ISSN: 2581-1274

Smart Park LED Strip Based by Internet of Things

Muharratul Mina Rizky[a,1,*], Depi[b,2], Fitra Rahida[c,3]

[a,b,c] *Program Studi Teknik Komputer, Politeknik Aceh Selatan, Kabupaten Aceh Selatan, 23711, Indonesia*
** kikyamiruddin@gmail.com[1]; depiginting@gmail.com[2]; fitra.rahida04@gmail.com[3]*
** Corresponding Author*

ARTICLE INFO

Article history:
Accepted

Keywords:
NodeMCU
RTC
Internet Of Things

ABSTRACT

The internet was a new thing that was interesting when it first appeared, because with the internet people were able to exchange news even over long distances. One application that can be carried out using the internet of things is garden lighting, especially in big cities, various methods have been used to control the lights automatically but they can only be turned on or off. The solution to this problem is to create an IoT-based Smart Garden LED Strip system. The aim of this research is to design a Smart Garden LED Strip device based on the Internet of Things. This device is designed to facilitate human performance because the LED lights have been programmed so that the LED lights can turn on and off automatically. This research method uses three parts, namely input, output and control. Where the MCU node functions as the controller of the entire circuit, while the RTC sensor functions as input. Researchers carried out tests 7 times to determine the performance of the tool that had been designed. In 7 tests of the Smart Garden LED Strip, the lights turned off at 06.00 in the morning, in 7 tests the lights managed to turn off on time, and at 19.00 at night the lights managed to turn on time. The conclusion of this research, when the time is 19.00 WIB, the lights will automatically turn on, and the lights will turn off automatically at 06.00 WIB.

I. Introduction

The internet was a new thing that was interesting when it first appeared, because with the internet people were able to exchange news even over long distances. As the internet develops, not only smartphones and computers are able to connect to the internet, objects can also be connected to the internet or what is known as the internet of things.

One application that can be carried out using the internet of things is garden lighting, especially in big cities, some will use smartphones to control performance in daily life, various methods have been used to control lights automatically but are only able to turn on or off. just turn it off.

The solution to this problem is to create a Smart Garden LED Strip system based on IoT, led strip, NodeMCU, and RTC to regulate time. Apart from that, this system will work from dusk until morning. The advantage of this tool is that the LED lights are able to change colors and will turn on at dusk at 19.00 and will turn off automatically at 06.00 in the morning.

II. Basic Theory

A. Park Lights

Garden lights are ornamenting that function as lighting; however, garden lights are not just for lighting. Many garden lights are also used to decorate gardens and decorate a place to beautify it. [1].

B. RTC

The RTC sensor or what is usually called a Real Time Clock is an electronic clock in the form of a chip that can calculate time from seconds to years very accurately and can store this time data in real time. RTC chips are often found on PC motherboards (usually located near the BIOS chip). All computers use RTC to store the latest clock information from the computer in question. The RTC is equipped with a battery to supply the chip's data power, so the clock will remain up-to-date even if the computer is turned off. [2].

C. NodeMCU

NodeMCU is an open source IoT platform. Consists of hardware in the form of an ESP8266-12 System On chip (SoC) made by Espresiff Systems, as well as firmware that uses the Lua scripting programming language. NodeMCU can be analogous to the ESP266 Arduino board. [3].

D. Relay

In simple terms, the definition of a relay is an electronic component that functions as an electrical switch which disconnects and connects the electric flow in a circuit with control in the form of voltage entering the coil. The function of a relay is that it is used in a circuit as an automatic switch or as a safety device when there is a surge in electric voltage or excess electric current, thereby preventing damage to other components in the circuit. [4].

E. LED Strip

LED Strip is defined as a lamp with an arrangement of SMD LED chips installed in a long circuit. The shape is flexible and has strong adhesive on the back of the lamp. This light is also often known by several terms, such as LED Tape, Ribbon light, hose light, flexible LED Strip, and so on. [5].

F. Arduino IDE

Arduino IDE (Integrated Development Environment) is an application that includes an editor, compiler and uploader that can use all Arduino module series, such as Arduino Duemilanoeve, Uno, Bluetooth, Mega. Except there are several types of Arduino production boards that use microcontrollers outside the AVR series, such as the AMR microprocessor. When writing program code or compiling Arduino hardware modules, you don't have to connect them to a PC or notebook, although when uploading them to the board you need a hardware module. Almost no PC mainboard still provides a parallel port. [6].

G. Telegram

According to Wikipedia's definition, Telegram is a cloud-based multiplatform instant messaging application that is free and non-profit. Telegram applications are widely available for various operating systems such as Android, iOS, Windows Phone, Ubuntu Touch, as well as computer devices such as Windows, MacOS X, and Linux. With Telegram, users can send text messages, photos, videos, audio, documents, stickers and various other types of files to each other. [7].

III. Research Methods

A. Design Chart

The tool design chart is as follows:

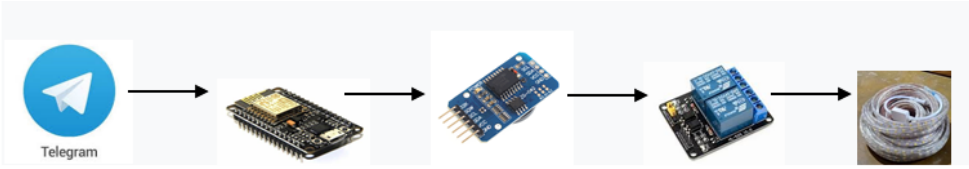

Fig. 1. *Design Chart*

Caption:

1. Telegram is used to activate or start the tool's performance
2. NodeMCU functions as a Microcontroller controller
3. RTC functions as a timer
4. The relay functions as a barrier to electric current
5. LED Strip functions to beautify the garden

B. Flowchart

The following is a flowchart of the Smart Park LED Strip tool based on the Internet of Things.

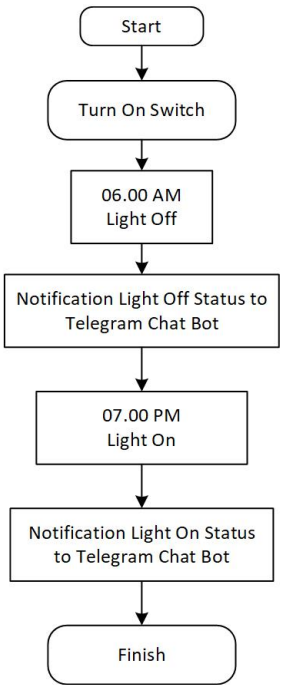

Fig. 2. Flowchart

C. Tool Design Schematics

All components are connected to each other, the system starts running using the pins that correspond to the input output required for the Smart LED Strip.

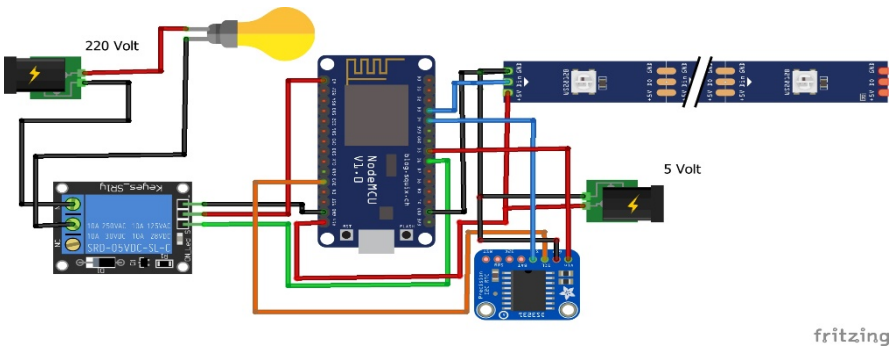

Fig. 3. Tool Design Schematics

D. Tool Design Sketch

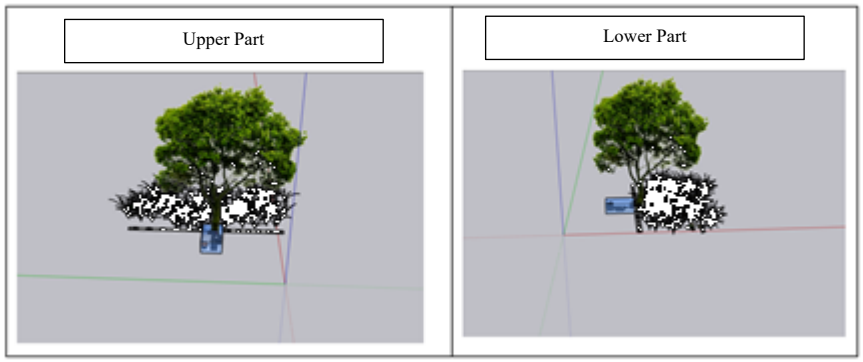

Fig. 4. Tool Design Sketch

IV. Result and Discussion

A. Overal series of tools

All components are connected to each other, the RTC will detect the programmed time at dusk at 19.00 the lights will turn on and the lights will turn off automatically at 06.00 in the morning.

