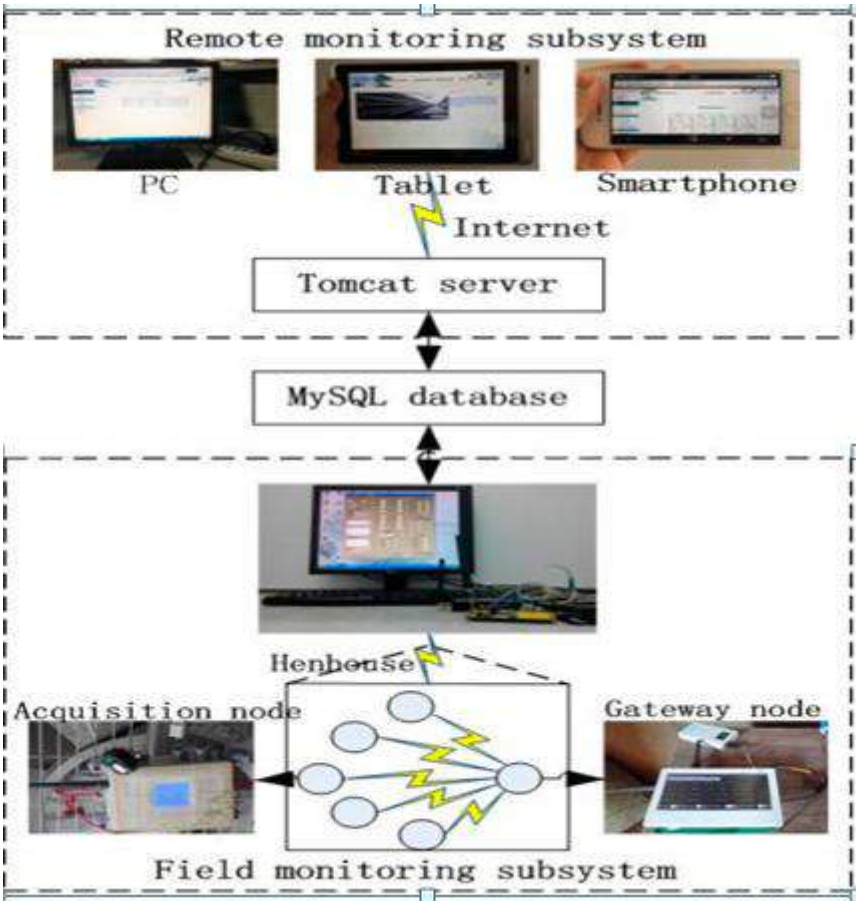
Figure 1.8: Yescom Mini Digital Transparent 7 Egg Incubator

Number 7 eggs Compatibility chicken, duck, geese Automation Temperature

1.7.8 Development of a Remote Monitoring System for Henhouse Environment Based on IoT Technology

To monitor multiple environmental factors of henhouses in modern chicken farms, a henhouse online monitoring system based on wireless sensor network was developed using wireless sensor technology and computer network technology,end he used a App in smarte phone to controle the farm

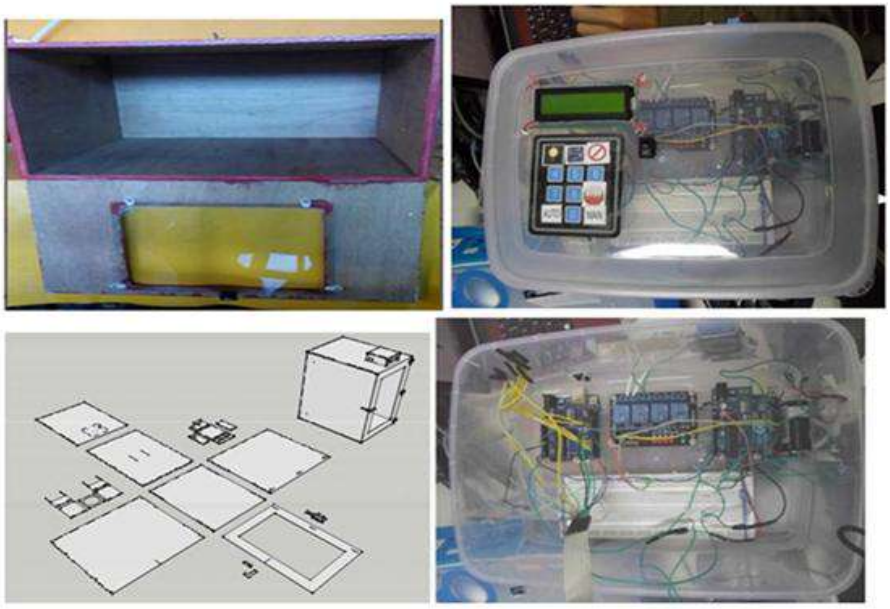
Figure 1.9: Development of a Remote Monitoring System for Henhouse Environment Based on IoT Technology



1.7.9 Smart eggs incubator system

The purpose of this project is to design and develop Smart Egg Incubator System (SEIS). The SEIS will fill with the temperature and humidity sensor. In this project, lamps are used as heater to give suitable heat temperature for the eggs

