UNIVERSITI TEKNIKAL MALAYSIA MELAKA

PUYUH FARM ENVIRONMENT CONTROL AND ALERT SYSTEM USING MICROCONTROLLER AND GSM MODULE

This report is submitted in accordance with the requirement of Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor of Electronic Engineering Technology (Industrial Electronics) with Honours

By

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APPROVAL

This report is submitted to the Faculty of Engineering Technology of UTeM as a partial fulfilment of the requirements for the degree of Bachelor of Engineering Technology (Industrial Electronic) (Hons.). The member of the supervisory is as follow:

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ABSTRACT

The unusual temperatures in Malaysia today impact the quail's execution. Therefore, there are a ton of requests from the grill business to keep great natural conditions by introducing the warmth controlling framework, for example, the current evaporative cooling framework that can control the temperature in a poultry house. Notwithstanding, there is an issue in an approach to coordinate the aggregate cooling cushion territory to the introduced deplete fan limit so that the coveted cooling productivity is accomplished. Moreover, it requires high upkeep in keeping the water lines clear with no green growth developed which are by utilizing different strides relying upon the evaporative cooling sort and producer's determinations, including cleaning or changing the channel. In perspective of this, a warmth controlling framework in light of PIC that can control fan and lights and a signal will be produced. The warmth controlling framework will be worked by, once the warmth controlling is turning ON, the DC fan and the AC light will likewise turning ON. At that point, when the temperature sensor sense the temperature in the poultry house is higher than the greatest scope of temperature, the DC fan and the buzzer will be turned ON. Something else, when the temperature is underneath the base temperature run, the signal and one light will be turned ON. This venture additionally won't cost a considerable measure as every one of the segments are reasonable. The purpose of this document is to report investigation and performance results of the build-up prototype dealing with temperature, humidity, and ammonia control of poultry house.

ABSTRAK

Suhu yang luar biasa di Malaysia hari ini memberi kesan pelaksanaan puyuh. Oleh itu, terdapat satu tan permintaan daripada perniagaan grill untuk mengekalkan keadaan semula jadi yang besar dengan memperkenalkan kehangatan mengawal rangka kerja, sebagai contoh, rangka kerja penyejukan penyejatan semasa yang boleh mengawal suhu di dalam rumah ayam. Walau apa pun, terdapat isu dalam pendekatan untuk menyelaras agregat wilayah penyejukan kusyen kepada had kipas menguras diperkenalkan supaya produktiviti penyejukan didambakan dicapai. Selain itu, ia memerlukan penjagaan yang tinggi dalam menjaga garis air bersih tanpa sebarang pertumbuhan hijau dibangunkan yang dengan menggunakan langkah yang berbeza bergantung kepada jenis penyejukan penyejatan dan penentuan pengeluar, termasuk pembersihan atau menukar saluran. Dalam perspektif ini, kehangatan yang mengawal rangka kerja berdasarkan PIC yang boleh mengawal kipas dan lampu dan isyarat akan dihasilkan. Rangka kerja ini kehangatan mengawal akan bekerja dengan, sekali mengawal kehangatan beralih ON, DC kipas dan lampu AC juga akan beralih ON. Pada ketika itu, apabila sensor suhu mengesan suhu di dalam rumah ayam adalah lebih tinggi daripada skop yang paling besar suhu, kipas DC dan buzzer akan dihidupkan. Sesuatu yang lain, apabila suhu di bawah suhu asas jangka, isyarat dan satu cahaya akan bertukar ON. Usaha ini tambahan tidak akan dikenakan bayaran ukuran yang besar kerana setiap salah satu segmen yang berpatutan. Tujuan dokumen ini adalah untuk melaporkan siasatan dan prestasi hasil prototaip membina-up yang berurusan dengan suhu, kelembapan, dan kawalan ammonia rumah ayam.

DEDICATION

I would like to dedicate this project to my supervisor, Mr Saifullah Bin Salam and Mr Fauzi Bin Ab Rahman whom had guided me in this project. i also would like to thank my parents, friends, and lecturer whom had helped and supported me.

