

# IoT Testbed Tower - Overview

## Team Name: ESP TESTBED

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## BACKGROUND & INTRODUCTION

Despite decades of research, home automation has yet to make a significant impact on our everyday lives. Current smart home products rely on the use of a central controller, increasing their cost and complexity.

Our client, Tyler Steane is developing a new IoT protocol which removes the need for a central controller. Steane's protocol is developed for the ESP8266, a low-cost Wi-Fi microcontroller. It can be found on the ESP-01 development module. With a lack of an onboard serial controller and voltage regulator, the ESP-01 is difficult to program on a large scale.

## AIM

Steane's protocol has been successfully tested on 5 devices. One concern of Steane's protocol is packet loss due to collision. The ESP Testbed aims to solve this problem by creating compact towers of IoT devices which can be programmed from a single PC. Our goal is to test this on up to 150 devices.

## KEY FEATURES

- Efficiently Flash many ESP-01 modules with any firmware.
- Power a full tower of 15 devices.
- Centrally manage a large number of ESP towers.
- Test WiFi interference in 3 dimensions.
- Communicate with a large number of ESP's via serial.

## CONCLUSION

The outcome of the ESP Testbed was successful in achieving its initial goal, morphing into a highly scalable, low-cost prototyping system which allows any researcher to test ESP8266 protocols and firmware. The full cost of a tower is approximately \$155 AUD with reductions when ordering in bulk. The project has been made open source on GitHub with all documentation, schematics and code made available for anyone to use on their own projects. Further work is planned to continue the development of the ESP Testbed, aiming to increase ease of use and adding extra functionality to the project.