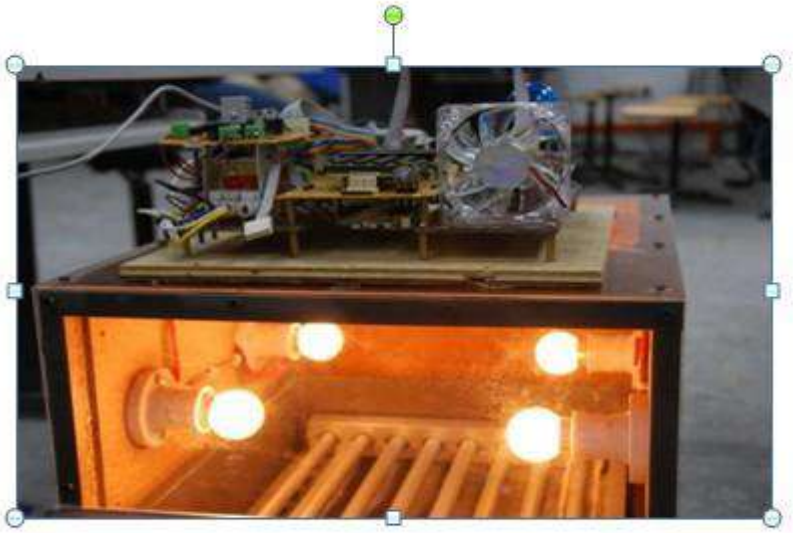
Figure 1.10: smart eggs incubator system



1.7.10 DEVELOPMENT OF SMART EGG INCUBATOR SYSTEM FOR VARIOUS 5 TYPES OF EGG

The purpose of this project is to design and develop the system of an egg incubator that able to incubate various type of egg named as Smart Egg Incubator System for Various Types of Egg (SEIS). The SEIS will fill up with the temperature and humidity sensor that can measure the condition of the incubator and automatically change to the suitable condition for the egg. The health of egg is very important for the development of embryo within the egg. Improper control means that the temperature or humidity is too high or too low. In this project, the light heater is use to give the suitable temperature to the egg. By using the water and controlling fan, it is can make sure the humidity and ventilation in good condition. The status condition in the SIES will appear on the LCD screen display. To make sure all part of egg was heated by lamp, DC motor is very useful to rotate iron rode at the bottom side and automatically change the position of egg. The entire element will be controlled using programmable integrated circuit (PIC). The PIC is a type of microcontroller that can process a data from sensor and

Figure 1.11: DEVELOPMENT OF SMART EGG INCUBATOR SYSTEM FOR VARIOUS 5 TYPES OF EGG



will execute the control element to change the condition of SEIS. This project will be a user friendly product since the SEIS can move to other place. It will secure by user must enter the password before activate the system.

Chapter 2

Conception

2.1 Introduction

In this chapter, we are going to descript how the different technologies are connected in order to build an integrated system, which is able to manage different tasks of the. In addition, we will explain some diagrams to explain our system.

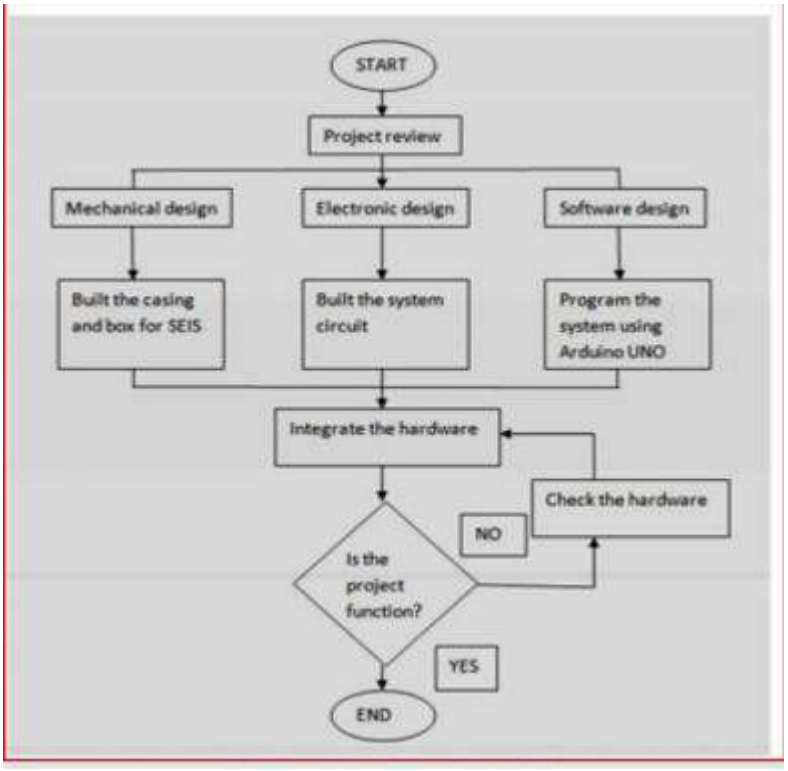
2.2 UML definition

The Unified Modeling Language (UML), a Unified Modeling Language (UML), is a pictorial graphic modeling language designed to provide a standardized way to visualize the design of a system. It is commonly used in software development and object-oriented design.

UML is the result of the fusion of previous object modeling languages: Booch, OMT, OOSE. Mainly from the work of Grady Booch, James Rumbaugh and Ivar Jacobson, UML is now a standard adopted by the Object Management Group (OMG).