ACKNOWLEDGEMENT

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LIST OF ABBREVIATIONS, SYMBOLS, AND NOMENCLATURE

PIC – Programmable Integrated Circuit

˚C – Degree Celcius

% - Percentage

Ppm – Part Per Million

CPR - Chlorophenol Red

GSM -Global System for Mobile

LCD – Liquid Crystal Display

IDE -Integrated Development Environment

PC – Personal Computer

USB – Universal Serial Bus

PWM – Pulse Width Modulation

UART – Universal Asynchronous Receiver/Transmitter

DC – Direct Current

AC – Alternate Current

ICSP – In Circuit Serial Programming

DHT - Dihydrotestosteron

CHAPTER 1

INTRODUCTION

1.0 Project Background

The project here is about quail farm environment control and alert system using microcontroller and GSM module. Nowadays, hot weather makes a negative effect on quail's nourishment and breeding. For a tunnel ventilated poultry house, the common comfort range of the temperature is within 34ºC until 38ºC compared with the temperature in the open poultry house which is within 35ºC to 40ºC. The issue now is about global warming el-nino also having a significant impact on the quail. Other than that, climate change is also a result of ammonia gas that accumulates inside the poultry house has resulted from the bird droppings. Because of that, the temperature controlling system based on PIC for Poultry House application is needed to control the temperature in a poultry house automatically. The purpose of this document is to report investigation and performance results of the builder-up prototype dealing with temperature, humidity and ammonia control of poultry house.

1.1 Project Objective

The main objectives of this project can be described as follows.

i. To design a quail farm environment control system based on the microcontroller prototype.
ii. To analyse and evaluate the performance of the quail farms environment controlling system prototype.

1.2 Problem Statement

Quail need good ventilation. Closed poultry house without good ventilation will cause the quail ammonia poisoning. High ammonia is produced from the bird excretes. When the ammonia level is so high, the temperature in the poultry house also increase. After the temperature in the poultry house increase, it is causes the quail sweating. From that, it is make the humidity in poultry house also increase. Other than that, quail are very sensitive to cold temperatures and quail also need an environment that is not damp. The environment of poultry house give effect to the quail grows up. The breeders who have been long engaged in a breeding quail have a difficulty to detect the ammonia by their bare nose. The quail dropping should be cleaned if the ammonia level is too high. Installing an environment controlling systems in the poultry house can help prevent the problem of the quails.

1.3 Project Scope

The scope of the project is limited to the electrical part and the construction of the miniature prototype for the controlling system. As for the electrical part, this project will focus on how to design an ammonia controlling system apart from the temperature and humidity based on the microcontroller application. The system needs to be operated by controlling the fans and lamps. The project will be designed in such a way, that microcontroller application will be able to control the turning ON or OFF of the lamps and fans that used 240VAC, based on the signal received from the sensors. Then, for the prototype part, a prototype of the poultry house will be designed taking into account similarity with the actual environment.

1.4 Report Outline

This report is outlined as follows:

Chapter 1 explains the introduction that includes concept of temperature, humidity, and ammonia controlling based on microcontroller application for poultry house application. It also outlines the objectives, problem statement and scopes of this system.

Chapter 2 describes the literature review of recent records, circuits and problem statement with regard to the project.

Chapter 3 provides description about the methodology in order to implement this project from the start until the end. The methodology is illustrated using the flow chart and each of the contents of the flow chart is described in this part. Besides, the circuit design that uses Proteus 8 Professional will be also explained in chapter this chapter.

1.5 Conclusion

This chapter gives overall view of the project such as project background that outlines the project objectives, problem statements, project scopes. The investigation of the temperature, humidity, and ammonia controlling system will give some valuable pertaining to existing temperature, humidity, and ammonia controlling system that can be used as the references in order to get the idea to implement this project. Then, the problem statement helps to improve the system that will be created, so that it will be more effective than the existing heat controlling system available in the market. Besides, the project scope will set a limit so that the study will focus only within the desired outcome whereas in this project is to design a poultry house ammonia controlling system.

