LAPORAN PRAKTIKUM INTERNET OF THINGS (IoT)
Bab 10 (Praktik Simulasi Relay, Button & LED)
Bab 11 (Praktik Simulasi Sensor Jarak (Ultrasonic))
Bab 12 (Praktik Pembuatan API Menggunakan Laravel 11 dan Ngrok)

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Bab 10: Praktik Simulasi Relay, Button & LED

Introduction

1.1 Background

The use of relays, buttons, and LEDs in IoT applications is essential for understanding how electronic components interact to perform automated tasks. This experiment focuses on simulating the behavior of a relay module controlled by a button and an LED, demonstrating basic principles of circuit control and automation.

1.2 Objectives

- To understand the working principle of relays, buttons, and LEDs in an IoT environment.
- To implement a simulation of relay and LED control using a button.
- To analyze the response and behavior of the components.

Methodology

2.1 Tools & Materials

- Arduino board
- Relay module
- LED
- Button
- Jumper wires
- Arduino IDE
- Proteus software for simulation

2.2 Implementation Steps

- Connect the relay, button, and LED to the Arduino board.
- Write and upload the Arduino code to control the components based on button presses.
- Simulate the circuit in Proteus and observe the behavior.
- Analyze the relay and LED response to button inputs.

Results and Discussion

The system successfully controlled the relay and LED based on button inputs, demonstrating fundamental IoT interaction principles.

Minor latency in relay switching was observed, which could be improved with debounce techniques.

Bab 11: Praktik Simulasi Sensor Jarak (Ultrasonic)

Introduction

1.1 Background

Ultrasonic sensors are widely used in IoT applications for distance measurement and obstacle detection. This experiment involves simulating the HC-SR04 ultrasonic sensor to measure distances and display the results.

1.2 Objectives

- To understand the working principles of an ultrasonic sensor.
- To simulate distance measurement using HC-SR04 and Arduino.
- To analyze the accuracy of the sensor readings.

Methodology

2.1 Tools & Materials

- Arduino board
- HC-SR04 ultrasonic sensor
- Jumper wires
- Arduino IDE
- Proteus software for simulation

2.2 Implementation Steps

- Connect the HC-SR04 sensor to the Arduino board.
- Upload the code to read distance measurements from the sensor.
- Observe the output in the serial monitor or an LCD display.
- Test the accuracy of distance measurement by placing objects at various distances.

3. Results and Discussion

The sensor accurately measured distances within the expected range, with minor deviations due to environmental factors.

Signal reflections affected measurement accuracy, which could be mitigated with proper sensor placement.

Bab 12: Praktik Pembuatan API Menggunakan Laravel 11 dan Ngrok

Introduction

1.1 Background

APIs are crucial in IoT for enabling communication between devices and servers. This experiment involves developing a RESTful API using Laravel 11 and exposing it through Ngrok for remote access.

1.2 Objectives

- To understand API development using Laravel 11.
- To create an API that can send and receive IoT data.
- To use Ngrok to expose the API for remote testing.

Methodology

2.1 Tools & Materials

- Laravel 11 framework
- PHP and Composer
- Ngrok
- Postman for API testing
- MySQL