2.3 Activities Diagram of our system

Figure 2.1: activities diagram [1]



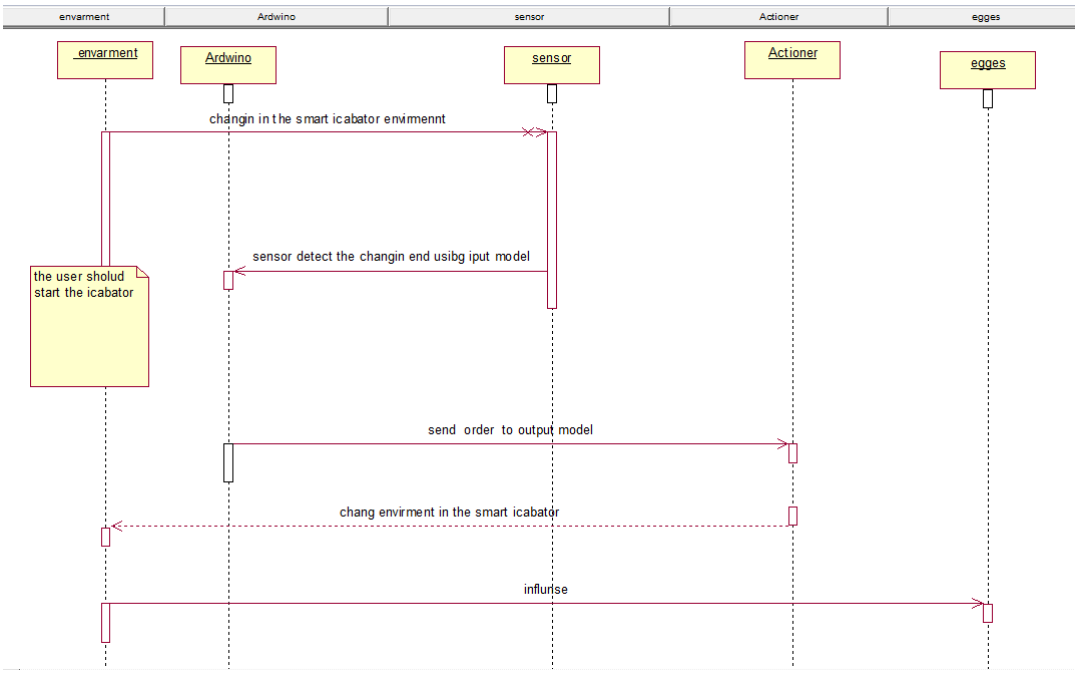
This scheme is designed for the engineering division of the incubator so that it consists of 3 main sections: Electronic Section, Software Section, and Mechanical Section. The latter consists of the external structure of the incubator and its general structure The electronic section consists of

the electronic circuit board system. The software section is all the programs and scripts used to run Arduino. The main elements of the system are assembled to form our hardware section to verify the work of all the basic functions of the system in the case of non-functioning of one of the function, we cheek the hardware.

2.4 Sequence diagram of our system

This diagram shows us the process of the work of the project so that the user to enter the ideal values of the incubator and begin to adjusting the environment and the operation of the auctioneer unit (fan ,motor,lamp) immediately after any change in temperature or humidity senses any change in the climate of the incubator

Figure 2.2: sequence digram

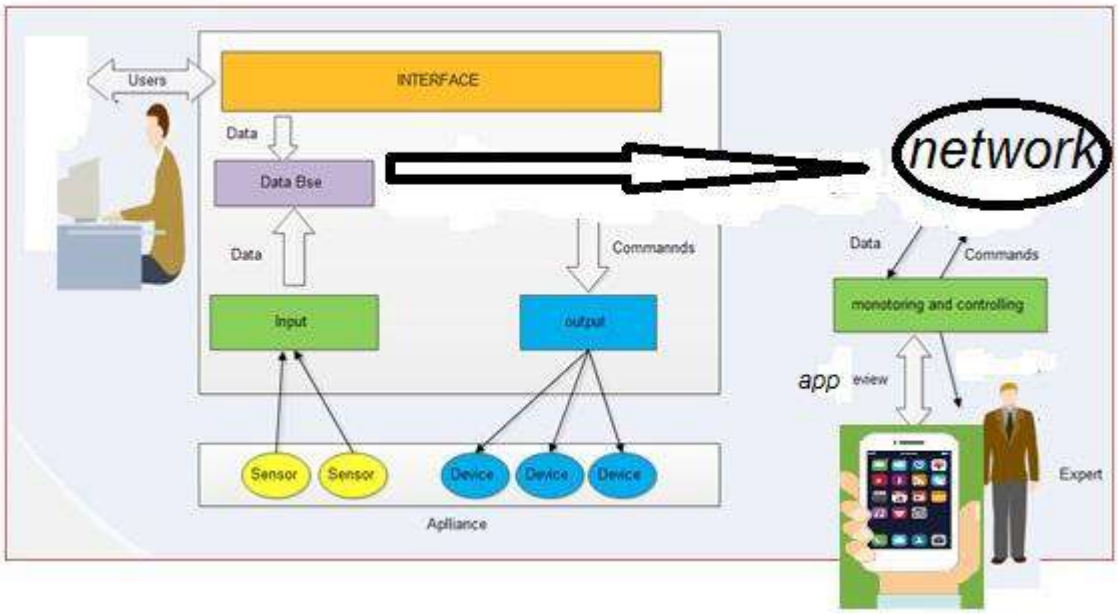


2.5 The proposed solution

Smart object interconnected between each other and producing a large volume of information as a smart system . The things that we expect to connect to the network will consist of

sensors, actuators with information processing and communication capabilities that will make themselves intelligent. Sensors are collecting continuously environmental data (e.g. body area network, smart city, cars, smartphones, etc.). We used Arduino for framework design. This architecture process real-time data and show how the information move in this smart system. It also ensures event-driven data collection given the buffer space and communication bandwidth limitations of each sensor. The following are the most important elements of this system :

Figure 2.3: the proposed solution



2.5.1 User

Is person using a generic system.