CHAPTER 2

LITERATURE RIVIEW

This section will examine about the historical backdrop of the quail cultivating, the hypothesis of the circuit furthermore the general point of view. The viewpoint and technique that has been utilized will be clarified and will be connected with our venture. In this section, thoughts will be executed on how the frameworks functions.

2.1 Quail Farm

A quail is a little fledgling that occupies forest and woodland zones far and wide. There are more than 15 types of quail with each of the quails are found in various parts of the world and all have somewhat extraordinary appearances relying upon how they have adjusted to their surroundings. Quails are generally lone fowls and invest their free energy either claim or with another combine. Moreover, quails tend to breed in more open territories, for example, farmland and lay their eggs in the homes that they have constructed. quails egg sizes can have a tendency to vary somewhere around 1 and 12 eggs relying upon the types of quail and the child quail chicks bring forth out of their eggs in under a month.

The historical backdrop of quail can be followed back in the Egyptian period where they understood that quail were a splendid wellspring of protein for their labourers so settled vast homesteads for reproducing them. With a specific end goal to breed the quail, lodging is required for them to breed. Quail can be brought up in either litter or confine framework. be that as it may, quail cultivating in enclosure framework is more reasonable than bringing them up in profound litter framework. In enclosure framework, administration is simple and sicknesses or other issue are less. So as to make the quails are splendidly encourage, the quail should devour around 20 to 25 grams of sustenance every day.

The arrangement of lodging to be utilized relies on upon the sort and size of the quail endeavour. Depending of the size of generation, there are three fundamental lodging frameworks accessible for quail cultivating that is aviary, the floor and the pen frameworks. Aviary framework are normally used to raise and keep the colourful quail, either in or out of the entryways. Floor frameworks are utilized by little to medium scale endeavour and ordinarily used existing houses or rooms. Whichever frameworks or mix of frameworks is utilized, lodging environment assumes an imperative part and can extraordinarily impact the level execution of the quail undertaking.

Figure 2.1: Closed Loop Poultry House.

2.2 Temperature of Quail

Temperature is critical for the quail since they are exceedingly suspicious to chills and draft. The zone of warm impartiality enemy sustained quails is between 35 to 37˚C and one day old, narrowing to 33˚C at one week and 31˚C at two weeks of age individually.

The temperature sensor measured the amount of heat and energy generated by an object or a system. It allows the project to sense or detect any physical change of the temperature, producing either analogue or digital output. There are many different types of sensor that can be used in this project, all of these have different characteristic

depending on the actual application that can be use. Basically, a temperature sensor consists of two basic physical types.

- Contact Temperature Sensor Types = these types are required to be in physical contact with the object being sensed and use of monitor conduction changes in temperature. They can be used to detect solids, liquids or gases over a wide range of temperatures.
- Non-contact Temperature Sensor Types = these type uses convection and radiation to monitor changes in temperature. Usually solids, liquids or gases used as a monitor for temperatures.

Figure 2.2: Quails.

The conduct if the quail is the great sign whether the temperature under the introvert is too high or too low. On the off chance that the quail assembles around the introvert, the temperature is too low. On the off chance that they are scattered around the edge of the ranch, the temperature is too high. On the off chance that they move to the other side pen, there is presumably a draft. At the point when the temperature is correct, the quail will be equitably spread and seem dynamic and substance.

According to Mohd. Azri Azman et al, 2008, the rising of temperature in a poultry house are due to the hot weather, ammonia gas and carbon dioxide that come from the chicken manure. Brian Fairchild, 2011 proves that poultry house contained some gas that can increase the temperature.

Table 2.1: Characteristic of Closed Poultry House.

