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Analysis Of Smart Monitoring Condition Room Planning Of British Education Center Medan File Room Using Blynk Software

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ABSTRACT
This study discusses the analysis of the planning of a smart monitoring system for the condition room for the file room at the British Education Centre Medan using Blynk software. This system is designed to monitor room conditions in real time, including temperature, humidity, and security, with the aim of maintaining the quality of file storage and preventing damage due to uncontrolled environmental changes. Blynk is used as the main platform for hardware integration with mobile applications, allowing users to access and monitor room conditions remotely via smartphone devices. The system planning process involves selecting appropriate sensors, designing communication networks, and setting up interfaces on the Blynk application. The results of this planning analysis indicate that the implementation of an IoT-based monitoring system such as Blynk can improve efficiency and accuracy in monitoring room conditions, as well as provide direct notification to users if an abnormal condition occurs. Thus, this system can help maintain the security and quality of files stored in the room, as well as offer a more effective and modern solution in managing the file room.

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INTRODUCTION

In the Industrial Revolution 4.0 Era, the Community's Need for Electrical Energy is Increasing, Where This is Due to Population Growth, Economic Growth, and Energy Consumption Patterns Themselves. Small and Large Industries Really Need Remote Monitoring Because It Will Be Very Profitable in Terms of Cost and Time, and Very Efficient, In This Case, the Author Creates a Title Remote Electrical Control as a Microcontroller That Will Be Installed in a Room That Will Later Be Temperature Controlled and Can Monitor Room Temperature Remotely Using Blynk Software. Blynk Will Be Installed From an Android Phone.

The Current Room Condition Monitoring System is an Important Need, Especially in an Environment That Requires Strict Supervision of Environmental Parameters Such as Temperature, Humidity, and Security. One Example is the File Room Used to Store Important and Sensitive Documents, Such as at the British Education Centre Medan, Where Changes in Environmental Conditions Can Negatively Impact File Integrity.

Here are the things that need to be known about the monitored room, namely the first desired room temperature, for example the ideal room temperature is 20 - 25 ° C and this greatly determines the quality of the plants in the room and the second is the humidity of the room, so the humidity of the room also greatly affects the room. If the humidity of the room is less than the standard, it will also be dangerous because it causes the plants to die, so this is the function of the blower / shower in the nursery room, namely specifically helping to regulate temperature and humidity.

In monitoring the room remotely, Blynk software is needed, where Blynk will help monitor the room temperature, Blynk is an iOS or Android operating system platform as a control on the Arduino module, Esp8266 and other similar devices via the internet (Blynk, 2017) and this software will control the Arduino module.

Therefore, a system is needed that is able to monitor room conditions in real time and provide notifications if changes occur that have the potential to damage files. In Current Technological Developments, the Concept of the Internet of Things (IoT) Has Allowed Various Devices to Connect and Communicate Through the Internet Network. One of the Popular and Easy-to-Use IoT Applications is Blynk, a Platform That Allows Users to Design a Remote Monitoring System Based on a Mobile Application. Blynk Supports Integration with Various Programmable Sensors to Monitor Environmental Conditions and Send Data in Real-Time to User Devices. This Study Aims to Analysed the Planning of a Smart Condition Room Monitoring System Using Blynk Software in the British Education Centre Medan File Room. This System is Designed to Monitor Temperature, Humidity, and Room Security, and Provide Warnings Through a Mobile Application if Abnormal Conditions are Detected. The Implementation of this IoT-Based Monitoring System is Expected to Increase Efficiency in File Room Management and Maintain the Quality of Stored Documents. With this Background, This Study Focuses on the Planning, Design, and Implementation of a Blynk-Based Monitoring System, as well as Analysing the Benefits and Challenges Faced in Its Implementation. The results of this study are expected to provide effective and modern solutions in room condition management, as well as being

Literature Review

Microcontroller

A microcontroller is a chip that functions as an electronic circuit controller and can generally store programs. Microcontrollers generally consist of a CPU (Central Processing Unit), memory / RAM, certain I / O (input / output) and supporting units such as Analog-to-Digital Converter (ADC) which are already integrated in it. As in the picture below we can see:

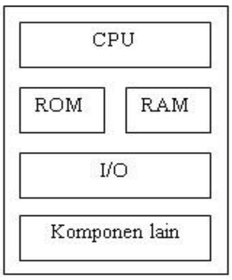

Figure 1. Microcontroller Layout

A microcontroller is a component of an IC circuit that can be programmed and adjusted to the desired electronic system circuit component. For example, DT51, AT89C51, AT89S51, ATmega2560. Microcontrollers can also be used to control electricity usage, fire hazards, and feed control.

Arduino Uno is an Arduino that uses the ATmega328 microcontroller. Arduino Uno has fourteen digital pins, six pins can be used as PMW outputs, six pins are used as analogue inputs, a sixteen MHz crystal oscillator, a USB connector, a voltage source connector, an ICSP header, and a reset button. And Arduino Uno has a large area in everything needed to support a microcontroller-based application.

Arduino Uno has advantages compared to other microcontroller boards, namely that it has its own programming language, namely the C language program. In addition, the Arduino Uno board also has a USB loader, making it easier for us to create programs with microcontrollers in Arduino Uno. While what we often find on other microcontroller boards still requires a separate loader circuit to enter programs and can also function as a serial communication port. Arduino Uno has twenty I/O pins consisting of six analogue input pins and fourteen digital input/output.

The programming language used by Arduino is a C language program that has been simplified into syntax language, so we can easily learn and explore the components of the microcontroller. The advantages of Arduino itself can be seen by comparing the microcontroller board, which is open source. In addition, the Arduino Uno board has a loader in the form of USB, making it easier for us to program the microcontroller in the Arduino Uno.

While what we see is that most microcontroller boards still require a separate loader circuit to enter the program when we program the microcontroller. The USB port, in addition to being a loader when programming, can also provide many benefits for us in using this board, because with the open source nature of the components we use, it does not only depend on one brand, but allows us to use all existing components.

The components in Arduino consist of an 8-bit microcontroller with the AT-mega brand. The Arduino Uno board uses different types of AT-mega depending on its specifications, for example, the Arduino Uno uses ATmega328 while the Arduino ATmega2560 uses Atmega2560. Arduino Uno is a microcontroller board based on the AT-mega 328.

Arduino Uno has 14 digital input/output pins (6 pins are used as PWM outputs), 6 analogue input pins, as a 16 MHz crystal oscillator, as a USB connection, as a power jack, as an ICSP header, and as a reset button. Arduino Uno helps the performance required by the microcontroller, can easily connect it to a computer with a USB cable or to an AC to DC adapter to get started.

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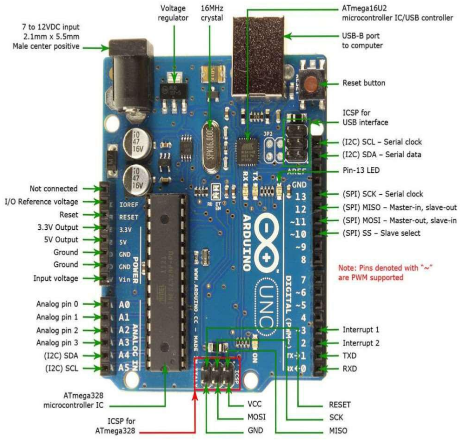

Figure 2. Arduino Uno

The Arduino Uno has a number of facilities for communicating with a computer, another Arduino, or another microcontroller. The ATmega328 provides UART TTL (5V) serial communication, which is available on digital pins 0 (RX) and 1 (TX). The Arduino firmware uses the standard USB COM driver, and no external drivers are required. However, on Windows, this file is required. The Arduino software includes a serial monitor that allows simple data to be sent to the Arduino board. The RX and TX LEDs on the board blink when data is being sent via the USB-to-serial chip and the USB connection to the computer.