2.5.2 Interface

User interface design (UI) or user interface engineering is the design of user interfaces for ma- chines and software, such as computers, home appliances, mobile devices, and other electronic devices, with the focus on maximizing usability and the user experience. The goal of user

interface design is to make the user's interaction as simple and efficient as possible, in terms of accomplishing user goals.

2.5.3 Database

A large amount of information stored in a computer system in such a way that it can be easily looked at or changed.

2.5.4 Expert

An expert system is a computer program that uses artificial intelligence (AI) technologies to simulate the judgment and behavior of a human or an organization that has expert knowledge and experience in a particular field.

2.5.5 Input and output (sensor, devices)

Input and output (sensor, devices) is a hardware device that has the ability to accept inputted, outputted or other processed data. It also can acquire respective media data as input sent to a computer or send computer data to storage media as storage output.

Chapter 3

Implementation

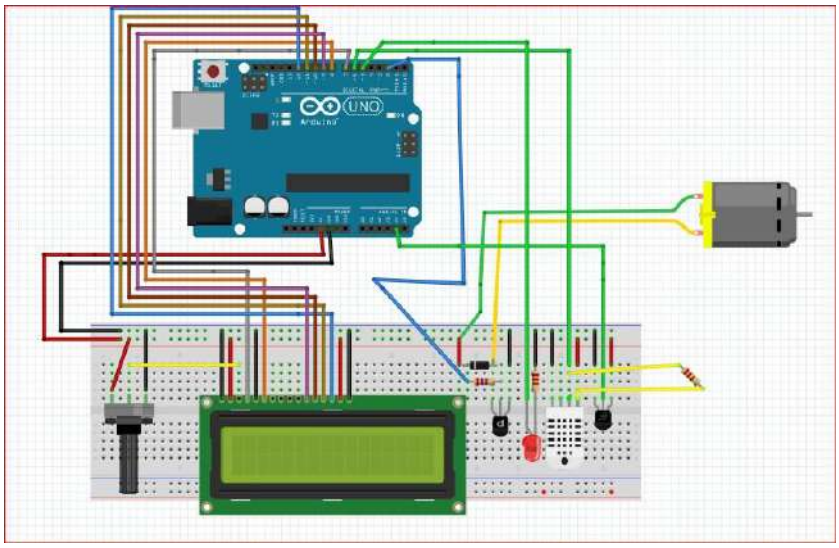
3.1 Introduction

In this chapter, we present implementation of automated smart incubator prototype based monitoring system. To test the implemented system, we choose a particular devices sush as arduino uno and other sensor and actuator.

3.2 The proposed solution :

In this, we are shown the general structure of our intelligent combination so that we have Arduino(UNO) connected to the units of implementation (fan motor movement and light) in addition to the output units (LCD) and the sensors of heat and humidity

Figure 3.1: the proposed solution

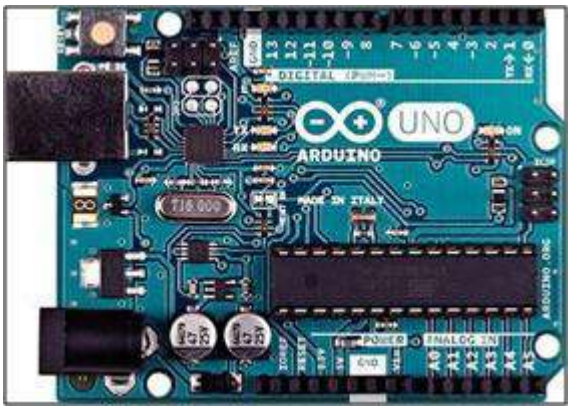


3.1 Identify the devices used in our system

3.1.1 Ardwino UNO

Arduino Uno is an electronic development board (microcontroller) based on the ATmega328P, which Consists of 14 digital I/O pins, 6 anal-inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP. It can be reset by a reset button. It can be controlled easily by USB output and sending commands. Arduino UNO is characterized by small size and price, that we can use without concern. We can also add shields, which are circuit boards that are installed above the original Arduino to expand what they can do. It gives 5V or 3.3V electric power, and the VIN port is used to power it. [43] The Uno board is the first in a series of USB Arduino boards and the reference model for the Arduino platform

Figure 3.2: Arduino UNO



3.1.2 Breadboard :

A Breadboards is a whiteboard with holes that allow circuits, wires, and other components to be interconnected without soldering. Breadboards are often used as an education tool and as a method of prototyping an idea before soldering anything onto a circuit board

Figure 3.3: Breadboard

3.1.3 LCD 16x2

LCD (Liquid Crystal Display) screen is an electronic display module and finds a wide range of applications. A 16x2 LCD display is a very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LED s. The reasons being: LCDs are economical; easily programmable. A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in the 5x7 pixel matrix. This LCD has two registers, namely, Command and Data.