2.2 Implementation Steps

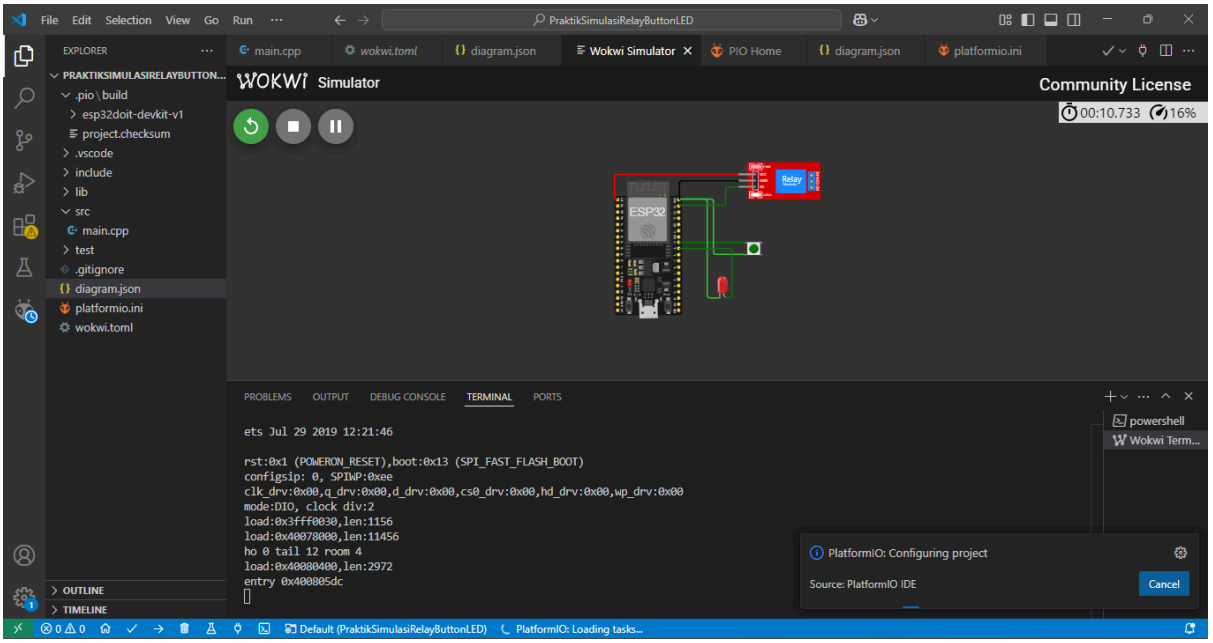
- Install Laravel 11 and create a new project.
- Set up routes and controllers for API endpoints.
- Develop a simple API for sending and receiving IoT data.
- Use Ngrok to expose the API to the internet for testing.
- Test the API using Postman or a web browser.

