JURTEKSI (Jurnal Teknologi dan Sistem Informasi) ISSN 2407-1811 (Print)
Vol. IX No 3, June 2023, hlm. 509 - 514 ISSN 2550-0201 (Online)
DOI: https://doi.org/10.33330/jurteksi.v9i3.2459
Available online at http://jurnal.stmikroyal.ac.id/index.php/jurteksi

UTILIZATION OF IOT TECHNOLOGY FOR TEMPERATURE MONITORING SYSTEM ON STMIK ROYAL COMPUTER LABORATORY

Adi Mas Afandi [1*] , Kamal Ramadhani [2]
[1]Sistem Komputer, STMIK Royal Kisaran
[2]Sistem Informasi, STMIK Royal Kisaran
email : *adimasafandi@gmail.com

Abstract : Air conditioner is an important component in a room nowadays. Due to its function as a regulator of air circulation in a room that was previously hot and stuffy, it becomes cool and comfortable. STMIK Royal Kisaran which is one of the tertiary institutions in the field of computers which has lots of air conditioners in each room, both in the theory room and in the laboratory room. Where the control and monitoring is still done manually, namely through a switch or remote control . This becomes a problem that arises when there is negligence in extinguishing it or in the ignition process. So we need a system that can turn on the air conditioner in every theoretical room or laboratory room remotely. So that the work feels lighter and more effective. In designing this control system, a NodeMCU ESP8266 module is used, which acts as the brain of the remote control system and with a DHT11 temperature sensor that can monitor room temperature. The IR Transmitter sensor acts as a connecting medium between the NodeMCU ESP8266 module and the Air Conditioner engine to regulate the temperature. So that in this way, this control system can make it easier for officers to control the Air Conditioner in the STMIK Royal campus room.

Keywords : air conditioners; dht11; internet of things; nodeMCU esp8266.

Abstrak*: Air conditioner* merupakan sebuah komponen penting pada suatu ruang di jaman sekarang ini. Dikarenakan fungsinya sebagai pengatur sirkulasi udara di dalam ruangan yang sebelumnya panas dan pengap menjadi sejuk dan nyaman. STMIK Royal Kisaran yang merupakan salah satu perguruan tinggi dibidang komputer yang memiliki banyak sekali air conditioner di setiap ruangannya, baik pada ruang teori serta diruang laboratorium. Di mana pada pengontrolan dan pemantauannya masih secara manual, yaitu melalui sakelar atau remot kontrol. Hal ini menjadi satu persoalan yang timbul ketika terjadi kelalaian dalam memadamkannya ataupun dalam proses penyalaannya. Sehingga dibutuhkan sebuah sistem yang dapat menyalakan air conditioner di setiap ruang teori maupun ruang laboratorium dengan jarak jauh. Sehingga pekerjaan tersebut teras lebih ringan dan efektif. Dalam perancangan sistem kendali ini digunakan sebuah modul NodeMCU ESP8266, yang berperan sebagai otak dari sistem pengendalian secara jarak jauh dan dengan sensor suhu DHT11 yang dapat memantau temperatur suhu ruangan. Sensor *IR Transmitter* sebagai media penghubung antara modul NodeMCU ESP8266 ke mesin Air Conditioner untuk mengatur temperatur suhu. Sehingga dengan demikian, sistem kendali ini dapat mempermudah petugas dalam mengontrol Air Conditioner di ruangan kampus STMIK Royal.

Kata kunci : air conditioner; dht11; internet of things; nodeMCU esp8266.

JURTEKSI (Jurnal Teknologi dan Sistem Informasi) ISSN 2407-1811 (Print)
Vol. IX No 3, June 2023, hlm. 509 - 514 ISSN 2550-0201 (Online)
DOI: https://doi.org/10.33330/jurteksi.v9i3.2459
Available online at http://jurnal.stmikroyal.ac.id/index.php/jurteksi

INTRODUCTION

The development of technology has progressed very rapidly which has an impact on our lives today. This is marked by the existence of various electronic equipment that has been created and can be operated automatically [1] . This technological advancement has a good impact on human life, because human work can be more effective and efficient in terms of execution. One of the impacts of technological developments also has an influence on electronic room temperature control devices, namely air conditioners (ACs) [2] .

Air conditioner is an important component in a room today. Because the main function of the air conditioner is to condition the air temperature in the room [3] . STMIK Royal Kisaran is one of the campuses that always uses Air Conditioner as a room temperature regulator. But in practice it is still done manually via switches or remotes in each room.