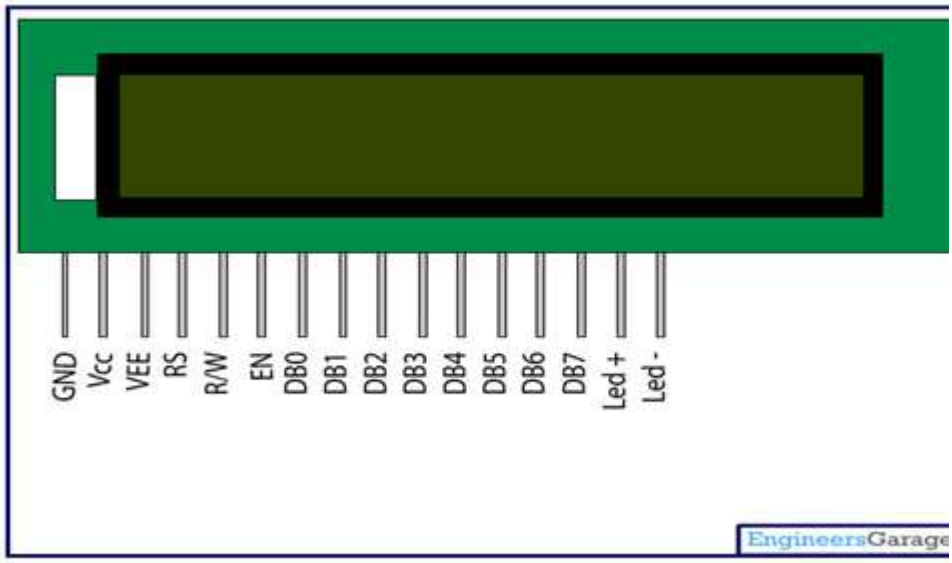


Figure 3.4: LCD 16x2

The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc. The data register stores the data to be displayed on the LCD. The data is the ASCII value of the character to be displayed on the LCD.

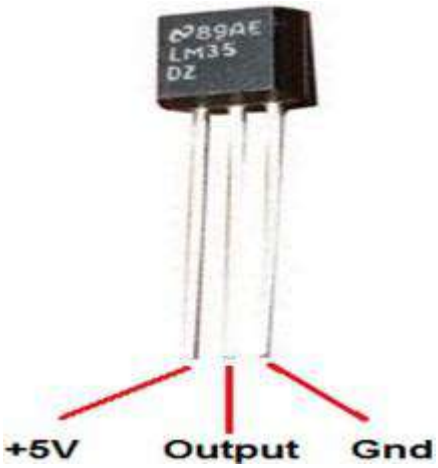
3.1.4 Potentiometer (e.g. 4.7K)

a device with three terminals, two of which are connected to a resistance wire and the third to a brush moving along the wire, so that a variable potential can be tapped off: used in electronic circuits, esp as a volume control

3.1.5 LM35 tempuratur sensor :

The LM35 is an integrated circuit sensor that can be used to measure temperature with an electrical output proportional to the temperature (in C).

Figure 3.5: LM35 TEMPERATURE SENSOR

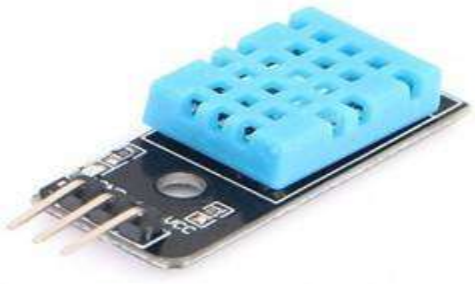


It can measure temperature more accurately than a using a thermistor. The sensor circuitry is sealed and not subject to oxidation.The LM35 generates a higher output voltage than ther- mocouples and may not require that the output voltage be amplified.The LM35 has an output voltage that is proportional to the Celsius temperature.The scale factor is .01V/C.

3.1.6 DHT11 humidity sensor

This DHT11 Temperature and Humidity Sensor features a calibrated digital signal output with the temperature and humidity sensor capability. It is integrated with a high performance 8bit

Figure 3.6: DHT11 HUMIITY SENSOR



microcontroller.

Its technology ensures the high reliability and excellent long-term stability. This sensor includes a resistive element and a sensor for wet NTC temperature measuring devices. It has excellent quality, fast response, anti-interference ability and high performance.

