Poultry House Tracking With IoT

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ABSTRACT

The use of Internet of Things (IoT)-based systems has recently been extended with incalculable Internet resources. The system exemplifies the development of novel systems that allow for remote control and monitoring regardless of distance or time. Temperature and humidity levels in a poultry house should be tracked on a regular basis to ensure the system runs smoothly. To prevent accidents that result in excessive temperature increases, it must be controlled 24 hours a day, seven days a week. This paper focuses on the IoT solution for monitoring temperature and humidity conditions, as well as the presence of electricity connectivity, at any time and in any place.

Keywords - Embedded system, Raspberry Pi, IoT, Mobile apps

I. INTRODUCTION

We cannot doubt the importance of the Internet of Things in the modern age of networking technology (IoT). It has the capacity to gather large amounts of data from any location at any time. The key concept behind the Internet of Things is to detect and collect data from the surrounding world, then exchange that data over the Internet for various interesting purposes.

IoT engineering is used by businesses in the manufacturing sector, and it is not limited to mechanical applications. The Internet of Things is in use all around us. “The Internet of Things can help some businesses achieve efficiencies, leverage information from a wide variety of equipment, boost operations, and increase customer satisfaction,” according to Lopez Research LLC. The Internet of Things would also have a major effect on people's lives. With more information and quicker communication of that information, it would enhance public safety, transportation, and healthcare.”

If the world moves toward emerging technology and the introduction of IoT, agricultural research is adopting IoT benefits in order to produce the best livestock. The majority of projects in this area employ a wireless sensor network (WSN) to collect data from various sensors deployed at various nodes. The data gathered includes details on the current state of the environment. Studies on poultry, for example, are conducted in a controlled environment where researchers must be concerned with livestock feeding status at an animal reproduction lab. They must keep an eye on the poultry shelter, watching for power outages, temperature anomalies, and humidity levels. The issue can emerge after

working hours, when the researcher needs to return to the poultry house to inspect the lab, especially the temperature and humidity levels. They must notify the caretaker or the lab assistant if an abnormality condition arises. Furthermore, there is no warning system in place to warn of changes in temperature or humidity in the poultry.

This paper proposes the use of IoT to aid animal research and examines how the research can be improved. The system sends real-time data and status from the sensor devices using a real-time database. The mobile application is being developed to allow users to access data and receive warning notifications.

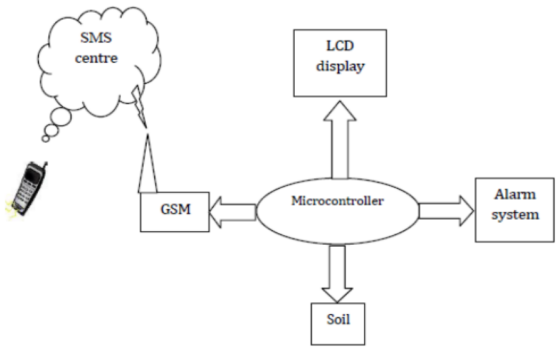

Figure 1. The smart farm empirical view [2].

II. RELATED WORKS

IoT is critical in today's world, especially in agriculture, where it is transforming the industry and enabling farmers to overcome enormous challenges. A smart farming system based on real-time soil humidity monitoring has been proposed. The device uses SMS to warn the soil humidity state, as shown in Fig. 1. The microcontroller serves as the system's repository, while the SMS centre provides cloud-based storage for alerting the user via phone. The device framework provides a more accurate pH rate and soil temperature rate, both of which are critical in horticulture. The temperature sensor, humidity sensor, and soil dampness sensor can all be connected to the microcontroller and used to evaluate additional data. The device, however, is not ideal for everyday use. Consider how annoying it would be if a user's phone received SMS from the device several times per minute. However, with some optimization, the concept can still be implemented. Since so many people nowadays use smartphones, it is more effective if the device can be monitored through a mobile application that enables the consumer to check the current temperature and humidity at any time.