Internet of things which is a technological concept that aims to provide convenience for users in utilizing internet network connecti-vity in controlling various electronic devices [4] . The internet of things can also be described as a medium that connects electronic objects such as smartphones, internet television, sensors and actuators and other electronic devices together and makes it possible to communicate directly remotely [5] .

Temperature and humidity are two measurement objects that are often found in data acquisition. There are many sensor devices that are often used in the environment around us, including the DHT11 sensor [6] . The DHT 11 sensor is a sensor that is often used in electronics projects in monitoring temperature and humidity in a room or laboratory [7] . Of course, by combining the DT11 temperature sensor and integrating it with the ESP8266 module, you can monitor and control the temperature in the STMIK Royal range computer laboratory room. So that the main purpose of designing and manufacturing this tool will make it easy for room staff to control and monitor the temperature in every room on the STMIK Royal campus.

METHOD

This research was conducted in one of the laboratory rooms on the STMIK Royal Kisaran campus. It took 3 months in this research process. Where from April to June 2023. The focus of this research is to design and build an IOT-based remote control and monitoring system for temperature in the room which in this study controls the air conditioner in the computer laboratory room.

The NodeMCU ESP8266 module which is an electronic media that acts as the main component of the Air Conditioner control system remotely using internet-based communication [8] . This module is also often called the Internet Of Things-based control media, which in this module uses an ESP8266 chio microcontroller as the control module [4] . With the support of the DHT11 sensor, which is a room temperature detection sensor in the STMIK Royal Kisaran computer laboratory.

In this research process there are several stages, one of which is the stage of direct observation of the research location (observation). Where this stage sees firsthand what needs are needed in

JURTEKSI (Jurnal Teknologi dan Sistem Informasi) ISSN 2407-1811 (Print)
Vol. IX No 3, June 2023, hlm. 509 - 514 ISSN 2550-0201 (Online)
DOI: https://doi.org/10.33330/jurteksi.v9i3.2459
Available online at http://jurnal.stmikroyal.ac.id/index.php/jurteksi

the STMIK Royal Kisaran computer laboratory. Next is an analysis of the design of room temperature monitoring and control tools using internet communication. After that, the design of a tool or control system was carried out using the NodeMCU ESP8266 module and the DHT 11 Temperature Sensor. IR Transmitter sensor as a link between the control system and the Air Conditioner. Where this sensor uses infrared communication as a medium for sending high or low data [9] .

The final stage is to test the control system that has been desi-gned before. This stage is a determination of the feasibility of the designed control system, whether the control system can be used and implemented or vice versa.

RESULT AND DISCUSSION

To make it easier to analyze the circuit, a block diagram is created as shown below :

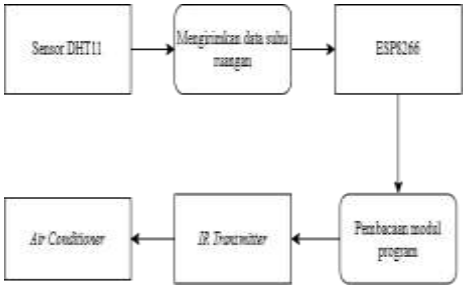

Image 1Data Flow Diagram

Image 1 shows that DHT11 as an entity will send room temperature data to the ESP8266 microcontroller then continue reading the program module to get results which will be forwarded via the IR transmitter and will be received by the air conditioner (AC).

ESP8266 is a microcontroller that has a variety of functions but low power and on board there is already integrated wifi [2] . In this study, wifi on the ESP8266 is used as a link between the controller and the air conditioner to be controlled, besides that this study will use a temperature sensor that will detect room temperature and send data in real time to the ESP8266 which can be seen and controlled by the controller [11] .

The DHT11 sensor is a sensor with a digital signal calibration that can provide temperature and humidity information supported by the Negative Temperature Coefficient (NTC) thermistor [2] .This sensor has the ability to respond quickly to the microcontroller and is also equipped with low production costs (low cost).

IR Transmitter is an electronic component that can identify infrared light specially made in one module as an IR Detector Photomodule which is a digital infrared detector chip and contains a photodiode and amplifier inside [12] . In the transmitter is built an infrared LED and when compared to ordinary LEDs, this infrared LED has a visible signal.