Arduino Software

The software used in creating program listings is Arduino-IDE (Integrated Development Environment), which is software that is native to the Arduino itself. In the Arduino-IDE software, the process of compiling and uploading programs created into the Arduino microcontroller can be carried out. The Arduino programming language is usually called a sketch and is created using the C language program. Simply put, sketches in Arduino are divided into 2, namely setup and loop.

1. The setup function is only called once when the program is first run. The setup function is used to define the pin display or start serial communication. The setup function must be included in the program even if no statements are executed.
2. Loop After the setup function, it will directly perform the loop function sequentially and carry out the instructions in the loop function.
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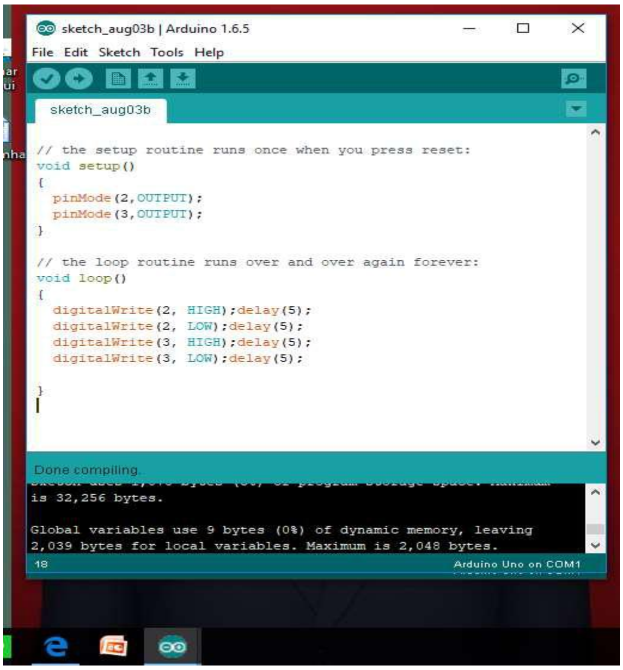

Figure 3. Arduino. Ide

METHOD

The research conducted is a descriptive study with a qualitative approach. Qualitative methods are research methods used to research natural object conditions that do not attempt to find the influence of certain variables on other variables where the researcher is the key instrument. Qualitative research objectively confirms the subjective statements of the subjects. The purpose of qualitative research is to obtain the results of temperature and humidity settings in the British Education Centre English tutoring room revealed from the perspective of the perpetrator, not to assess the subject and his background with external criteria of the perpetrator. based on notes about the ideal room temperature when obtaining information in the study. Figure 1 is a research process with observation and an inductive approach that has been implemented at the British Education Centre, where this research begins by analysing the problems that occur in obtaining and studying data for tool design. Problem solving is the process of getting a solution to the problem and Tool design is a process that considers all aspects of the need to maintain a good room temperature and monitor it remotely. And there is a conclusion, namely the results of the tool design that can overcome these problems by creating an ideal room temperature and facilitating monitoring of room temperature remotely. This research was conducted at the British Education Centre English language institution, for this research was carried out in September - October 2024. The components used consist of Wemos D1 R1, DS18B20 temperature sensor, Breadboard, 1k Resistor, jumper cable and Buzzer. The design flow of the tool is shown in the Figure below: Field researchers and objective and subjective reflections when collecting data. Qualitative research is essentially a more technical research where researchers tend to use inductive methods.

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At the design stage of the Air Conditioner control and monitoring tool, namely by determining the components of the tools and materials that will be used to make the tool such as the DHT11 temperature sensor, Node-MCU, Infrared. After determining the electrical components, then create a hardware block diagram.

Figure 4. British Education Centre.

After designing the block diagram, the next step is to assemble all the electrical components according to the block diagram in Figure 6. Then continue testing the tool to find out whether the tool works properly. Testing is carried out on each component, including:

a. Testing the connection between NodeMCU and temperature sensor
b. Test connection between NodeMCU and Infrared Receiver
c. Test connection between NodeMCU and Infrared Transmitter

The monitoring system testing is carried out after the design and assembly process on the device is complete. This test aims to determine whether the device works and can display what we want on the monitoring device, namely the smartphone. This test is carried out on the Android Blynk application to monitor the temperature in the room.

