**Praktik Simulasi Relay, Button & LED**

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**Abstract**

Relay, button, and LED are fundamental components in embeded system and IoT applications. A relay acts as an electrically operated switch that allows low power circuits to control high power devices, while a button serves as an input to triger actions, and an LED provides visual feedback. In this simulation using ESP32, wokwi and VS Code, we integrate these components to demonstrate their interaction. The ESP32 microcontroller reads the button state, controls the relay, and toggles the led accordingly. This practice helps ini understanding how to implement basic control mechanisme in embedded system, which are widely used in home automation and industrial

*Keywords—ESP32, Relay, LED, Simulation*

**1. Introduction**

**1.1 Background**

This project simulates the interaction between a relay, button, and LED using an ESP32 microcontroller. The simulation is conducted on Wokwi, with code development and testing performed in VS Code. When the button is pressed, the ESP32 sends a signal to activate the relay and turn on the LED, demonstrating a simple control system. This experiment provides hands-on experience in interfacing digital inputs and outputs, essential for developing automation and IoT applications..

**1.2 Objectives**

The objective of this simulation of a relay, button, and LED is to understand their functionality and interaction within a microcontroller-based system using the ESP32. In this simulation, the relay acts as an electronically controlled switch operated by the microcontroller, while the button functions as a digital input to activate or deactivate the relay and LED. Wokwi is used as a simulation platform to test the circuit without requiring physical hardware, and VS Code serves as the development environment for ESP32 programming. Through this practice, users are expected to enhance their understanding of simple control systems that can be applied to automation and IoT projects.

**2. Methodology**

**2.1 Tools & Materials**

* **Microcontroller**: Virtual Arduino Uno (via Wokwi)
* **Software**: Wokwi (https://wokwi.com), GitHub (https://github.com), Vs Code, PlatformIO IDE,
* **Internet Access**
  1. **Implementation Steps**

1. Open wokwi.com, and Choose ESP 32 to create a diagram like the one in the module.
2. Open the Vscode. Create new project in PlatformIO IDE.
3. Then compile the c++ code in main.cpp.
4. After the compiling process is successful. there are 2 important files that will be used in the simulation process. namely the firmware.bin and firmware.elf files.
5. Copy the relative path of each file into the wokwi.toml file.
6. Then create a diagram.json file and copy and paste from the json diagram on the wokwi.com platform.
7. Before starting the simulation, request a new license by running the > Wokwi command: Request a New License.
8. The last step is to run the simulation by typing the command

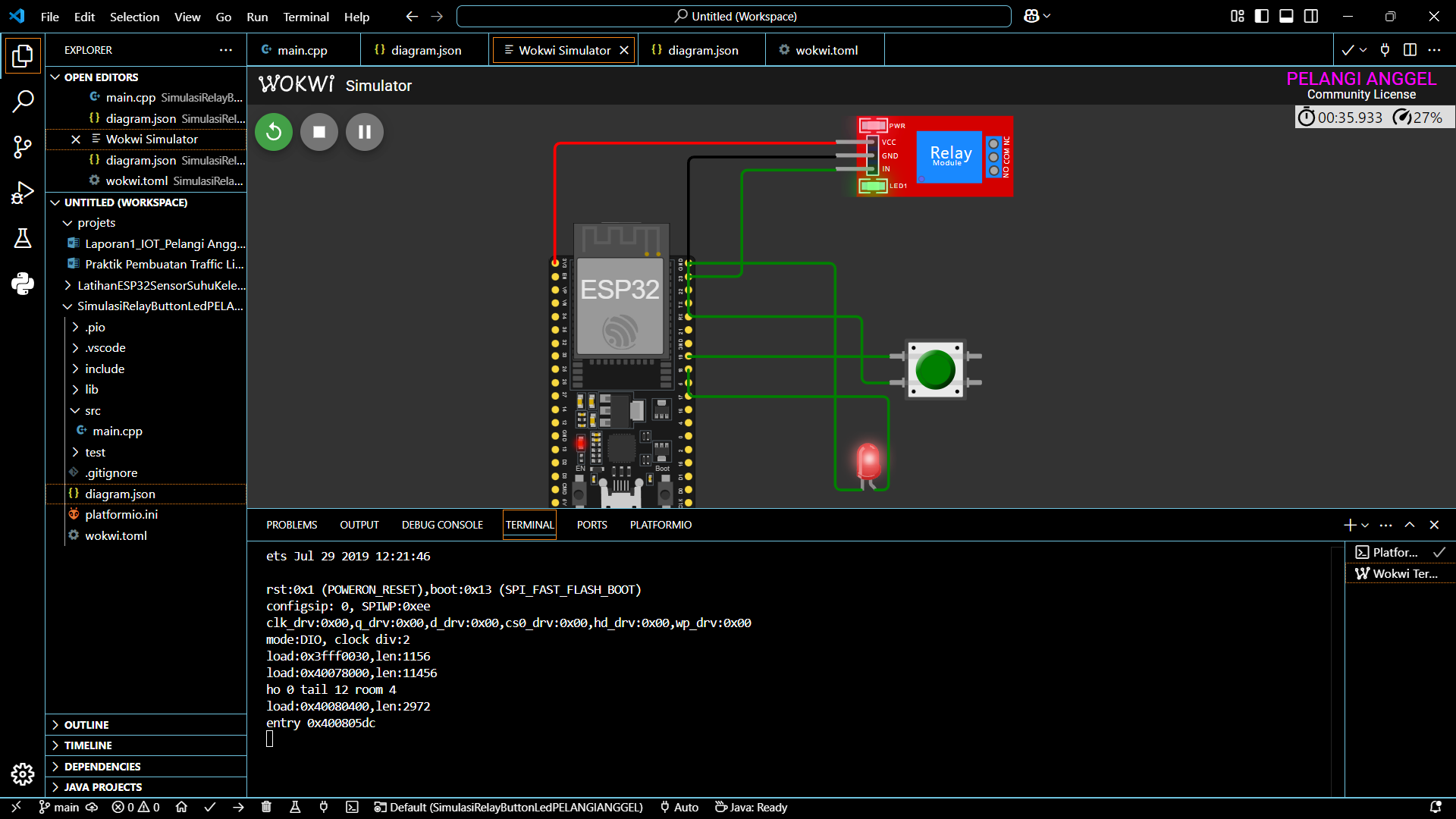
> Wokwi: Start Simulator

**3. Results and Discussion**

**3.1 Experimental Results**

|  |  |  |
| --- | --- | --- |
| **Platform** | **Completed Task** | **Key Outcome** |
| Wokwi | Relay, button, and LED simulation | The relay, button, and LED successfully interacted as programmed, with the relay activating and the LED turning on when the button was pressed |
| VS Code | Writing and uploading ESP32 code | The ESP32 code was successfully written, compiled, and executed, allowing proper control of the relay and LED based on button input |

VsCode screenshot result:



Wokwi screenshot result:

