



Practical Development for IoT and Embedded Systems

Report 2: Controlling LED on a Curcuit over the Network

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1 Introduction

This report describes the development and operation of an IoT application designed to control an LED via an Android tablet. This project utilizes a Raspberry Pi 4 Type B, various LEDs, and a MCIGICM 10pcs Breadboard for Arduino DIY Electronics kit.

2 System Overview

The system comprises an Android tablet Google Nexus 7 as the user interface, a Raspberry Pi 4 Type B as the central controlling unit, and a breadboard setup with LEDs. The Android tablet communicates with the Raspberry Pi via a WiFi connection, sending commands to the Raspberry Pi to control the LEDs. The Raspberry Pi hosts a small web server that receives these commands and manipulates the GPIO pins to turn the LEDs on or off accordingly. This setup is ideal for demonstrating basic IoT principles and can be extended for more complex applications.

3 Operational Proof

3.1 Circuit Setup

Below is an image showing the actual circuit setup during testing. This setup includes the Raspberry Pi connected to a breadboard with LEDs configured to demonstrate the control capabilities via the Android tablet interface.

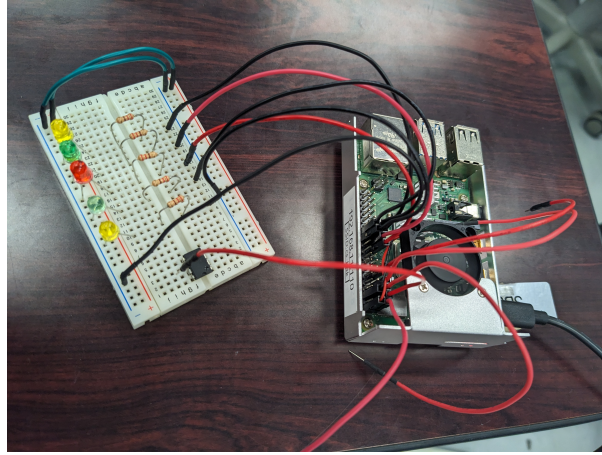


Figure 1: Test setup showing the Raspberry Pi and LED configuration on the breadboard.

3.2 Command Line Output

The following screenshot shows the terminal output from a PC during the operation of the LED control system, demonstrating the successful reception and execution of commands to toggle the LEDs on and off. Operation from a tablet was also executed and result shown to be successful.

```

nicolasxx@XX:~$ cd ~
nicolasxx@XX:~$ ssh pi@192.168.0.130
pi@192.168.0.130's password:
Welcome to Raspberry Pi!
$ cd led_control_project
$ python3 led_controller.py
LED Control Server Started. Listening for commands...
Received command: LED ON
Turning LED on...
Received command: LED OFF
Turning LED off...
$ exit
logout
Connection to 192.168.0.130 closed.
nicolasxx@XX:~$

```

Figure 2: Terminal output showing commands received and executed by the LED control system.

4 Conclusion

The project successfully demonstrates the use of a Raspberry Pi 4 and control control of LEDs over a network, in particular we propose the screenshot from the PC, highlighting the ease and flexibility of using standard components for IoT applications. It is also highlighted that it is easy to control such a system using an android device.

References

1. Mamanchuk N., University of Tsukuba, Github, June 24, 2024. Available online: <https://github.com/RIFLE>