Design and Building of an Automated Lighting Control System for Rooms Based on Internet of Things (IoT)

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ABSTRACT

The development Internet of Things (IoT) technology has been widely used in daily life, especially in the use of electronic devices in homes, such as lights. To create an automatic lighting control system for a room from a distance, a PIR (Passive Infrared Receiver) sensor is needed as input to turn the light on and off automatically based on movement detected in the room. To control the light automatically and connect the devices to the internet, the ESP8266 is used. The results show that the PIR (Passive Infrared Receiver) sensor can detect movement within the room. Thus, the automatic lighting control system can be monitored remotely using a smartphone.

Keyword : ***Automated Lighthing, Control System, Internet Of Things (IoT), PIR (Passive Infrared Receiver) Sensor, ESP8266***

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1. INTRODUCTION

Internet of Things (IoT) is a technology that connects to the internet, enabling automatic data exchange to execute specific commands. Internet of Things (IoT) has been widely applied in various fields, including agriculture, healthcare, transportation, manufacturing, environment, and energy. The use of IoT can often be found in our daily lives, such as in controlling automatic lighting systems in a room. Motion sensors detect movement as needed; the automatic light will turn on if the sensor detects movement in the room, and conversely, it will turn off if no movement is detected. The motion sensor used in this research is a PIR *(Passive Infrared Receiver*) sensor, while the ESP8266 is used as a controller and to connect the devices to the internet network. The sensor readings are displayed on the serial monitor in the Arduino IDE. For initial setup, ports on the Wemos D1 Mini are used. With IoT, users are expected to control the automatic lighting system in the room through a smartphone connected to the internet.

2. RESEARCH METHOD

1. Here are the steps taken in the research:

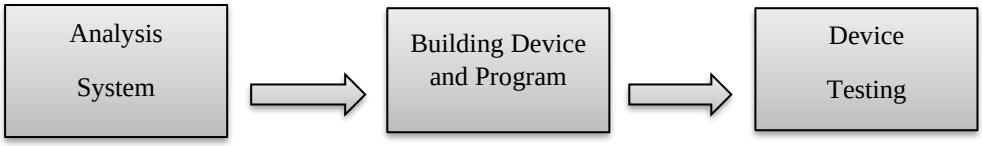

Figure 1. Research Method

Description:

a) System analysis involves assessing the system according to user requirements, where the automatic light in the room can be controlled via a smartphone if connected to the internet.
b) Building device and program involve designing the device and application according to user needs.
c) Device Testing where the automatic light will turn on if the sensor detects movement in the room; conversely, if the sensor does not detect any movement, the automatic light will turn off.

2. Steps for System Testing

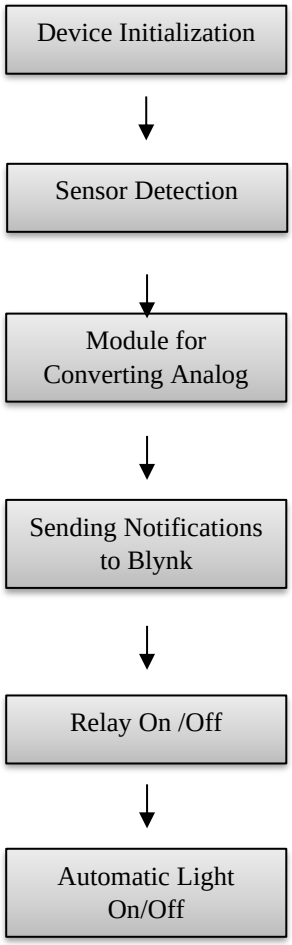

Figure 2. System Testing Flow

Description:

a) Performing initialization (I/O) of input and output involves configuring the pins of the Wemos D1 Mini as input and output according to the system's requirements.
b) The sensor will detect objects.

c) The module will convert the analog values generated by the sensor into digital signals and send notifications to Blynk.
d) The relay will receive a digital signal input from the module.
e) The automatic light will turn on if movement is detected, or the automatic light will turn off if no movement is present

3. RESULTS AND DISCUSSIONS

The first step to designing an automatic lighting control system for a room based on the Internet of Things (IoT) is to ensure that the system is connected to the power supply. Next, use an input of 220V AC, so that the system's active condition can be indicated by an LED on the Box Chasing. The power supply and Hi-Link adapter's input side are connected directly to the 220V AC power source, while the output side is connected to the Wemos D1 Mini, allowing the power supply to be centralized on the Wemos.

The system testing process begins with setting up the PIR Infrared sensor to detect objects, resulting in HIGH (1) and LOW (0) values. In the testing of the PIR sensor circuit and the High Trigger Relay Module, it is necessary to define the variables: int sensor_pir, int lamp, and int lamp_state to represent the lamp's status for initial initialization using the ports on the Wemos D1 Mini. Next, create a Blynk 2.0 account to make a new template with a description and the device you are using. Then, open the Arduino IDE application, which will automatically display the initial screen as "sketch_xxxxxx," as in the previous step. Type the template ID, device name, and auth token at the top of the Arduino IDE sketch for firmware initialization, along with the program listing for testing the entire circuit. Click "Sketch Verify," and a dialog box will appear to save the newly created project file. Therefore, the program that has been created includes all the necessary libraries required by Arduino. Here are the results of the testing that was conducted.

Figure 3. Testing Results

4. CONCLUSION

1. The device testing conducted can detect human movement when entering the room.
2. The automatic light in the room will turn on if there is a moving object inside the room and will turn off if there is no movement detected.
3. The automatic light in the room can be controlled using a smartphone if it is connected to the internet.

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