## ACKNOWLEDGEMENTS

Dr. PJ Radcliffe, PhD student Mr. Tyler Steane

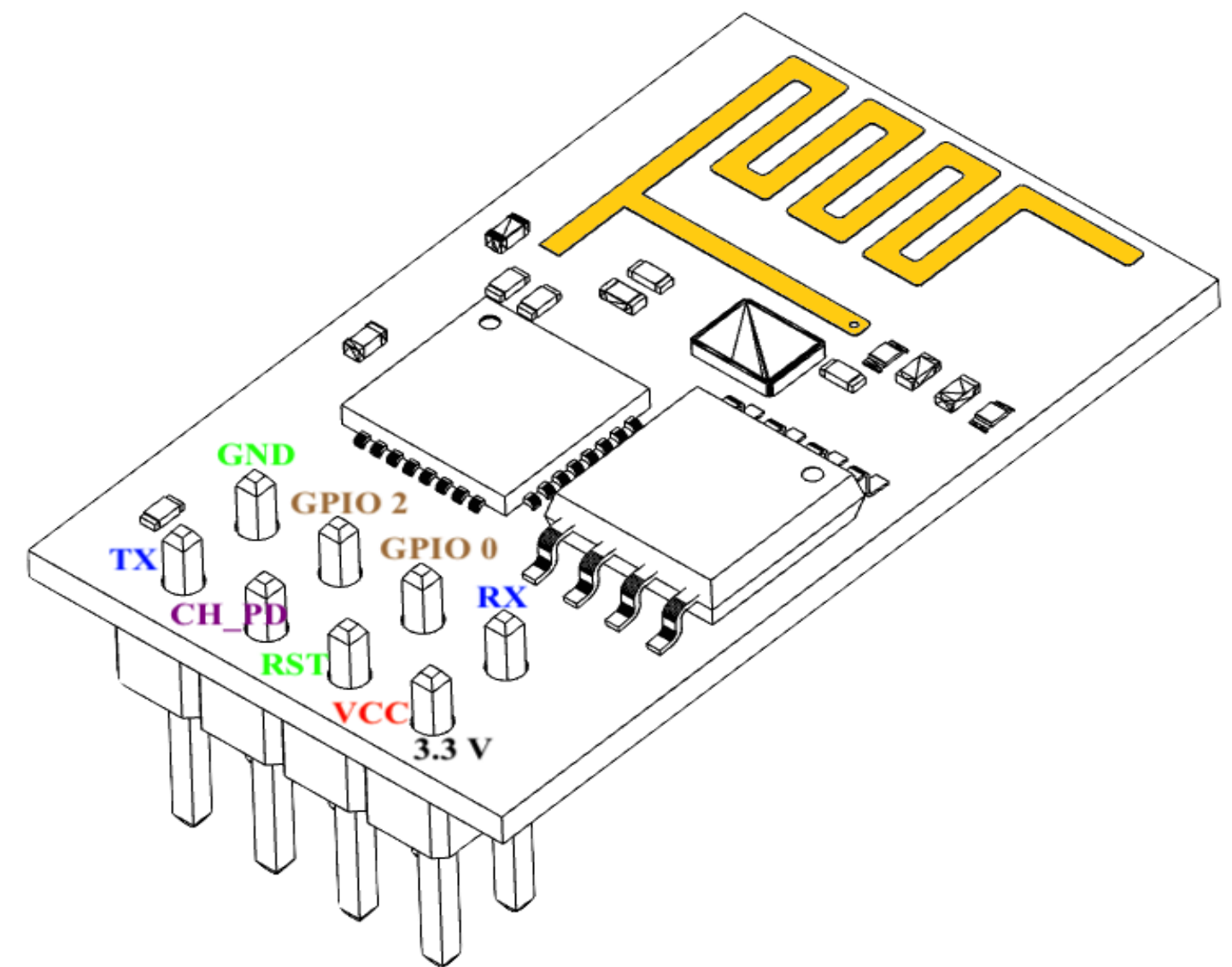


Figure 1: Ai-Thinker ESP-01 Wireframe

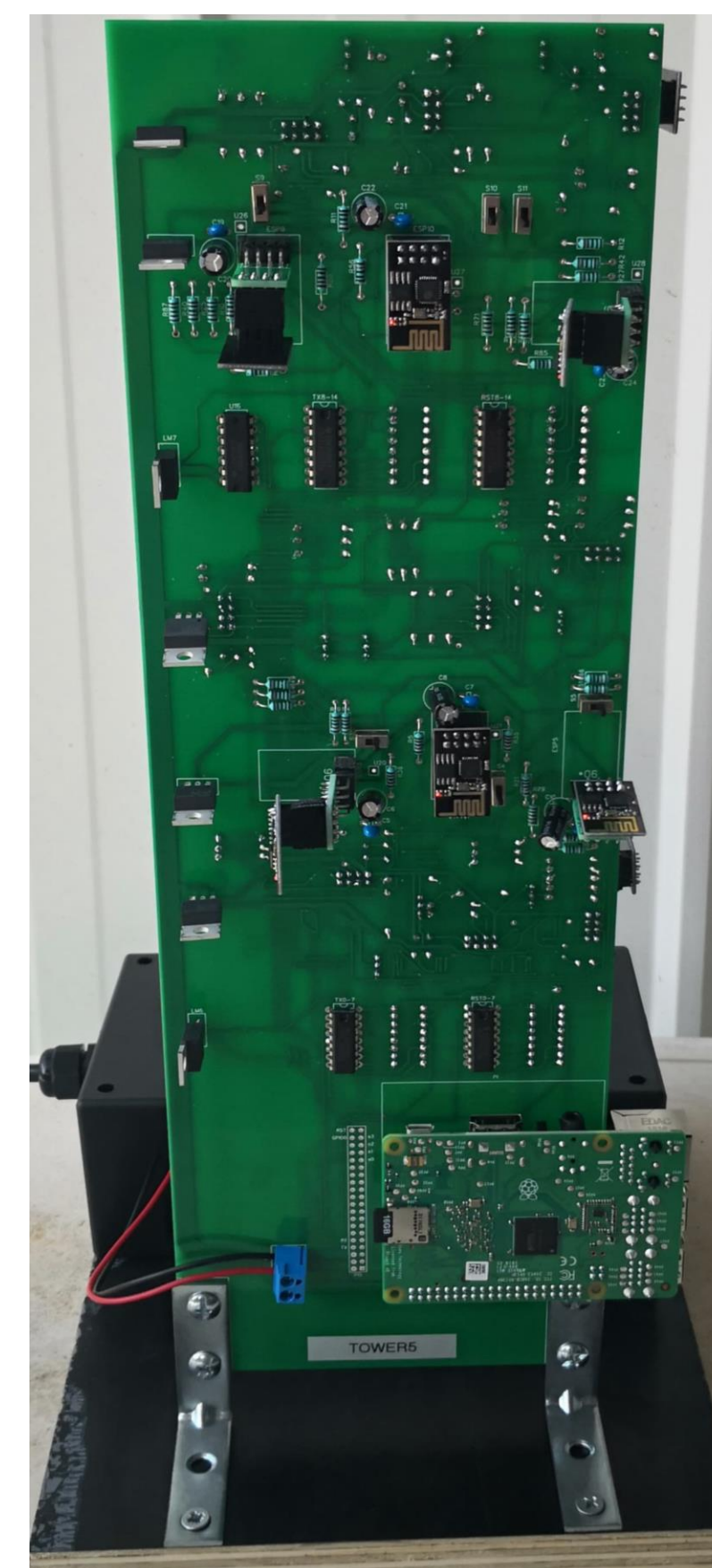


Figure 2: ESP Tower – Front View



Figure 3: ESP Tower – Rear View