RESULT

Tool Design

After knowing the tools and materials that will be used to complete the tool. The next step is to start the initial design in the form of designing the tool scheme that will be made. To create a scheme, you can use an application that supports the creation of electronic schemes and here the application we use is Fritzing on a laptop or computer. In the following figure 4. is a picture of the control circuit on the tool to be made. The tool will use NodeMCU as a microcontroller board and an infrared transmitter will be installed.

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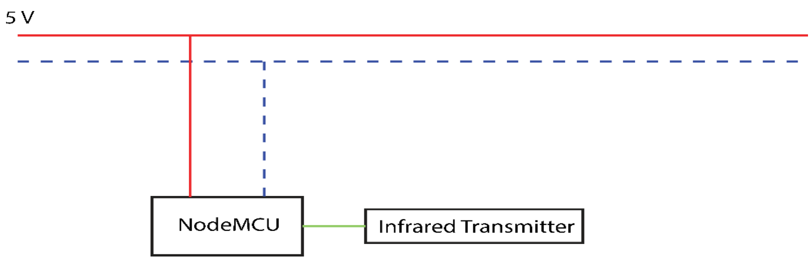

Figure 5. Control circuit on the tool

After knowing the control circuit on the air conditioner and the tool that we will make, next we make a tool schematic as in Figure 5 below.

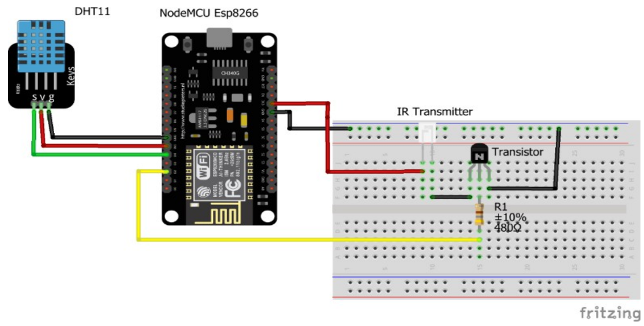

Figure 6. Tool scheme

System Control

System Control that describes or explains the steps to solve a problem. The purpose of writing a flowchart is to facilitate the reading of the systematic sequence in working on the tool so that the work is neater and more orderly.

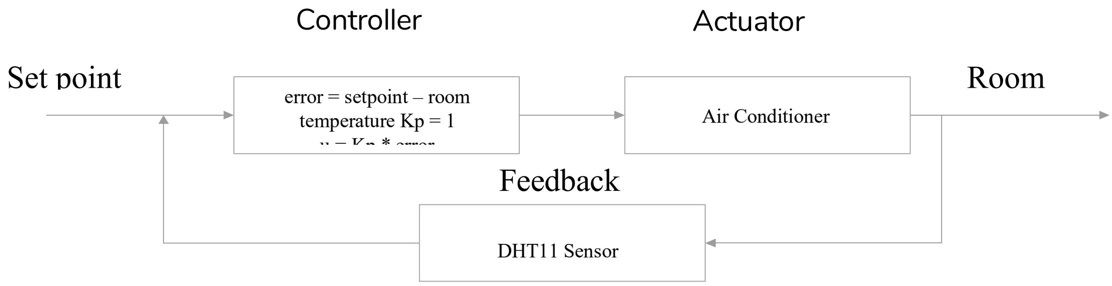

Figure 7. block diagram of the control system

DHT11 Temperature Sensor Design

The DHT11 sensor is a sensor used to measure the temperature value in a room where the output value of the sensor is in the form of a digital voltage which is then processed on the NodeMCU board. After knowing the schematic of the tool that we will build, the next step is to design a DHT11 temperature sensor circuit to the Node-MCU board to find out if the sensor is functioning properly. Based on figure 7 the following is the DHT11 circuit to the board

Node-MCU.