Gas	Symbol	Lethal	Desirable
Carbon Dioxide	CO_2	Above 30%	Below 1%
Methane	CH_4	Above 5%	Below 1%
Ammonia	NH_3	Above 500ppm	Below 40ppm
Hydrogen Sulfide	H_2S	Above 500ppm	Below 40ppm
Oxygen	O_2	Below 6%	Above 16%
Source: University of Kentucky			

Besides, in order to decide the suitable normal temperature range in a poultry house, it is need to know and understood what the effect on the chicken's performance is if temperature in the poultry house is reach a certain value. Because of that, the guide of the performance of chickens at different temperatures is referred as shown in the below table.

Table 2.2: Chicken Performance at Different Temperature.

Temperature (°C)	Performance of Chicken
<10°C	Depreciation to weight gain, a serious negative impact on the efficiency of feed conversion
10 °C - 23 °C	Low feed conversion efficiency
24 °C – 28 °C	The most suitable temperature range
29 °C - 35 °C	Food intake declined steadily, decreased weight gain. Cooling process must be applied before it reaches this temperature
35 °C - 38 °C	Heat Prostration is could happen. Safety measures may be required. Severely decreased food intake. Drinking water intake is very high
>38 °C	Emergency measures to cool the chicken is very necessary and very important factor in survival is at this temperature

The other literature review about the suitable temperature chosen for this heat controlling system is from the studies of Anne Fanatico, 2007 said that the body temperature of an adult chicken is between 40.6ºC to 41.7 ºC (105ºF and 107ºF). Based on this temperature, Anne Fanatico 2007 recommended that the temperature range for a poultry house is between 18ºC to 24ºC (65ºF to 75ºF), which allows the chickens to maintain their body temperature. If the temperature is above 24ºC or 75ºF, heat must be lost in some way. Furthermore, it also explained that chickens have no sweat glands, and since eating can increasing their body temperature, chicken reduce their feed intake during hot weather and therefore, gains will be less. Besides, chicken begins panting at 85ºF (29.4ºC) to help dissipate heat, and drink more to avoid dehydration. A combination of high temperature and high humidity is a problem, because panting does not cool them under this condition.

Then, according to N.J Daghir, 2008, it is mentioned that the thermo-neutral zone temperature for an adult chicken is around 18ºC to 23.9 ºC and when the

temperature of a chicken is in their thermo-neutral zone, the energy from the feed is used directed to help in growing, immune system development and reproduction. However, if the temperature of the chickens is below the thermo-neutral zone, energy from the feed is used as to generate the heat and not for the growth and development. Besides, Mohd. Azri Azman et al, 2008 mentioned that the range of temperature for a poultry house is about 24 ºC -28ºC. The table 2 below shows the summarization of temperature for a poultry house.

Table 2.3: Specification of Temperature.

SOURCE	TEMPERATURE (°C)
Anne Fanatico, 2007	18°C to 24°C
N.J Daghir, 2008	18°C to 23.9 °C
Mohd. Azri Azman et al. (2008)	24 °C to 28°C

Based on the above table, it is showed that there are three suggested range of temperature of a poultry house are given. Based on this information, the range of temperature that will be used for this project is based on Mohd Azri Azman et al, 2008 suggestion. This is because, it is noticed that this project will be applied in Malaysia, because of that, this temperature is chosen.

2.3 Humidity Control System

As indicated by H Ueda, Y Okamoto and H Noda, 2013, a humidity control framework incorporates three dehumidifiers. Each of the dehumidifiers on the other hand switches between first cluster operation in which air whose dampness has been caught up in a first adsorption part is provided to a room and air warmed in a warmth exchanger is depleted to outside the room during a time adsorption segment and second clump operation in which air whose dampness has been adsorbed in the second adsorption segment is provided to the room and air warmed in the warmth exchanger is depleted to outside the room through the primary adsorption segment. The

framework additionally incorporates a controller permitting the exchanging of the dehumidifiers to be performed at various timings and a chamber gathering air to be provided from the dehumidifiers to the room.

