

Use of Arduino IoT Cloud Remote in Monitoring Temperature and Humidity for Egg Incubation

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1. Introduction

Egg incubation requires precise control of temperature and humidity to ensure healthy embryo development. Traditional methods often lack real-time monitoring and can be costly or intrusive. This research introduces an innovative solution using the Arduino IoT Cloud for remote monitoring, emphasizing cost-effectiveness and real-time data access. By integrating the ESP8266 Wi-Fi chip and DHT11 sensor, users can maintain optimal incubation conditions, enhancing success rates. Alerts via Telegram ensure timely intervention, addressing deviations from set parameters due to external weather conditions.

2. Methodology

The system employs an ESP8266 Wi-Fi chip and DHT11 sensor for accurate temperature and humidity readings. The Arduino IoT Cloud facilitates remote monitoring, with real-time data accessible via customizable dashboards and historical data logging. Telegram integration provides alerts for any abnormalities. Functionality and network testing were conducted to ensure system reliability, alongside evaluation through the Technology Acceptance Model (TAM).

3. Results & Discussion

The system demonstrated reliable real-time monitoring of temperature and humidity,

crucial for egg incubation. Functionality tests confirmed accurate sensor readings, while network tests ensured stable data transmission across various distances. Users found the system useful and easy to use, with TAM results indicating high acceptance. The integration of Telegram alerts proved effective, enabling prompt responses to environmental changes, thereby improving incubation outcomes. Figure 1 and Figure 2 illustrates the average results obtained

Scenario	Average response time for user to receive alert notifications via Telegram application (sec)
1	2.68
2	2.87

Figure 1. Average results obtained from Scenario 1 and Scenario 2.

Distance (meter)	Average response time for user to receive alert notifications via Telegram application (sec)
1	2.87
2	3.08
3	3.18
4	3.28
5	3.38

Figure 2. Average response time in different distances

4. Conclusion

This project provides a cost-effective, reliable solution for egg incubation monitoring using Arduino IoT Cloud and Telegram. Real-time data access and timely alerts enhance control and improve incubation success rates.

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