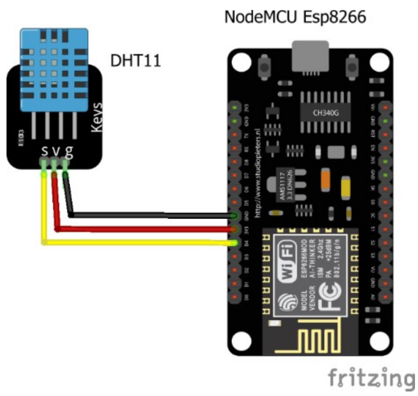

Figure 8. DHT11 circuit

Figure 7 shows a series of temperature sensor tests using the DHT11 temperature sensor. For the circuit connection, see the following DHT11 temperature sensor circuit schematic table:

Table 1. DHT11 and NodeMCU temperature sensor circuit

DHT11 temperature sensor pins	NodeMCU Pins
Pin S	Pin D4
Pin V	Pin 3.3
Pin G	Pin g

After the design of the DHT11 sensor to NodeMCU is complete, the next step is testing the temperature sensor. Testing is done using the program on NodeMCU. Writing the program code is done on the Arduino IDE application with the following program code.

```
#include "DHT.h"
#define dht_pin D4
#define DHTTYPE
DHT11
DHT dht(dht_pin, DHTTYPE);
int temperature;
void setup(){
Serial.begin(9600);
dht.begin(); }
void loop() {
temp = dht.readTemperature();
Serial.print("Temperature = ");
Serial.print(temp); Serial.print(" C");
Serial.print("\n");
delay(2000); }
```

After the DHT11 temperature sensor circuit with NodeMCU is complete and the program code is successfully uploaded to the NodeMCU board, then see the results of the

DHT11 temperature sensor reading on the serial monitor on the Arduino IDE. And the results obtained can be seen in Figure 9 below.

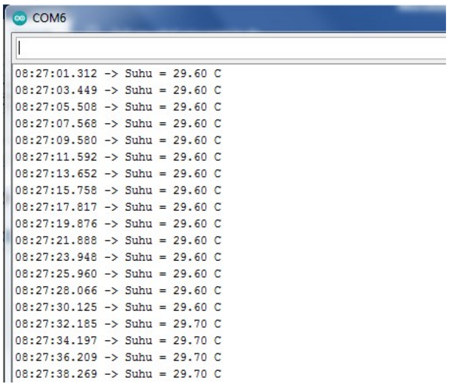
COM6
08:27:01.312 -> Suhu = 29.60 C
08:27:03.449 -> Suhu = 29.60 C
08:27:05.508 -> Suhu = 29.60 C
08:27:07.568 -> Suhu = 29.60 C
08:27:09.580 -> Suhu = 29.60 C
08:27:11.592 -> Suhu = 29.60 C
08:27:13.652 -> Suhu = 29.60 C
08:27:15.758 -> Suhu = 29.60 C
08:27:17.817 -> Suhu = 29.60 C
08:27:19.876 -> Suhu = 29.60 C
08:27:21.888 -> Suhu = 29.60 C
08:27:23.948 -> Suhu = 29.60 C
08:27:25.960 -> Suhu = 29.60 C
08:27:28.066 -> Suhu = 29.60 C
08:27:30.125 -> Suhu = 29.60 C
08:27:32.185 -> Suhu = 29.70 C
08:27:34.197 -> Suhu = 29.70 C
08:27:36.209 -> Suhu = 29.70 C
08:27:38.269 -> Suhu = 29.70 C

Figure 9. Results of the DHT11 experiment

If the serial monitor on the Arduino IDE successfully displays the value of the DHT11 temperature sensor, the next step is to test the performance of the DHT11 temperature sensor. Testing is done to determine the accuracy, response and error of reading the DHT11 temperature sensor. Testing is done by comparing the temperature value read on the DHT11 sensor with the thermometer value in the same room. Testing is done in a room measuring 4x2 meters and testing is done for 30 minutes at 10.30 am. The results can be seen in the following table.