The smart agriculture monitoring system has proposed IoT with various features such as GPS based remote controlled monitoring, moisture and temperature sensing, intruders scaring, stability, leaf wetness, and proper irrigation facilities. It employs WSN to track the soil and surrounding ecosystem in real time.

The job depicted in Fig. 2 is completed by. The device was created using TelG bits equipped with business temperature sensors and a CMOS camera, and is based on Advanced Telecommunication Technology (ATT). Temperature and disease control are the most important aspects of poultry farming production. The system is divided into three parts: I the checking station, ii) the multiplication station, and iii) the multiplication station. The gathered temperature and image data will be

transmitted through remote multi-bounce hubs and stored on a dedicated local server at the observing station. Multi-bounce hub invention is a significant preferred standpoint for the framework because it eliminates the ranch area impediment while expanding the transmission territory reach. The ranchers have different levels of access to the information and data from the put-away sensors thanks to the local server. It has complete control locally via activated WIFI devices, as well as the ability to remotely monitor and investigate the ranch's progress via a homestead's dedicated programming or web.

Figure 2. Wireless monitoring operation system in poultry farm [5].

These articles provide some insight into the concept and how it can be implemented using a variety of resources, computers, and hardware. The PIC microcontroller can be replaced with a Raspberry Pi with built-in Wi-Fi transmitter. If the data to be saved is just in kbs, Google Firebase can be the best option for a cloud and real-time database since it is free and has a wide room. Instead of using standard SMS APIs, a smartphone application becomes more suitable. As a result, Android apps could be the most suitable medium for implementing this scheme.

III. METHODOLOGY

The technology is being developed in order to meet the user's goals and requirements. Based on the study's goals, four criteria have been established. The usage case diagram in Figure 3 depicts conditions that were perfectly aligned with the needs of the users. In Figure 4, the Raspberry Pi runs three programmes (light sensor, temperature, and switch) at the same time, all of which are operated by the timer. When the Raspberry Pi boots up, these programmes run automatically.

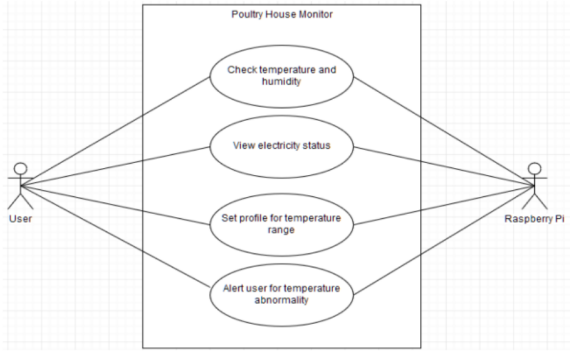

Figure 3. Poultry House Monitoring.

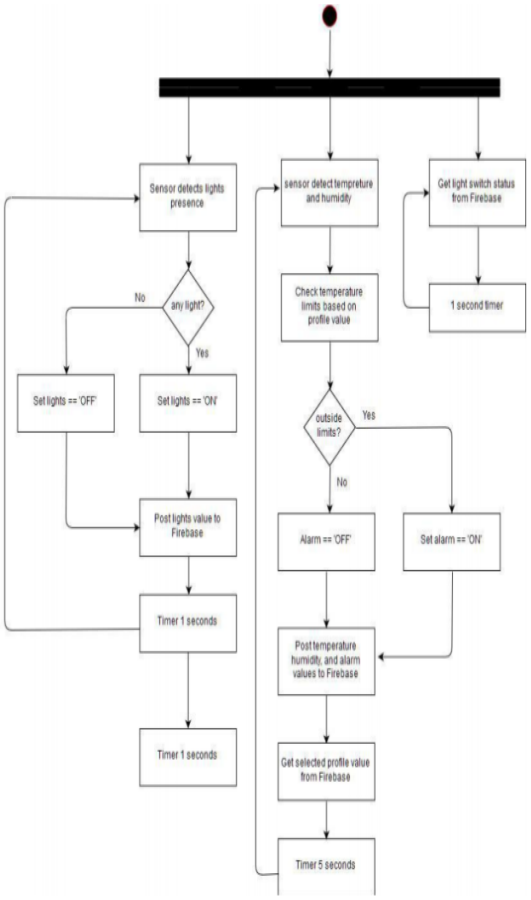

Figure 4. Raspberry Pi circuit activity diagram.

