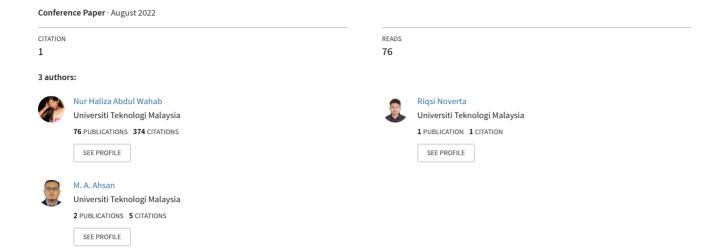# HYBRID SYSTEM ON TEMPERATURE AND HUMIDITY FOR SWALLOW NEST FARM VIA MOBILE APPLICATION IN INTERNET OF THINGS

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HYBRID SYSTEM ON TEMPERATURE AND HUMIDITY FOR SWALLOW NEST FARM VIA MOBILE APPLICATION IN INTERNET OF THINGS

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ABSTRACT

Swallows are poultry that is cultivated with nests as the main production. There are several types of swallows, one of which is Collocalia Fuciphaga, this species is a swiftlet that is capable of producing white nests. Swallow's nest production is influenced by environmental conditions. This condition consists of temperature and humidity in the habitat of the swallow. However, to achieve that high quality of nest, the farmers need to have the proper device and hard work to achieve. This system will have the solution for the farmers doing their swallow nest farms. This system will have an IOT device that will be put inside the building to read the temperature and humidity and can be monitored in the android mobile application with an alert. The devices can send the data of temperature and humidity to the mobile application if it is connected to the internet. Compared with the existing system, the proposed project has achieved better efficiency.

Keywords: Sensor, IOT, Temperature, Humidity, Monitoring

INTRODUCTION

Temperature and humidity are two important key factors in resulting in the best swallow nest that will be selling in the market [1]. The temperature and humidity can make the color and texture of the swallow nest will be in high or low quality. These two factors also can affect the swallow's comfort. And it can make the swallow will choose another building to make their nest. Nowadays, the swallow farmers still used manual hygrometers to measure the temperature and humidity inside the swallow building. Since not all of them have their building near the place where they lived it will take more time and energy to go to the swallow building just need to monitor the temperature and humidity in the building. Besides that, there are still many devices that the farmers can use for measuring the temperature and humidity. However, the price for that devices is quite expensive and not all the farmers can buy that devices for their current buildings. Aim for this project is i will measure the temperature and humidity inside the swallow farm building in real-time situations and can be monitored in mobile applications. for the alert

system, if the temperature or humidity is out of range it will send an alerts through the mobile applications.

METHODOLOGY

A. Internet of Things (IoT)

Internet of Things or IoT is the combination of two words, there is the internet and things [2]. First is the internet, the internet is a system that is globally used by many users around the world. It is worked by a computer that has an interconnected network that uses internet protocol (TCP/IP) to connect the users worldwide. Internet is a network that consists of millions of private, public, academic, government, and business local into the global scope that was linked by an electronic broad array, wireless, and technologies optical networking [3]. When the thing is, it can be referred to any object, person, animal, or anything that existed in the real world. To sum up, IoT is a concept or program where an object can transmit or send data over a network without using the help of computers and humans there are still many devices that the farmers can use for measuring the temperature and humidity. However, the price for that devices is quite expensive and not all the farmers can buy that devices for their current buildings.

B. Swallow Nest Farmer's Management

Based on an interview with some of the farmers, the way how they manage their farmers is mostly in the manual or traditional system. Some of them even did not care on their farms and did not check the temperature and humidity continuously, and its effect on their nest resulted in some of them having a bad quality or even the nest are cannot be sold. The temperature and humidity are some of the important keys to the swallow nest business. However, in daily situations, the farmers should not go inside the building as often as possible. The swallow is very sensitive to the different smells that come from the farmers. To keep the temperature and humidity inside the building, farmers usually used this handcrafted vaporizer as shown in Figure 1 to make the room have a cold and stable temperature and humidity. They just put the brick inside the bucket that was filled with the water and they believed it works to make the temperature and humidity stable. To harvest the nest, there should not be an egg or chicks inside the nest. If there is having an egg or chicks, it cannot be harvest. Where have a meaning to cultivate the number of swallow for the farmers building [5].