Table 2. DHT11 sensor test results

O'clock	Temperature thermometer(°C)	Temperature sensor DHT11(°C)	Temperature difference (°C)	Presentation *error (%)*
10.30	26.3	26.5	0.2	0.7
10.35	26.2	26.3	0.1	0.3
10.40	26.2	26.3	0.1	0.3
10.45	26.3	26.4	0.1	0.3
10.50	26.3	26.3	0	0
10.55	26.3	26.3	0	0
11.00	26.3	26.4	0.1	0.3

Table 2 is a table of DHT11 sensor testing in a room. The test was conducted at 10:30 to 11:00. and the temperature value on the thermometer and also the temperature value on the DHT11 temperature sensor were obtained.

Monitoring System Testing

Testing of the monitoring system is carried out to determine whether the device can send data to the smartphone and whether the data can be displayed on the smartphone. The application used is Blynk. How to test monitoring on the Blynk application as follows.

1. Download the Blynk application on the Playstore by clicking Blynk in the search or directly to the blynk.io website. After the application is installed on the smartphone, open the Blynk application.
2. Then login to Blynk by creating a new account or using your Facebook account.

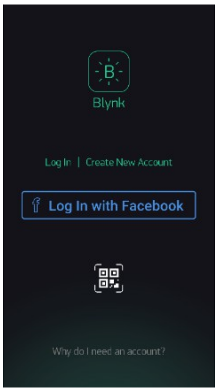

Figure 10. Blynk application login menu

3. After entering the application, click new project. Then enter the name of the project to be created, select the device to be used and the dark or light display theme. When finished, click Create.

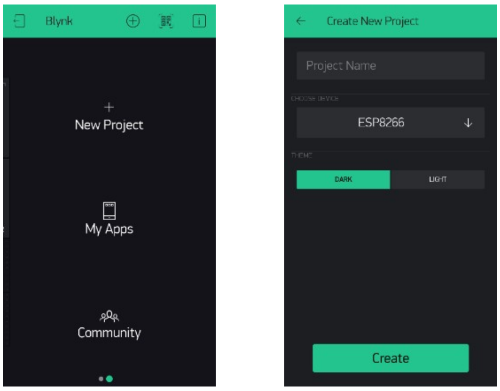

Figure 11. New project creation menu

4. After you click create, the authentic code from Blynk will automatically be sent to our account email. To find out the authentic code, you can see by logging into your email and you can see that there is an email sent from Blynk.

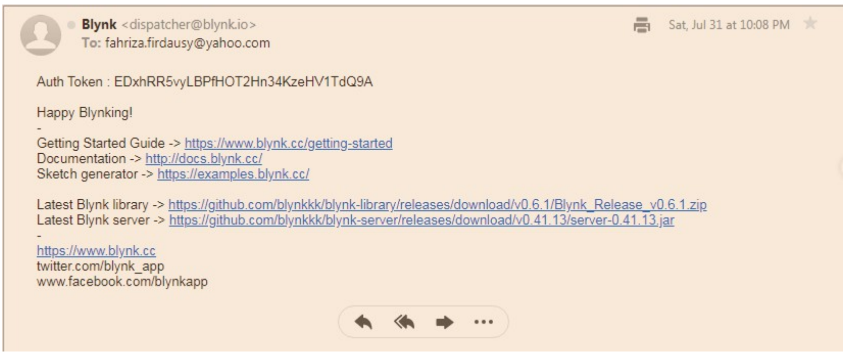

Figure 12. Authentic code email

5. Next, in the Blynk application, click add to add a widget or tool that we will use. The use of tools on Blynk is limited to new users getting 2000 batteries, each tool has a different battery value. If the battery usage has run out, we need to add it by paying a

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minimum of Rp 41,000. The widget that will be used for the monitoring system is as shown in Figure 4.12 below.