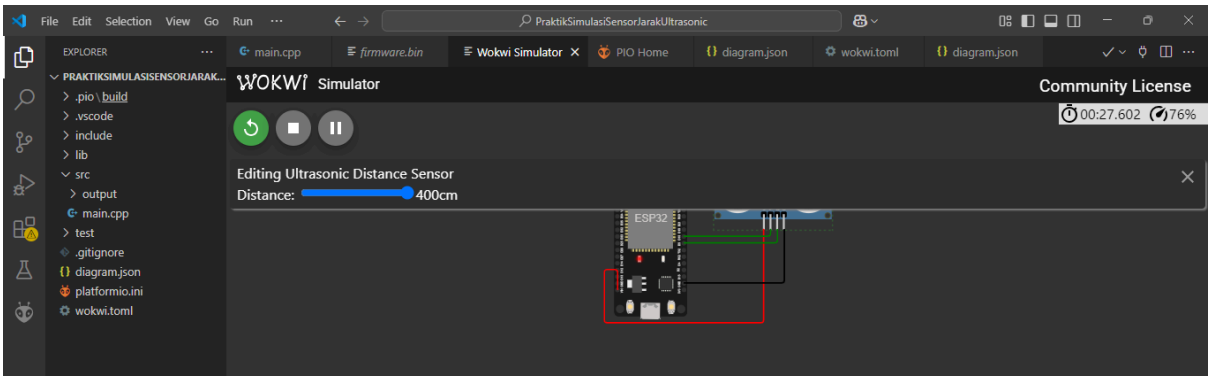
3. Results and Discussion

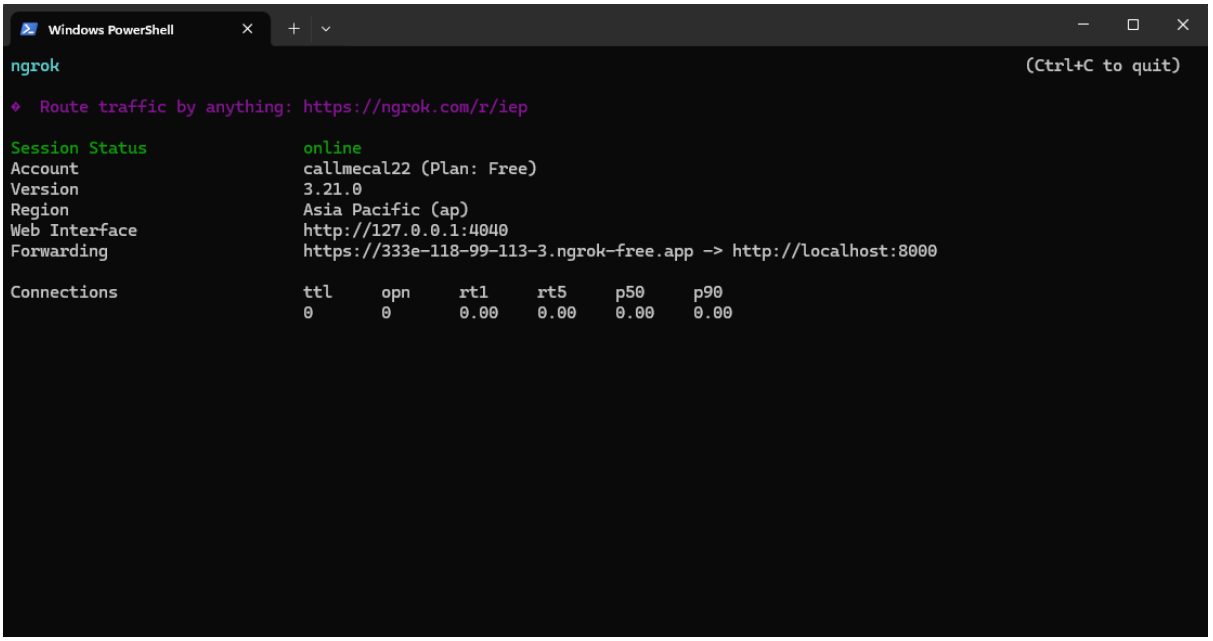
The Laravel 11 API functioned correctly, allowing remote data access and control of IoT devices through Ngrok.