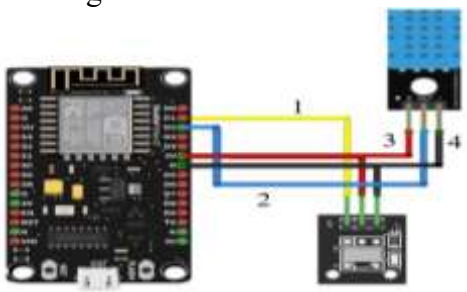

Image 2Overall System Configuration

From the whole series it can be concluded that the system configuration between ESP8266 with DHT11 and IR Transmitter in the scheme designed by the author, DHT11 and IR Transmitter will be connected to ESP8266 with predetermined pins [13] .The IR Transmitter will work by providing coded data that has been obtained and DHT11 works by detecting the ambient room temperature [1] .

JURTEKSI (Jurnal Teknologi dan Sistem Informasi) ISSN 2407-1811 (Print)
Vol. IX No 3, June 2023, hlm. 509 - 514 ISSN 2550-0201 (Online)
DOI: https://doi.org/10.33330/jurteksi.v9i3.2459
Available online at http://jurnal.stmikroyal.ac.id/index.php/jurteksi

ESP8266 testing

This test just wants to see if the circuit is working properly. The test is carried out using an LED which will be connected to the GPIO5 (D1) pin of the ESP8266, then a program is entered that will turn the LED on and off.

Table 1ESP8266 test results

Voltage	Status	Information
3VDC	HIGH	Life
3VDC	LOW	Dead

DHT11 testing

In this study DHT11 serves as an input to take temperature readings in the room. Tests carried out on DHT11 are by connecting DHT11 to the GPIO4 pin on ESP8266 so that DHT11 can be controlled with commands that have been made via serial data received by ESP8266. When DHT11 is on and reading ambient room temperature.

Table 2DHT11 Test Results

Component	Condition	Voltage
DHT11	HIGH (1)	3 VDC
DHT11	LOW (0)	0VDC

IR Transmitter Testing

In this study the IR transmitter functions as an infrared sender to the AC. The test carried out on the IR transmitter is by connecting the IR transmitter to the GPIO5 pin on the ESP-8266. Then the thing to do is open the serial monitor on the Arduino IDE, then press the button on the AC remote you want to retrieve the code while pointing at the IR transmitter. Each button on the remote has its own code.

Table 3IR Transmitter Test Results

Component	Distance	Results
IR Transmitters	< 100cm	Succeed
IR Transmitters	>100cm	Fail

Air conditioning (AC) temperature control system testing

Air conditioner temperature control system is carried out to find out whether the device can transmit and display data to the device. The application set to be used is made using a codular application. Applications from kodular.io that have been made on the kodular.io website can be used directly using the companion available on the Android Play Store.

Image 3Temperature Control

Image 4. Testing the ON Button

In the picture is the result of testing the tool to turn on the air conditioner (AC) using the ON button on the device application. If the ON button on the application is pressed, the application will send data 0 to the database . After that the system will read the data in the database then the

JURTEKSI (Jurnal Teknologi dan Sistem Informasi) ISSN 2407-1811 (Print)
Vol. IX No 3, June 2023, hlm. 509 - 514 ISSN 2550-0201 (Online)
DOI: https://doi.org/10.33330/jurteksi.v9i3.2459
Available online at http://jurnal.stmikroyal.ac.id/index.php/jurteksi

microcontroller will process the data and then send the IR ON code.

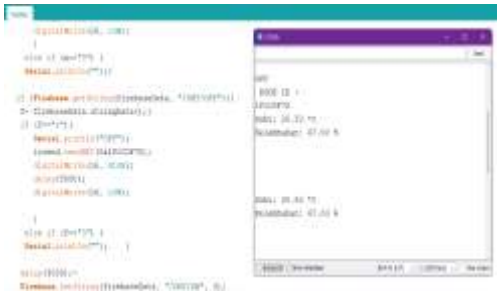

Image 5. Testing the OFF Button

Image 5 shows the results of testing the tool to turn on the air conditioner (AC) using the OFF button on the device application. If the OFF button on the application is pressed, the application will send data 0 to the database . After that the system will read the data in the database then the microcontroller will process the data and then send the IR OFF code.

Image 6. Automatic System Testing

Image 6 is a test carried out by the system to find out whether the device can control the temperature drop automatically. Tool testing is carried out at a setpoint of 35 and can be seen in the image if the temperature is above 35, the system will send a warning that the room temperature is too hot. The system works by processing data obtained from the DHT11 sensor, if the data received from the DHT11 sensor exceeds the specified setpoint , the system will send an IR code to lower the temperature. From the results of the tests carried out, it can be explained that an air conditioner (AC) temperature control system has been realized using an internet connection as the communication and ESP8266 as a data control and processing device.