3.1.7 HC-05 Bluetooth sensor

Figure 3.7: HC-05 Bluetooth sensor

HC-05 is a Bluetooth module which is designed for wireless comunication. This module can be used in a master or slave configuration. It is used for many applications like wireless headset, game controllers, wireless mouse, wireless keyboard and many more consumer applications. It has range up to ı100m which depends upon transmitter and receiver, atmosphere,

3.1.8 Ventilators (Fan)

It is a DC motor with a ventilator in the head. We used two ventilators in order to adjust the CO2 concentration in the greenhouse; the first one for ingoing air

Figure 3.8: Ventilators (Fan

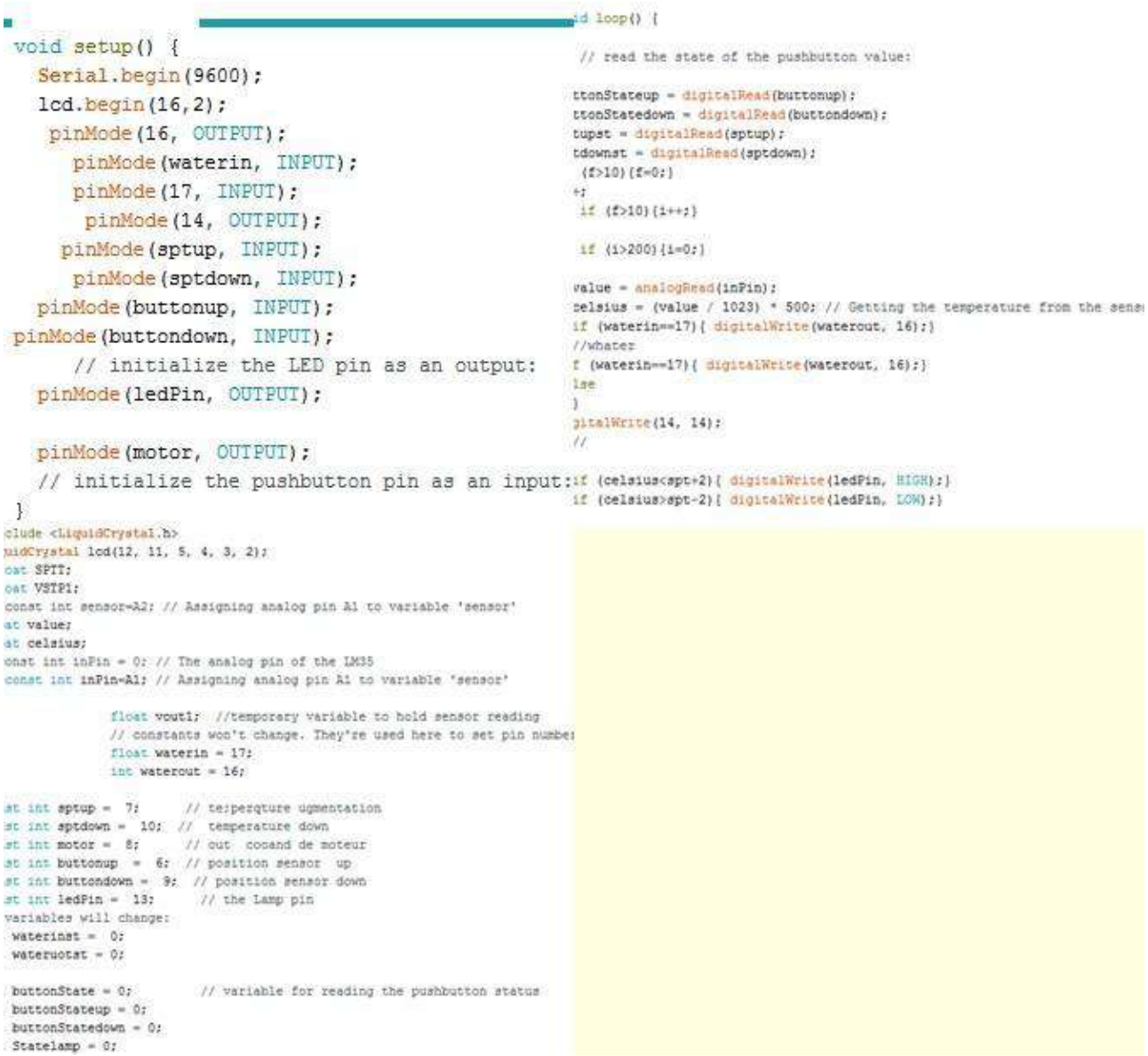
3.1.9 Ardwino

Arduino is an open source border, helps to develop a lot of ideas and projects related to automatic control by using electronic circuits. In order to use ArdWino, you have to use ArdWino programming tool by Arduino IDE Integrated Development open source

language (ArdWino c). Arduino was developed the first time in 2005 by David Cuartielles and Massimo Banzi.

Ardwino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something on-line. You can tell your board what to do by sending a set of instructions to the microcontroller on the board.