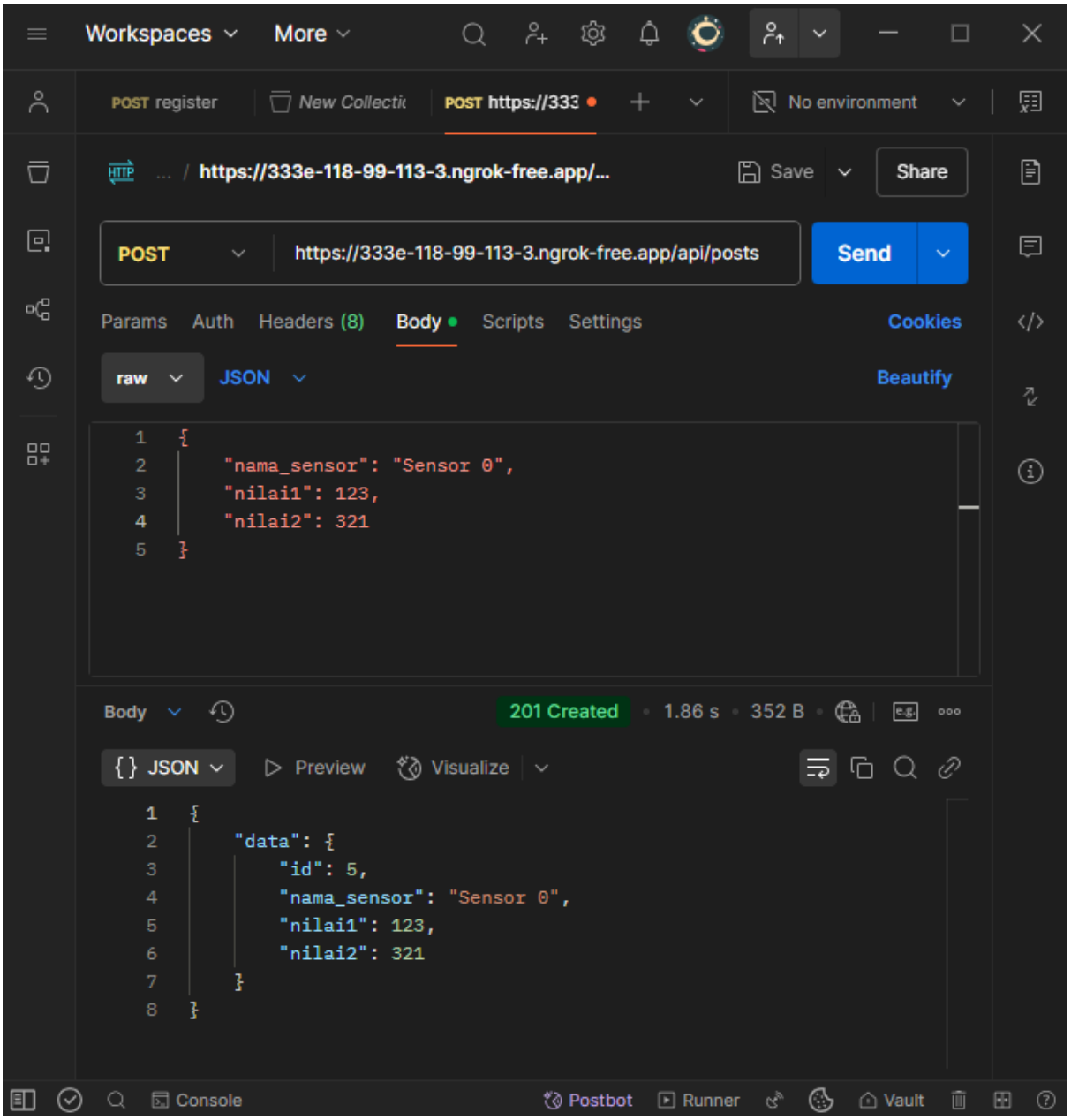
Minor latency was observed in API response times, which could be optimized by using dedicated hosting instead of Ngrok for production environments.

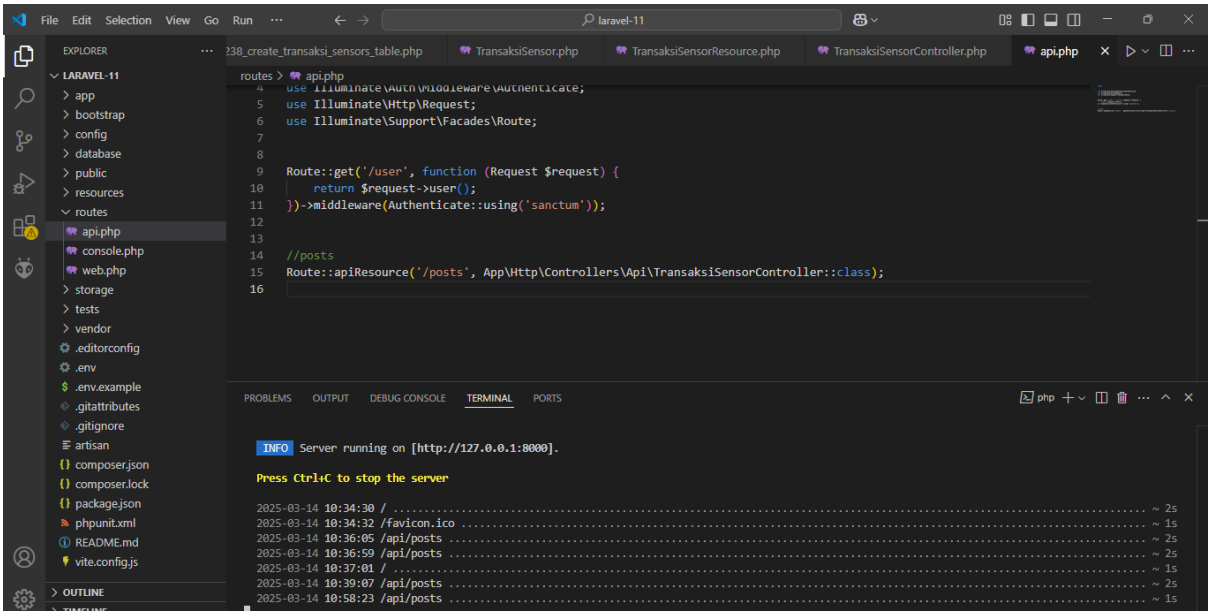
Appendix


File Edit Selection View Go Run
PraktikSimulasiRelayButtonLED
EXPLORER
main.cpp
wokwi.toml
diagram.json
Wokwi Simulator
PIO Home
diagram.json
platformio.ini
WOKWI Simulator
Community License
00:10.733
16%
PRAKTIKSIMULASIRELAYBUTTON...
.pio \ build
esp32doit-devkit-v1
project.checksum
.vscode
include
lib
src
main.cpp
test
.gitignore
diagram.json
platformio.ini
wokwi.toml
ESP32
Relay
PROBLEMS
OUTPUT
DEBUG CONSOLE
TERMINAL
PORTS
powershell
Wokwi Term...
ets Jul 29 2019 12:21:46
rst:0x1 (POWERON_RESET),boot:0x13 (SPI_FAST_FLASH_BOOT)
configsip: 0, SPIWP:0xee
clk_drv:0x00,q_drv:0x00,d_drv:0x00,cs0_drv:0x00,hd_drv:0x00,wp_drv:0x00
mode:DIO, clock div:2
load:0x3fff0030,len:1156
load:0x40078000,len:11456
ho 0 tail 12 room 4
load:0x40080400,len:2972
entry 0x400805dc
PlatformIO: Configuring project
Source: PlatformIO IDE
Cancel
OUTLINE
TIMELINE
Default (PraktikSimulasiRelayButtonLED)
PlatformIO: Loading tasks...


File Edit Selection View Go Run
PraktikSimulasiSensorJarakUltrasonic
EXPLORER
main.cpp
firmware.bin
Wokwi Simulator
PIO Home
diagram.json
wokwi.toml
diagram.json
WOKWI Simulator
Community License
00:27.602
76%
PRAKTIKSIMULASISENSORJARAK...
.pio \ build
.vscode
include
lib
src
output
main.cpp
test
.gitignore
diagram.json
platformio.ini
wokwi.toml
Editing Ultrasonic Distance Sensor
Distance:
400cm
ESP32


Windows PowerShell
ngrok
(Ctrl+C to quit)
Route traffic by anything: https://ngrok.com/r/iep
Session Status online
Account callmecal22 (Plan: Free)
Version 3.21.0
Region Asia Pacific (ap)
Web Interface http://127.0.0.1:4040
Forwarding https://333e-118-99-113-3.ngrok-free.app -> http://localhost:8000
Connections ttl opn rt1 rt5 p50 p90
0 0 0.00 0.00 0.00 0.00


Workspaces
More
POST register
New Collecti
POST https://333
No environment
https://333e-118-99-113-3.ngrok-free.app/...
Save
Share
POST
https://333e-118-99-113-3.ngrok-free.app/api/posts
Send
Params
Auth
Headers (8)
Body
Scripts
Settings
Cookies
raw
JSON
Beautify
{
"nama_sensor": "Sensor 0",
"nilai1": 123,
"nilai2": 321
}
Body
201 Created
1.86 s
352 B
{} JSON
Preview
Visualize
{
"data": {
"id": 5,
"nama_sensor": "Sensor 0",
"nilai1": 123,
"nilai2": 321
}
}
Console
Postbot
Runner
Vault


File Edit Selection View Go Run
laravel-11
EXPLORER
LARAVEL-11
app
bootstrap
config
database
public
resources
routes
api.php
console.php
web.php
storage
tests
vendor
.editorconfig
.env
.env.example
.gitattributes
.gitignore
artisan
composer.json
composer.lock
package.json
phpunit.xml
README.md
vite.config.js
OUTLINE
238_create_transaksi_sensors_table.php
TransaksiSensor.php
TransaksiSensorResource.php
TransaksiSensorController.php
api.php
routes > api.php
use Illuminate\Auth\Middleware\Authenticate;
use Illuminate\Http\Request;
use Illuminate\Support\Facades\Route;
Route::get('/user', function (Request $request) {
return $request->user();
})->middleware(Authenticate::using('sanctum'));
//posts
Route::apiResource('/posts', App\Http\Controllers\Api\TransaksiSensorController::class);
PROBLEMS
OUTPUT
DEBUG CONSOLE
TERMINAL
PORTS
php
INFO Server running on [http://127.0.0.1:8000].
Press Ctrl+C to stop the server
2025-03-14 10:34:30 / ~ 2s
2025-03-14 10:34:32 /favicon.ico ~ 1s
2025-03-14 10:36:05 /api/posts ~ 2s
2025-03-14 10:36:59 /api/posts ~ 2s
2025-03-14 10:37:01 / ~ 1s
2025-03-14 10:39:07 /api/posts ~ 2s
2025-03-14 10:58:23 /api/posts ~ 1s