



# WiFi-Controlled Model Train

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## Description

A model train controlled wirelessly from a virtual throttle on a smartphone.

## System Overview

Inputs: Smartphone Web Interface  
Controller: ESP32  
Output: L298N H-Bridge (to DC motor)

## How It Works

- The phone connects to the WiFi created by an ESP32 and serves the Web Interface
- The user selects speed and direction on the phone
- The ESP32 sends a PWM (Pulse Width Modulation) signal to the H-Bridge
- The H-Bridge output powers the DC motor of the train via the track.

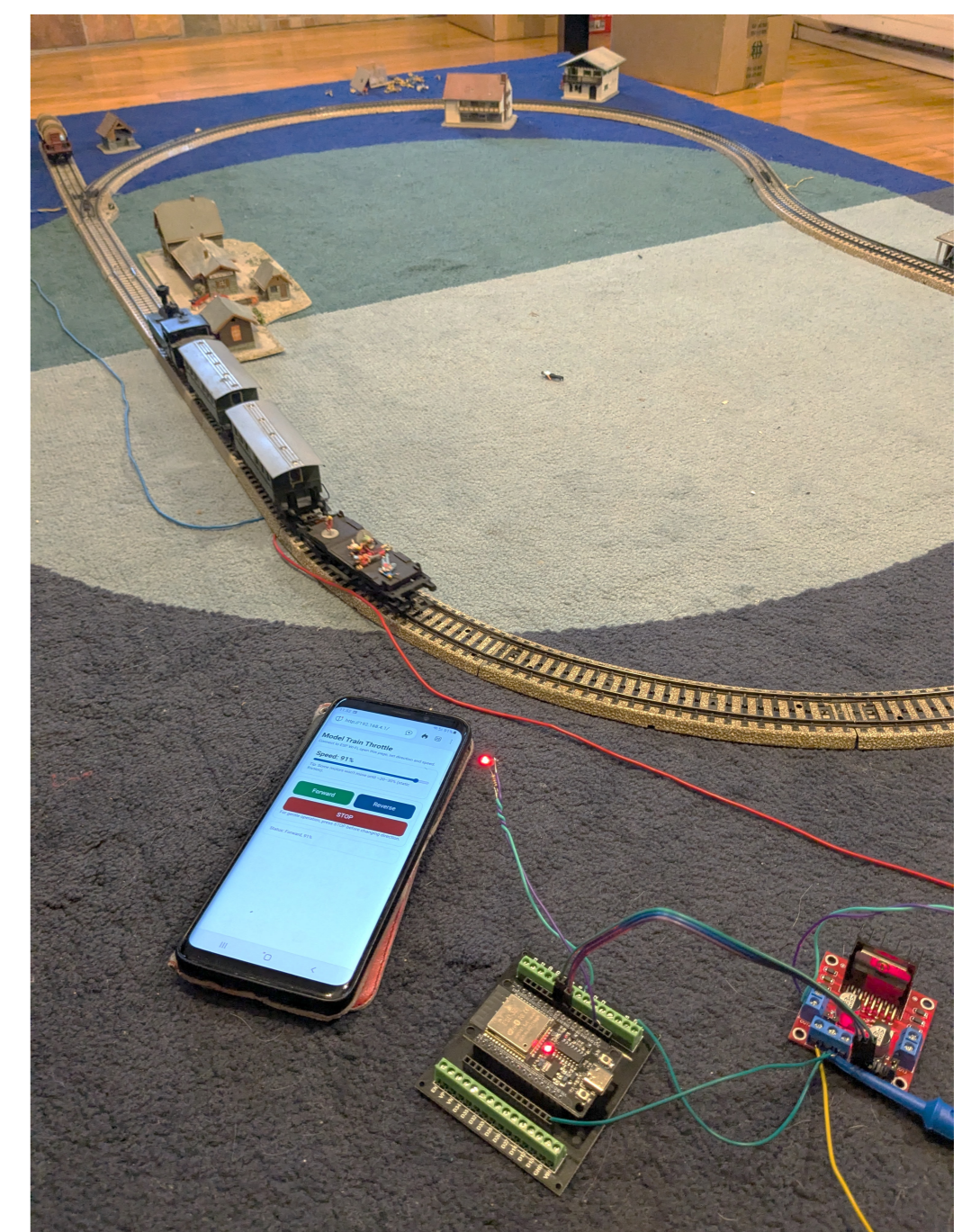
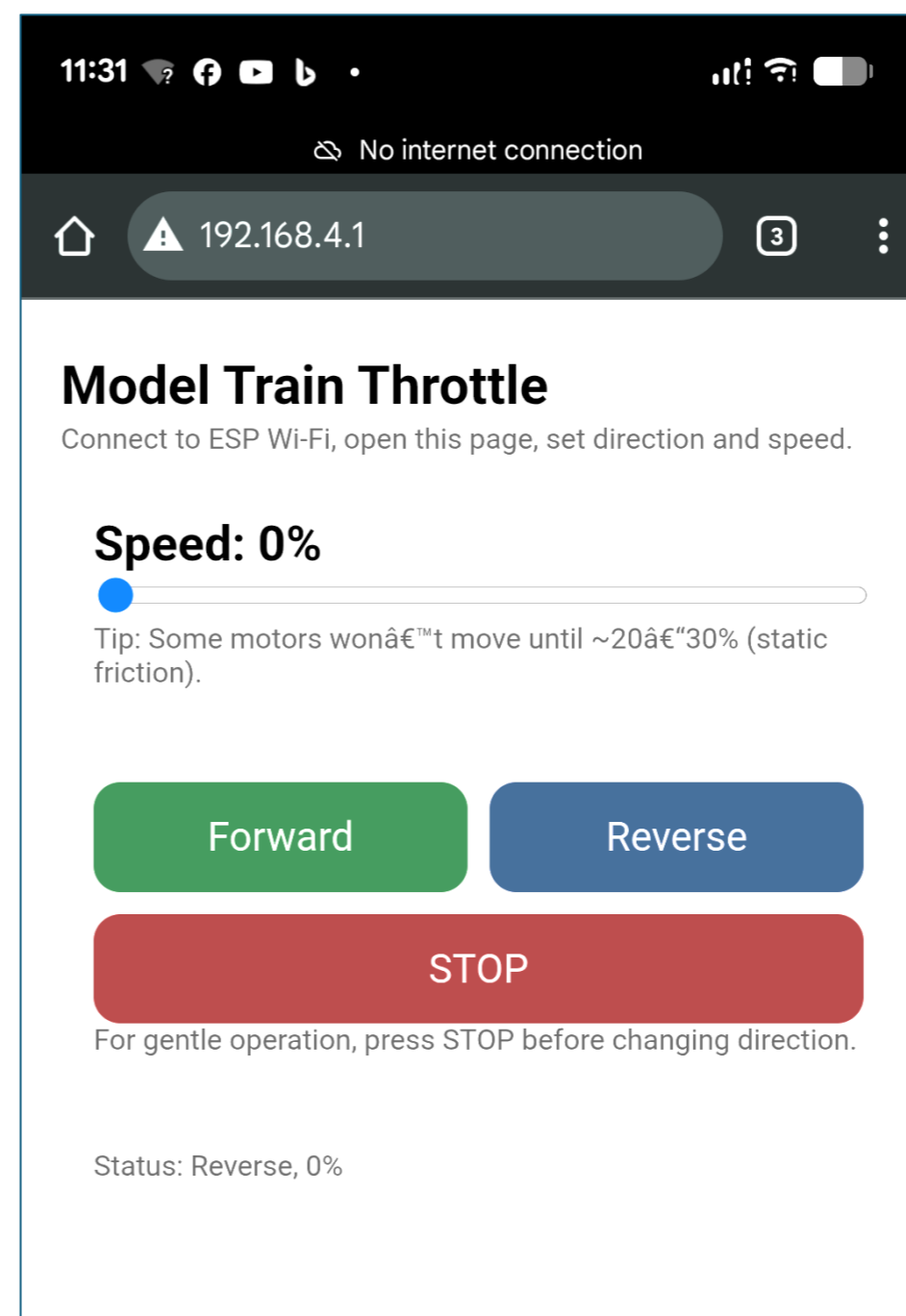
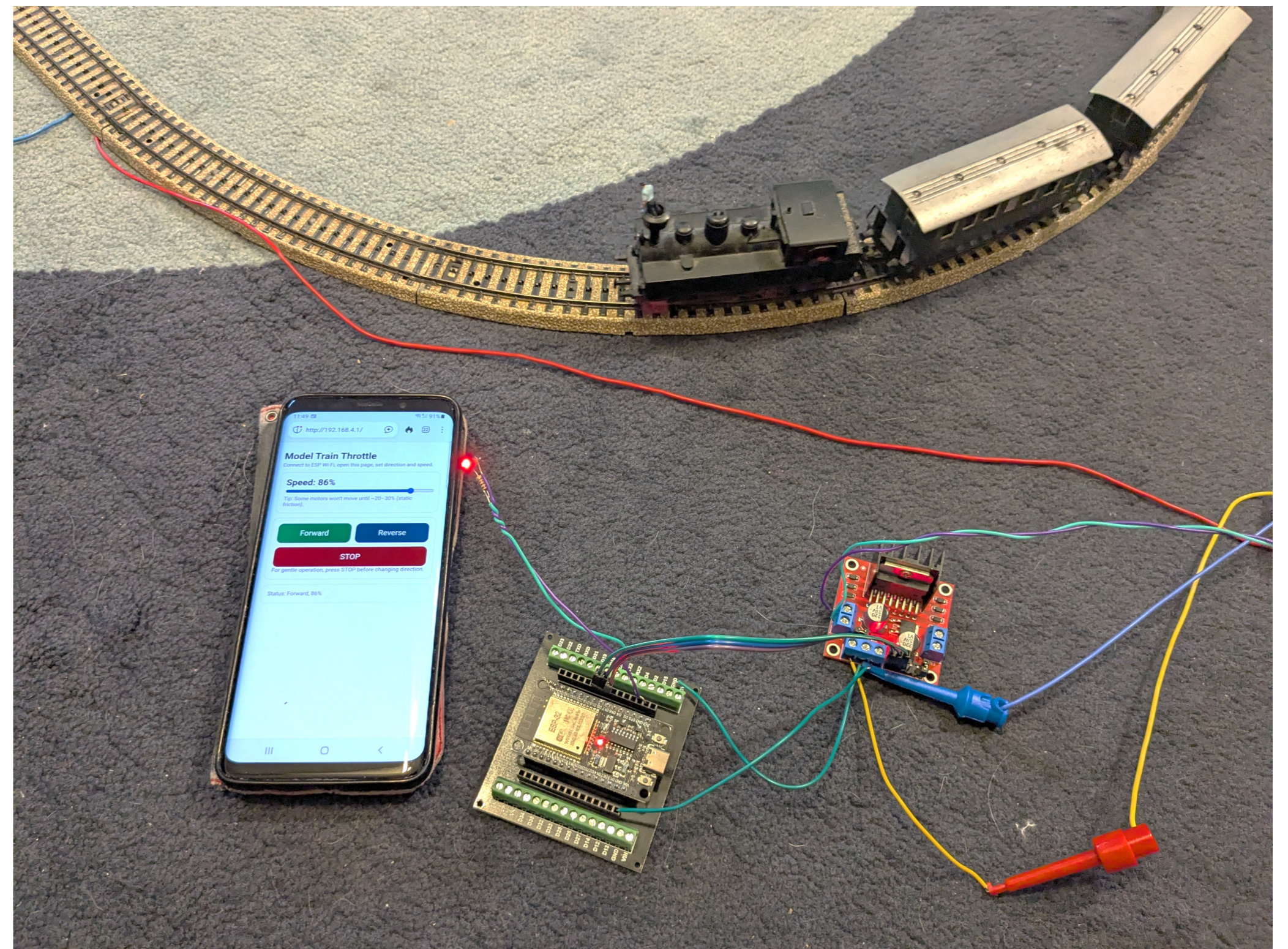
## Results

The user can move around the track (follow the train) and stay in control. Some minor issues with the phone trying to reconnect with a WiFi with internet access.

## Takeaways

- Learned how to use the ESP32s WiFi feature
- Implemented PWM motor control
- Reused a 40-year-old train set

## Photos



```
11 // ----- Wi-Fi Access Point -----
12 const char* AP_SSID = "ESP32-Train";
13 const char* AP_PASS = ""; // 8+ chars (or "" for open)
14
15 // ----- L298N (Channel A) -----
16 // IMPORTANT: Remove the ENA jumper on the L298N to use PWM.
17 const int PIN_ENA = 5; // PWM -> L298N ENA
18 const int PIN_IN1 = 18; // DIR -> L298N IN1
19 const int PIN_IN2 = 19; // DIR -> L298N IN2
20
21 // ----- PWM Settings -----
22 const int PWM_FREQ = 20000; // 20 kHz (quiet)
23 const int PWM_RES = 8; // 8-bit duty (0..255)
```

## Project Link