3.1.10 An extract of our source code



```
void setup() {
  Serial.begin(9600);
  lcd.begin(16,2);
   pinMode(16, OUTPUT);
     pinMode(waterin, INPUT);
     pinMode(17, INPUT);
      pinMode(14, OUTPUT);
    pinMode(sptup, INPUT);
     pinMode(sptdown, INPUT);
  pinMode(buttonup, INPUT);
pinMode(buttondown, INPUT);
     // initialize the LED pin as an output:
  pinMode(ledPin, OUTPUT);

  pinMode(motor, OUTPUT);
  // initialize the pushbutton pin as an input:
}
```

```
id loop() {

 // read the state of the pushbutton value:

ttonStateup = digitalRead(buttonup);
ttonStatedown = digitalRead(buttondown);
tupst = digitalRead(sptup);
tdownst = digitalRead(sptdown);
 (f>10){f=0;}
+;
 if (f>10){i++;}

 if (i>200){i=0;}

value = analogRead(inPin);
celsius = (value / 1023) * 500; // Getting the temperature from the sens
if (waterin==17){ digitalWrite(waterout, 16);}
//whater
f (waterin==17){ digitalWrite(waterout, 16);}
lse
}
gitalWrite(14, 14);
//

if (celsius<spt+2){ digitalWrite(ledPin, HIGH);}
if (celsius>spt-2){ digitalWrite(ledPin, LOW);}
```

```
clude <LiquidCrystal.h>
uidCrystal lcd(12, 11, 5, 4, 3, 2);
oat SPTT;
oat VSTP1;
onst int sensor=A2; // Assigning analog pin A1 to variable 'sensor'
at value;
at celsius;
onst int inPin = 0; // The analog pin of the LM35
onst int inPin=A1; // Assigning analog pin A1 to variable 'sensor'

            float vout1;  //temporary variable to hold sensor reading
            // constants won't change. They're used here to set pin numbe
            float waterin = 17;
            int waterout = 16;

st int sptup =  7;      // te;perqture ugmentation
st int sptdown =  10;  //  temperature down
st int motor =  8;      // out  cocand de moteur
st int buttonup  =  6;  // position sensor  up
st int buttondown =  9;  // position sensor down
st int ledPin =  13;      // the Lamp pin
variables will change:
 waterinst =  0;
 waterwotst = 0;

 buttonState = 0;         // variable for reading the pushbutton status
 buttonStateup = 0;
 buttonStatedown = 0;
 Statelamp = 0;
```

3.3 Result

3.3.1 General description

Our objective is to build smart egg incubator. This incubator will fill white the temperature end humidity sensor. We use the lamp as a heater to give suitable heat temperature for the egg. We use also controlling fan for making sure the humidity and ventilation in good condition we sau the status condition in LCD screen display the output-input will be controlled by using Arduino UNO

3.3.2 The eggs box outside lock

As shown above, the box is a small refrigerator that has been modified to suit the conditions of hatching eggs, which contain the main gate for use to lay eggs or shake chicks. Also, maintenance should be required. The box should be well sealed with no insulation so as not to affect the external environment.

With a square base of 60 * 60 cm and height up to 130 cm and a load capacity of 100 to 150 eggs depending on the type of eggs to be hatched with insulation to be affected by the external

climate

3.3.3 Movement function :

After setting the eggs, the incubation process begins. An important part of this process is turning or rotating, the eggs.

Eggs must be physically turned to prevent the developing chick from sticking to the shell. More scientifically, the embryo should be resting on top of the yolk. The yolk tends to float upward, on top of the egg white towards the shell if the egg is not turned. As a result, the developing embryo can be squeezed between the yolk and the shell, causing potentially fatal damage. By

Figure 3.11: our project

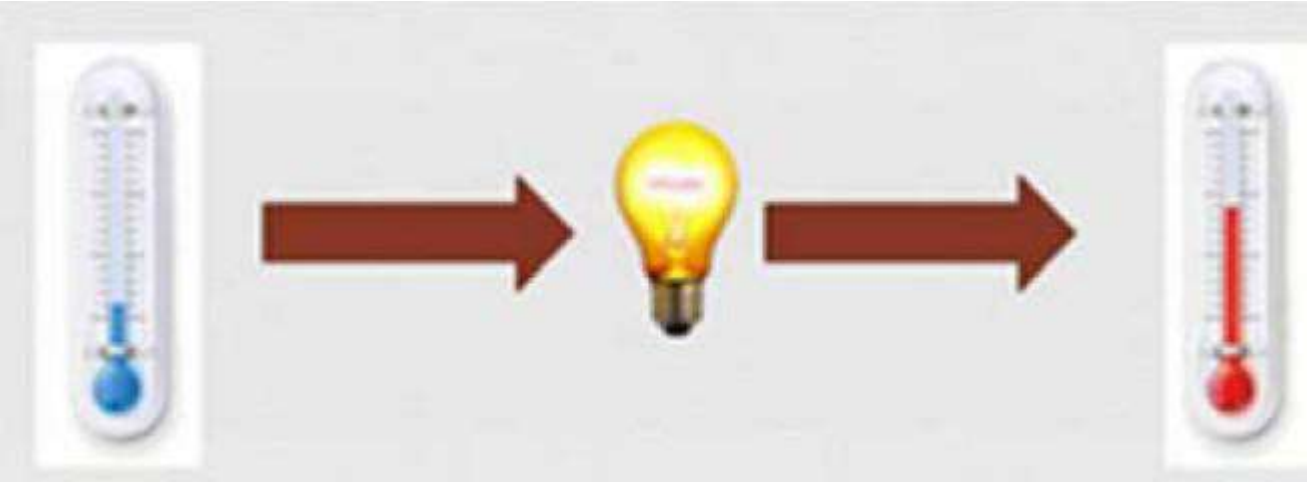
turning the eggs, the yolk turns within the albumin, once again moving the yolk away from the shell and making it safe for the embryo on top until it is time to turn again.

Eggs will need to be turned a minimum of 3 times per day, and 5 times is even better.