Figure 1. Handcrafted vaporizer

C. Temperature and Humidity

Temperature is the standard measure that usually can be notated as "cold" or "hot" whereas for the terms of scientific "heat" and "temperature." Also, humidity is the amount of vapor from the water that was present in a sample of gas that is expressed as volume or weight of water vapor per volume of gas or unit weight [4]. In the swallow nest industry, temperature and humidity inside the farm building are very important to achieve a good result in nest production by the swallow [1]. Based on the study, the temperature and humidity that are suitable for the building are respectively about 26°C to 31°C, and the humidity that is suitable for the building is about 80% to 90%.

D. Agile Methodology

Methodology that used is Agile. To ensure development time can finish at the exact time without having any resistance to the project, agile methodology is the most suitable method for this project. Scrum Agile methodology is open to changing requirements over time and facilitates continuous input from the end-users also it is more effective rather than other methodologies. Agile methodology has 6 phases, there are requirement, design, development, testing, deployment, and review.

RESULTS AND DISCUSSION

Table 1. Comparison of existing system

Existing systems	Study 1 [6]	Study 2 [7]	Study 3 [8]	My Study
Hardware	LCD, Temperature and humidity sensor, Speaker	NodeMCU 8266, DHT11, LCD Screen, Relay, Fan and Pump.	Adriano mega2560, DHT11, GSM Module	NodeMCU 8266, DHT11, LCD Screen
Main Features	Measure temperature and humidity.	Measure temperature and humidity, control the fan.	Measure temperature and humidity, alert to the database.	Measure temperature and humidity, alert to the user phone.
Software Used	No	Arduino IDE, Blynk	Arduino IDE, Database	Arduino IDE, Flutter, Firebase
Accuracy	±5% RH ±1.8 °F	±5%RH ±2 °C	±5%RH ±2 °C	±5%RH ±2 °C

From comparison table, there is still a lack of the technologies and features on their devices. There is still an improvement that should be done among the other 3 studies. Such as the implementation of an alert system in mobile applications.

Table 2. Hardware used

Hardware	Description
Laptop	A laptop will be used to configure the Node MCU ESP8266 and the coding session that will be needed in this project.
Node MCU ESP8266	Instead of having Arduino and Wi-Fi modules separately, the usage of the Node MCU ESP8266 can make the project cost less.
DHT11	DHT11 is a sensor that will capture the temperature and humidity inside the building and then will send it into the Node MCU ESP8266.
Breadboard	A breadboard is a place where all the components connect without having to do soldering.
LCD Screen	To show the status of the temperature and humidity on the device.
Cable Jumper	A cable jumper is an electrical cable that will connect the components without the need for soldering into the components.
Mobile Phone (Android)	The interface of the project will be installed and can execute all the features of the apps and only can be operated in the mobile phone with Android OS.

Table 3. Software used

Software	Description
Flutter	Flutter is an app where the code will be written in the dart to give an output result to the interface.
Firebase	Firebase is a platform to store the data in the database and the user authentication.
Figma	Figma is an application where the user can design the interface of their apps and will be easily converted into the dart files.
Arduino IDE	Arduino IDE is used as a tool to write the codes that will be installed into the Arduino.
Android Studio	Android Studio is an IDE for the android applications development that was based on the IntelliJ IDEA.

EXPECTED RESULT

This system will allow the user to register and login into their account by using their email and password or fingerprint.

The main feature of this system is to monitor the temperature and humidity, which will be divided into 3 colors based on the scale of the temperature or humidity. The color will be red if the temperature is higher than 31°C and/or humidity is lower than 80% and green if in stable condition and blue if the temperature is lower than 26°C. And based on the scale of the temperature and humidity, if it is lower or higher it will send an alert to the user's android phone.

Figure 2. Swallow applicaiton interfaces

Figure 3. Swallow applicaiton controlled interfaces

Another feature that this system has is to add the device to the application by typing the serial number that was already saved into the database, also the user can turn on or turn off the device from the application, and the last features in the history of the temperature and humidity.

CONCLUSION

Some processes that have been done in making this temperature and humidity monitoring system have achieved the goals. Where this system will have the purpose to help the swallow nest farmers to easier monitor the temperature and humidity inside their buildings. The design of the system was made as simple as possible to make the farmers easier to understand and the hardware that will be used in making this system is the most suitable for the swallow building based on some studies and easier to get in any marketplace. To sum up, the system objectives, system requirements, and system functionalities have been achieved during and after the development of this project.

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