In this research, the AC is controlled in the form of a simulation. For connection with wifi, it has been programmed from the start on the arduini IDE program listing to the ESP8266 nodeMCU, if you want to change the SSID and password then you have to do it by changing the program script and you need to re-upload it .

CONCLUSION

The design of the air conditioner temperature control system that is made can assist AC management officers in managing air conditioning in the STMIK Royal Laboratory. The use of an air conditioner temperature control system with the Internet of things technology is able to provide convenience because users can control the system anywhere as long as they are connected to the Internet.

The use of Blynk applications is very useful in this air conditioner temperature control system because it is a medium of communication between the device and the device. The interface is also very easy to use and easy to understand by users.

The design made can be run by manual or automatic work. The officer only needs to turn on the device after which the design of the control system will read the input given.

JURTEKSI (Jurnal Teknologi dan Sistem Informasi) ISSN 2407-1811 (Print)
Vol. IX No 3, June 2023, hlm. 509 - 514 ISSN 2550-0201 (Online)
DOI: https://doi.org/10.33330/jurteksi.v9i3.2459
Available online at http://jurnal.stmikroyal.ac.id/index.php/jurteksi

BIBLIOGRAPHY

[1] S. Siswanto, M. Anif, DN Hayati, and Y. Yuhefizar, "Securing Room Doors Using Arduino Mega 2560, MQ-2, DHT-11 Based on Android," J. RESTI (System Engineering and Technology. Information) , vols. 3, no. 1, pp. 66–72, 2019, doi: 10.29207-/resti.v3i1.797.

[2] AH Saptadi, "Comparative Study of Accuracy of Tempe-rature and Humidity Measu-rements Between DHT11 and DHT22 Sensors Comparative Study on ATMEL AVR and Arduino Platforms," J. Inform.

[3] GF Pangestu and HH Purba, "Value Engineering-Based Air Conditioner Work Cost Effic-iency in Office Buildings," Syntax Lit. ; J. Ilm. Indonesia. , 2021.

[4] Mariza Wijayanti, "Prototype Smart Home With Nodemcu Esp8266 Based on IoT," J. Ilm. Tech. , vol. 1, no. 2, pp. 101–107, 2022, doi:10.561-27/juit.v1i2.169.

[5] A. Deris, "Emergency Infor-mation System in Mini Market Using Esp8266 Microcontro-ller Based on Internet of Things," Computing J. Ilm. Computing Science. and Matt. , vol. 16, no. 2, pp. 283–288, 2019, doi: 10.33751/kompu-tasi.v16i2.1622.

[6] A. Najmurrokhman, "Cold Storage Using a Microcontro-ller," J. Teknol. , vol. 10, no. 1, pp. 73–82, 2018.

[7] GS Doni Kurniawan, Yad-darabulah,"Implementation of the Internet of Things in Drip Irrigation Systems to Help Utilize Urban Farming," 7 th Univ. Res. Colloq. , pp. 106–17, 2018, [Online].

[8] AD Pangestu, F. Ardianto, and B. Alfaresi, "Arduino Nodemcu Esp8266 Based Electrical Load Monitoring System," J. Ampere , vol. 4, no. 1, p. 187, 2019, doi: 10.31851/ampere.v4i1.2745.

[9] I. Maulidin, A. Rohsari, I. Utami, T. Verasta, TD Guna-wan, and D. Citeureup, "Internet of Things (IoT) Training for Simple Hydropo-nic Systems in the Citeureup Community in Welcoming the Smart Nation Era Methodol-ogy Image 1 . IoT Training Dissemination in Image 3. pH Sensor Module with probe 2 . 2 IoT System Simulation," Community, 2021,[Online].

[10] A. Prafanto, E. Budiman, PP Widagdo, GM Putra, and R. Wardhana, "Presence Detect-ors use ESP32 for Automatic Door Lock Systems," JTT (Jurnal Teknol. Ter. , vol. 7, no. 1, p. 37, 2021, doi: 10.31884/jtt.v7i1.318.

[11] U. Ulumuddin, M. Sudrajat, TD Rachmildha, N. Ismail, and EAZ Hamidi, "Prototype of Water Monitoring System in Internet of Things Based Tanks Using Nodemcu Esp8266 Sensors and Ultrasonics," Semin . Nas. Tech. Electrical 2017 , no. 2016, pp. 100–105, 2017, doi: 978-602-512-810-3.