Figure 13. Monitoring display on the Blynk application

After creating a monitoring display in the Blynk application on the smartphone, the next step is testing the monitoring system of the tool. Next, create a code so that the tool can perform monitoring. The code is as follows.

Testing the tool to reduce the temperature with a setpoint value of 24

Testing the tool to reduce the temperature with the desired temperature value in the room/setpoint, namely 24 and the amplifier value (Kp) varies 0.5, 1 and 2. The results of the experiment can be seen in Figure 13 below.

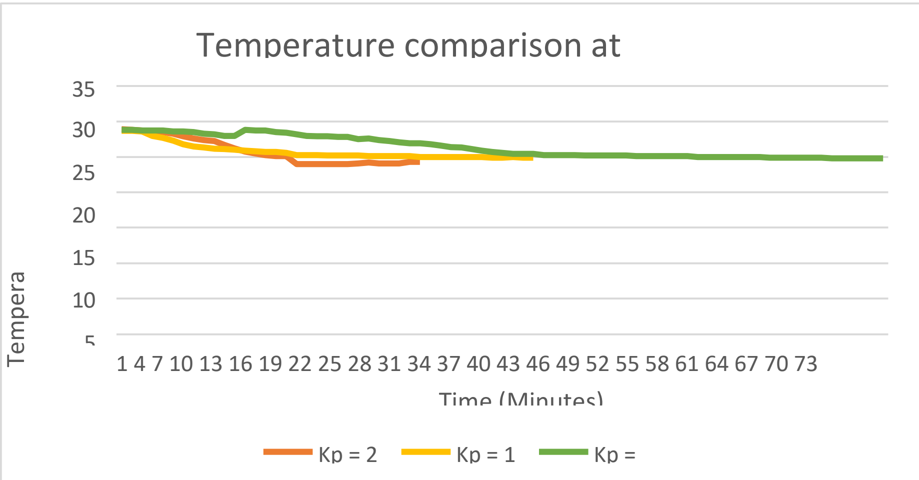

Figure 14. tool response graph at setpoint 24

Analysis: the tool test was carried out at setpoint 24 and the amplifier value (Kp) = 0.5. In Figure 4.15 it can be seen that at the beginning of the test the room temperature was 28.7°C. The graph shows that it took 40 minutes to reach the rise time and 67 minutes to reach the settling time of the setpoint value of 24 and the difference between the input and output on the graph is 24 - 24.8 = -0.8. Furthermore, the tool test for the value of Kp = 1. In Figure 4.15 it can be seen that at the beginning of the test the room temperature was 28.7°C. The graph shows that it took 18-20 minutes to reach the rise time and 25 minutes to reach the settling time and the difference between the input and output values is 24 - 24.9 = -0.9.

The last test of the tool with the amplifier value (Kp) = 2. In Figure 4.15 it can be seen that at the beginning of the test the temperature in the room was 28.9°C. In the graph it can be seen that it took 16 minutes to reach the rise time and it took 17 minutes to reach the settling time setpoint value of 24 and the difference between the input and output values is 24 – 24.3 = -0.3.

CONCLUSION

The analysis of the smart monitoring system for the file room at the British Education Center Medan, implemented using Blynk software, has demonstrated that an IoT-based approach can significantly enhance real-time monitoring and management of room conditions. The system is capable of continuously tracking critical environmental factors such as temperature, humidity, and security. Through the integration of sensors with the Blynk platform, real-time data can be visualized and alerts can be sent to users in case of deviations from predefined thresholds, ensuring the safety of important documents. This smart monitoring system offers several benefits, including improved efficiency in maintaining optimal room conditions, timely notifications to prevent potential damage to files, and the ability to access data remotely from any location via mobile or web platforms. The use of Blynk software for the system interface makes the monitoring process user-friendly and customizable. Furthermore, the system provides a cost-effective and scalable solution, allowing for future enhancements without significant additional costs. Overall, this project proves that IoT technology can effectively address the challenges of room condition monitoring, providing a reliable and accessible solution for file management.

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