To do this, we have used Egg Collector with a structure specifically designed to facilitate egg movement . In addition, we use a rotary motor in one direction to ensure that the egg collector turns automatically so that it reaches the picker to stop automatically and after a specified period of time it automatically descends until it touches the picker. The process continues automatically and lasts for 18 days starting from the start of the hatching process. The motor is electrically connected and also connected to the Arduino to receive and execute orders as required

3.3.4 Temperature function

Figure 3.12: Temperature function

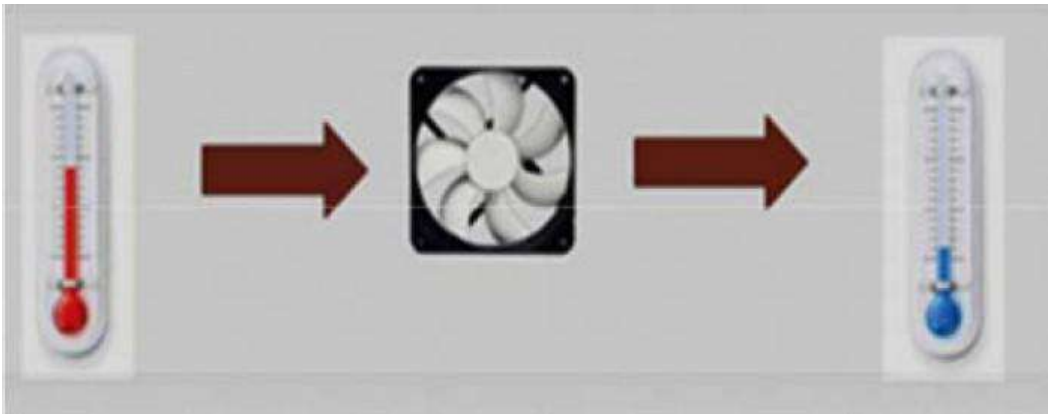


Returning to the figure above, we have shown the operation condition of the lamp after the desired temperature drop. When the temperature is below the desired temperature, the

light will be turned on to increase the temperature in the Smart Egg incubator, and once the desired temperature is reached, the lamp will return to its natural state and be redone.

3.3.5 Ventilation function

Figure 3.13: ventilation function

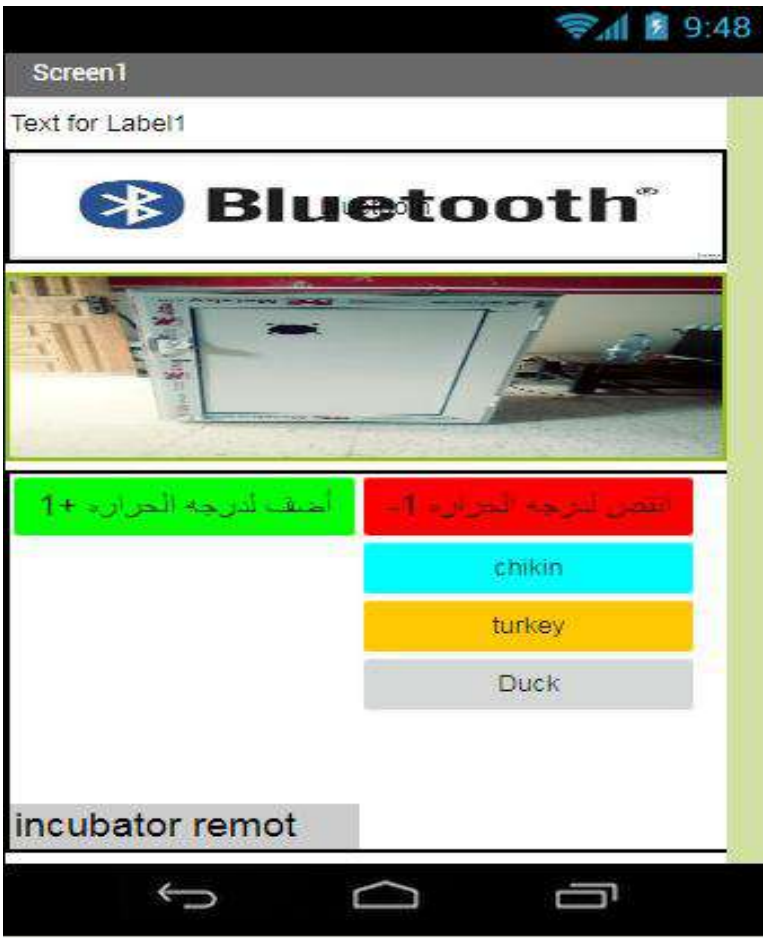


Returning to the figure above, we showed how the fan is operated, and then after the temperature rise and precisely the current temperature is higher than the desired temperature, the fan will work to reduce the temperature in the smart egg incubator. After moderation the temperature will be the propeller for its natural state and drone Again.

3.3.6 Our Application Mobile

We have implemented a simple application in the smartphone that allows us to control the incubator remotely by increasing or decreasing the temperature of the ocean and also allows us to choose the climate associated with hatching eggs, which makes the incubator in line with the creator of egg types

Figure 3.14: Application smart phones



3.4 Production:

3.5 Conclusion

In this dissertation, we have developed an application in the smartphone to remote control an incubator. Our application depends on some basic sensor such as heat and humidity sensor, motor and fan. The goal of this project is to demonstrate that it is possible to create an intelligent system that can manage and control the stages of hatching eggs until the embryo is released.

After having designed the system, we have implemented it using Arduino.
We have tested our system for different types of eggs and we have 70%_80% Of the fertilized eggs.

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