Humidity affects the rate of feather development as well as the incidence of respiratory diseases in the growing chick [5]. Low humidity often associated with Low humidity is often associated with reduced feather growth and poor plumage covering, while high humidity affects the respiration rate, particularly when the temperature is also high. When the quail is exposed to both high temperature and high humidity, it becomes unable to pant fast enough to dissipate its body heat and death frequently occurs. Therefore the humidity of the quail farm must be in the range between 60 and 70%.

Concurring on research of Alimuddin, Kudang Boro Seminar, I Dewa Made Subrata, Sumiati, Nakao Nomura about a Supervisory Control System for Temperature and Humidity in a Closed House Model for Broilers. That is a logical demonstrating of Dynamic Systems Control Temperature and Humidity in a poultry house. Assumptions used execution showing thoughts of temperature and sogginess are: 1) story and air temperature in the poultry house uniform, 2) air clamminess in the henhouse uniform, 3) encompassing air temperature and wetness uniform, and 4) characteristic conditions incorporating the poultry house taking after physical components, which affect the substance as a delayed consequence of correspondence between circumstances with fowls, 5) persisting state of the fluid structure is a settled time break, 6) obliged convection (control convection), 7) Numbers consistent coefficient of air (specific warmth, conductivity and consistency unfaltering air). As.

requirements be, to predict the temperature and relative clamminess are planned in a logical model poultry house under the law of essentialness equality as takes after.

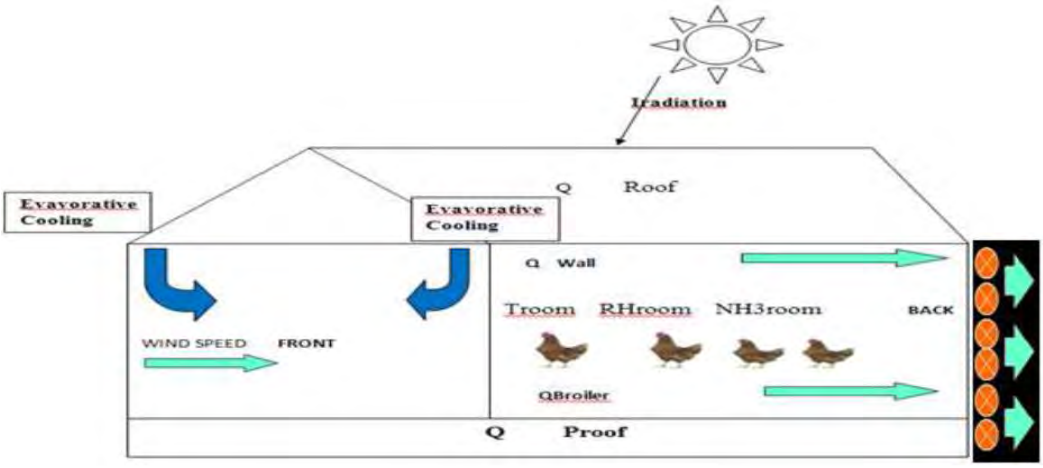

Figure 2.3: System Flow in the Closed Poultry Houses.

The figure 1 illustrate the concept modelling of poultry house. It is show the flow system wind in the poultry house. The wind will come in from the front and out at the back side. The fans which act as the output and blow out the ammonia in the poultry house.

2.4 Ammonia Intensity Control System

In light of the Yu Huang, Shiquan Tao Journal of Sensor Technology, 2011, ammonia sensors have extensive variety of uses for mechanical method control furthermore for environ-mental observing. An optical fibre alkali sensor test has been delivered by using a bowed optical fibre having double poly (methyl methacrylate) (PMMA)/chlorophenol red coatings as a transducer. This sensor test was striven for checking take after noticing salts in gas tests using air as test cross section. The reaction of noticing salts with CPR causes a shading change of the reagent, which was distinguished by using fibre optic evanes-penny wave absorption spectrometry as a recognizing signal. By grasping a double layer covering structure, the sensor test has snappier response appeared differently in relation to a sensor using an extensively recognized distinguishing reagent-immobilized polymer covering structure. The