Figure 5 depicts the mobile application's phase flow since it has been launched. Since the programme is still running, there is no end protocol for retrieving data from Firebase until the Internet link is lost. Firebase is an online cloud storage subsystem in which all data is dynamically structured according to the program's post operation, whether it's from the Raspberry Pi or from the internet.

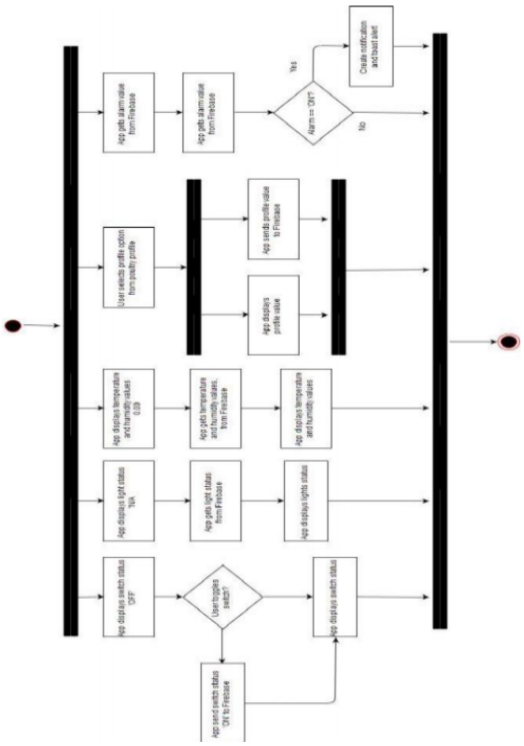

Figure 5. Activity diagram for the mobile application.

IV. IMPLEMENTATION

The Raspberry Pi microcontroller is the core interface used in the system's implementation. The machine monitors the situation at the poultry house on a continuous basis. The machine performed the following tasks:

1. Determining whether or not electricity is available.
2. Taking a temperature reading
3. Real-time reading by connecting to a cloud database.
4. Used a mobile app to send data to a smartphone.
5. If an abnormality happens, the customer will be notified.

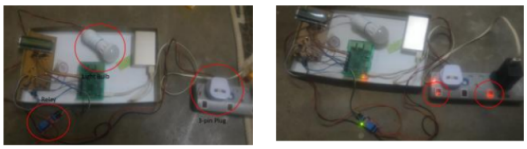

Figure 6. The setup of Raspberry Pi.

Figure 7. Poultry House Monitor Main Activity.

A. Raspberry Pi configuration

The Raspberry Pi must be set up and configured before the device can be implemented. Furthermore, the Internet Link is used to bind to the database, and it is often used. for the test on handheld devices Attach a power bank to the computer first. Set up a charging condition with a power extension cord. The power bank acts as a backup power supply (Uninterruptible Power Supply). If there is a power outage, the power bank will automatically turn on the Raspberry Pi, as seen in Figure 6. The 3-pin light bulb is then plugged into the electrical outlet. The light bulb serves as a gauge for the presence of electricity. For eg, if the light switch is switched on but no lamps are turned on, this indicates a "no power" state.

Finally, switching on both the Raspberry Pi and the light bulb switches. Inside 10 seconds, the Raspberry Pi begins booting up and immediately runs the Python scripts.

B. Poultry House Monitoring application

The main window of the application has such selection options, current temperature and humidity, lighting status and a switch toggle button to either turn on or off the light. The poultry profile lets the user select notification according to the suitable temperature. Fig. 7 shows the main activity of this application.