Fig. 5. Overal series of tools

B. Tools Testing Procedures

After the system has been created, it is necessary to test the system. When we click the Start button on Telegram, the RTC will detect the time that has been programmed on the MCU Node, the lights will turn on at 19.00 at night and will automatically turn off at 06.00 in the morning, and the Relay is responsible for controlling the incoming current. This test was carried out 7 times to determine the performance of the tool that had been designed.

Tabel 1. Prosedur Pengujian Alat

Tanggal Percobaan	Waktu lampu mati	Status lampu	Waktu lampu hidup	Status lampu	Telegram			
					Waktu bot lampu mati	Status Lampu	Waktu bot lampu hidup	Status lampu
21-01-2023	06.00	Mati	19.00	Hidup	06.02	Berhasil	19.00	Berhasil
22-01-2023	06.00	Mati	19.00	Hidup	06.01	Berhasil	19.00	Berhasil
23-01-2023	06.00	Mati	19.00	Hidup	06.02	Berhasil	19.00	Berhasil
24-01-2023	06.00	Mati	19.00	Hidup	06.00	Berhasil	19.00	Berhasil
26-01-2023	06.00	Mati	19.00	Hidup	06.00	Berhasil	19.00	Berhasil
27-01-2023	06.00	Mati	19.00	Hidup	06.00	Berhasil	19.00	Berhasil
28-01-2023	06.00	Mati	19.00	Hidup	06.00	Berhasil	19.00	Berhasil

C. Tools testing results

Fig. 6. Hasil Pengujian Alat

From Figure 1 to 4 is the working process of the internet of things based Smart Garden LED Strip tool. The lights will turn on by themselves when the time is 19.00 WIB, and the lights will turn off automatically at 06.00 WIB.

V. Conclusions and Suggestions

A. Conclusions

After designing and testing the Smart Garden LED Strip Tool based on the internet of things and then testing the tool, both testing each series and the overall sensor readings. So, it can be concluded:

1. Using the RTC sensor as a timer, which can set the time starting from seconds, minutes and hours very accurately, in this test the time that has been set is 19.00 WIB to 06.00 WIB.
2. When the time is 19.00 WIB, the lights will automatically turn on, and the lights will turn off automatically at 06.00 WIB.

B. Suggestions

After carrying out this test, several suggestions for further development can be obtained:

1. The LED strip smart garden tool can be used by the community to make people's work easier, because this tool has been set, the lights will automatically turn on at 19.00 WIT and will automatically turn off at 06.00 WIT.
2. The LED smart garden device can be further developed using an IoT system so that it can control the color of the lights in the LED smart garden.

Refferences

[1] H. Sujadi, T. Wahyuni, "Implementasi Stop Kontak Pintar Pada Lampu Taman Dengan Menggunakan Mikrokontroller Wemos D1 R1 Berbasis IoT", J-ENSITEC, Vol. 8 No. 01 (2021): December 2021.

[2] P. Rahardjo, "Sistem Penyiraman Otomatis Menggunakan Rtc (Real Time Clockberbasis Mikrokontroler Arduinomega 2560 Pada Tanaman Mangga Harum Manis Buleleng Bali", Jurnal SPEKTRUM Vol. 8, No. 1 Maret 2021.

[3] D. Saputra, V. Arinal, "Perancangan Home Automation dalam mengontrol lampu dan kipas angin menggunakan Blynk berbasis NodeMCU", Jurnal social dan Teknologi (SOSTECH), 1(7): 596-606-2774-5255, 2021.

[4] SP Santosa, R. MW Nugroho, "Rancang Bangun Alat Pintu Geser Otomatis Menggunakan Motor Dc 24 V", Jurnal Ilmiah Elektrokrisna Vol 9 No 1 Januari 2021.

[5] MF Hakim, I Ridzki, Sukamdi, Mudjiono, BI Kurniawan, "Pemasangan Lampu Sorot dan Led Strip Dengan Pengoperasian Otomatis di Gapura Klaster SPI Sukun Kota Malang", ELPOSYS: Jurnal Sistem Kelistrikan, Februari 2021.

[6] S . Wardoyo, dan Pramudyo, S.A. "Pengantar Mikrokontroler. Yogyakarta", Teknosaim. 2018.

[7] AD Mulyanto, "Pemanfaatan Bot Telegram Untuk Media Informasi Penelitian, Jurnal Matics", Vol 12, No 1, 2020

[8] MM Rizky, SU Mouna, MA Ihsan, "Repository Information System for the Final Assignment of the South Aceh Polytechnic", Jurnal Inotera 8 (1), 128-136, 2023.