V. OUTCOMES

The device is inexpensive, convenient to use, and simple to set up. the benefits of the method The customer would be able to save time and money. cost of labour for inspecting the state of the poultry house using the cell phone. Figure 8 depicts the real-time storage data that would fit the data from the smartphone application as viewed from an Internet browser.

The toggle switch is set to on status and the light is switched on at the same time until they are paired, as seen in Figures 9 and 10. Figure 11 shows how to choose the poultry profile and the warning alert. Touch the poultry profile button on the main operation screen to complete both activities. After selecting a choice that does not fit the current temperature, wait a few seconds to see whether a message to alert the user appears, as seen in Fig. 11. The toast message will be shown on the computer if

the update is sent. The voice, vibration, and warning are all included with this notice.

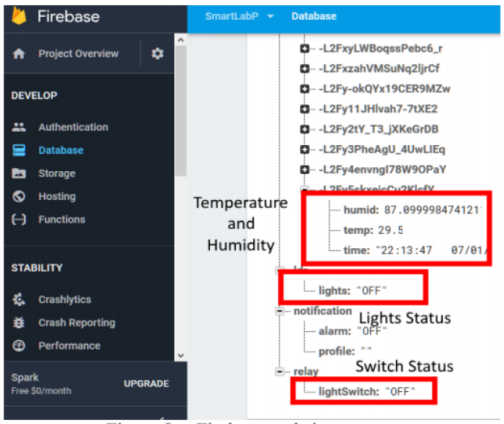

Figure 8. Firebase real-time status.

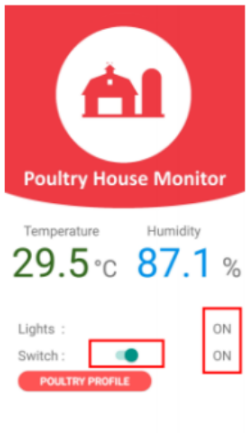

Figure 9. Indicator on mobile apps for light on.

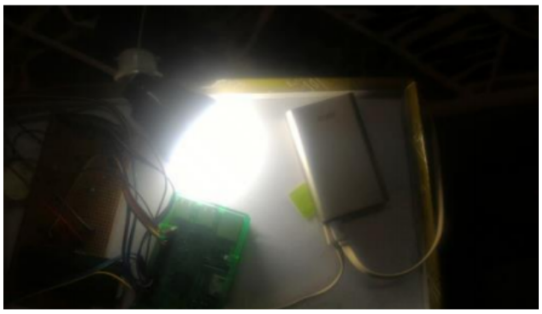

Figure 10. Light bulb turning on.

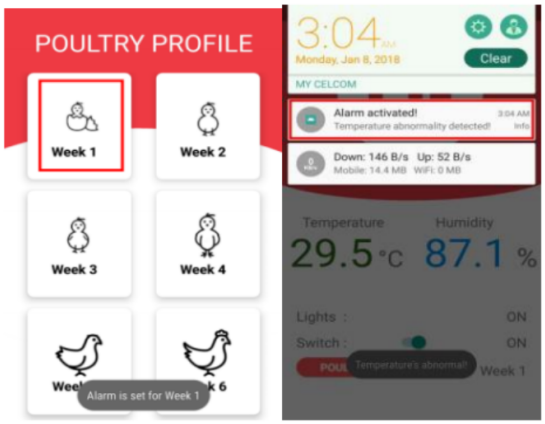

Figure 11. Profile Selection and Notification Alert.

CONCLUSION :

The Poultry House Monitor is an IoT-based app that allows you to monitor the temperature and humidity of your poultry house from your smartphone. As a result, based on the results, the consumer would be able to determine the state of the poultry. This machine can be used to monitor some kind of managed environment, not just poultry houses. It can also be used to monitor homes and workplaces. Enhancements can be implemented in the future to upgrade the device, whether in terms of hardware or software. This work can be expanded by using prediction functions for analysing the collected data in order to improve the results of research experiments and livestock production.

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