

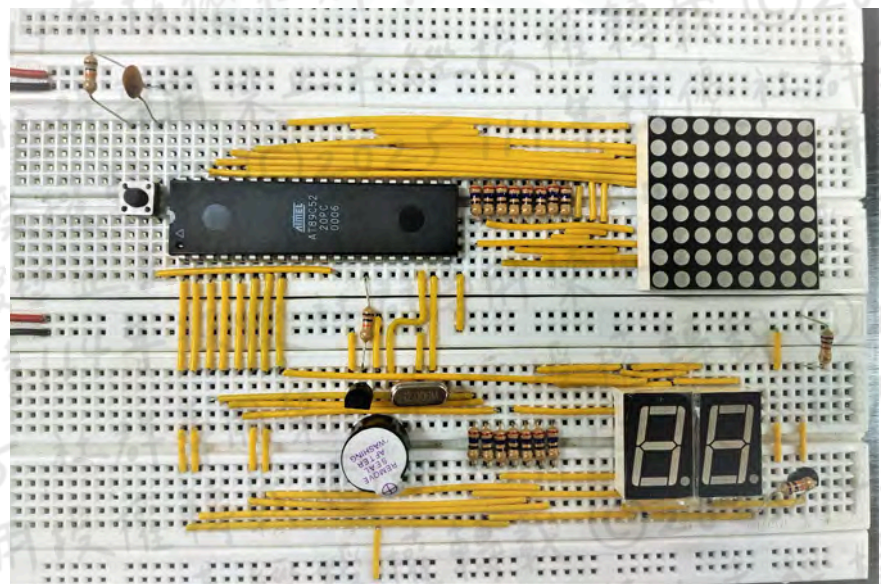
MICROCONTROLLER PRACTICE

8051 Stack Game

Inspired by a famous mobile game "Stack," where the player tries to stack moving blocks as high as possible, I and two other students made use of the knowledge we learned in our microcontroller practice course and built a circuit that mimics the game's functionality on a breadboard with an AT89S52.

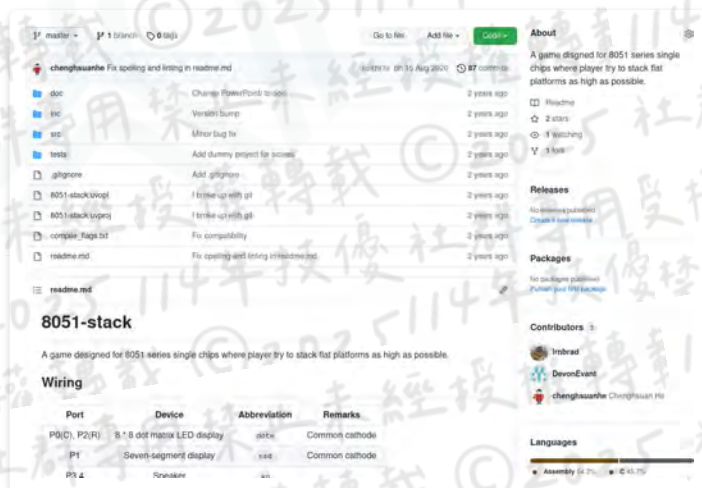


▲ Original game screenshot

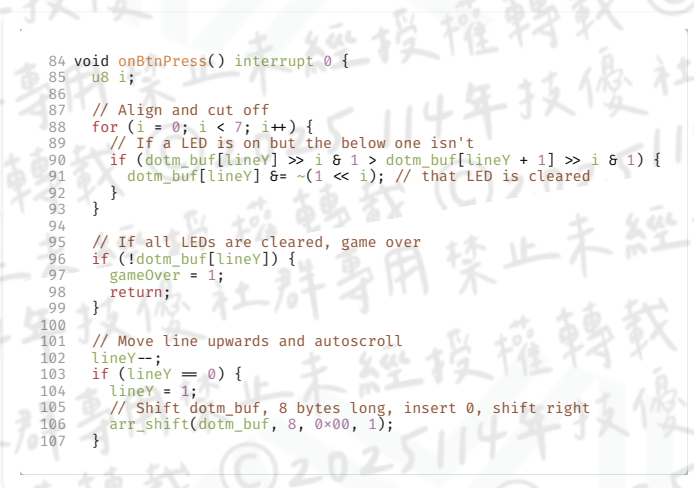


▲ Breadboard circuit

We successfully replicated the game with a dot matrix display, a seven-segment display for the score, along with a buzzer for sound effects. During the designing of code and circuits, **I learned how to coordinate a team as a project leader. I used Git to manage source code and documentation and published them on GitHub with an open-source license.**



▲ Collaborate and open-source on GitHub



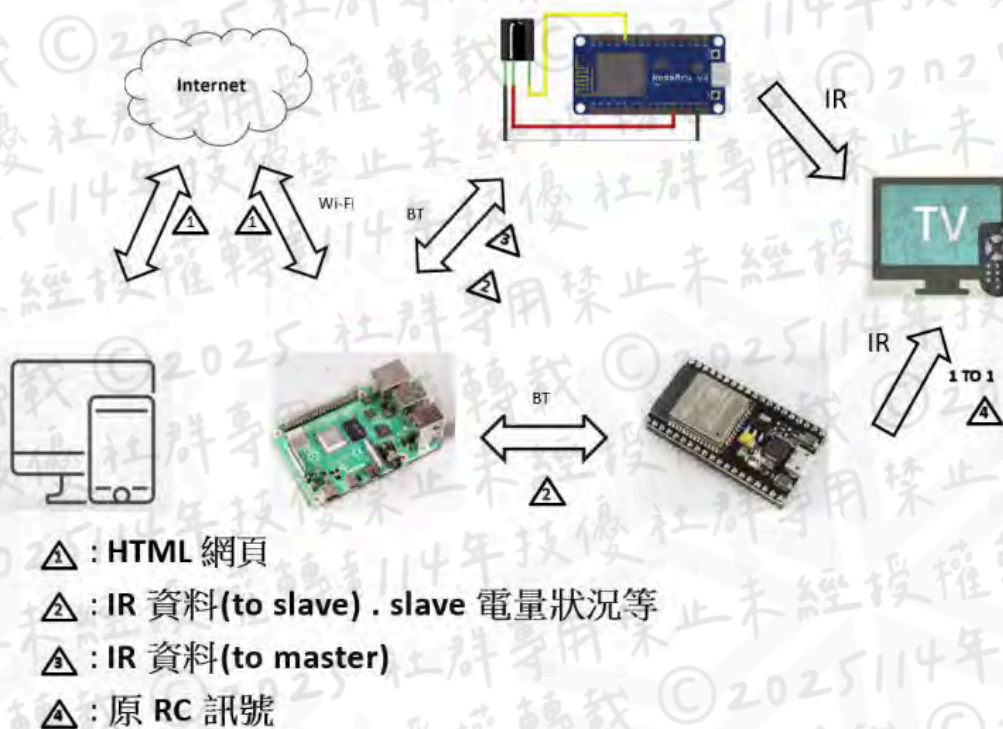
▲ Well documented code

Making the detector, **I learned how to control Raspberry Pi's GPIO** and send messages over the Internet using Python. **I created a step-by-step tutorial for one to build their own** in the hope of preventing more tragedies from occurring.

INDEPENDENT STUDY

Cross-Platform Remote Controller

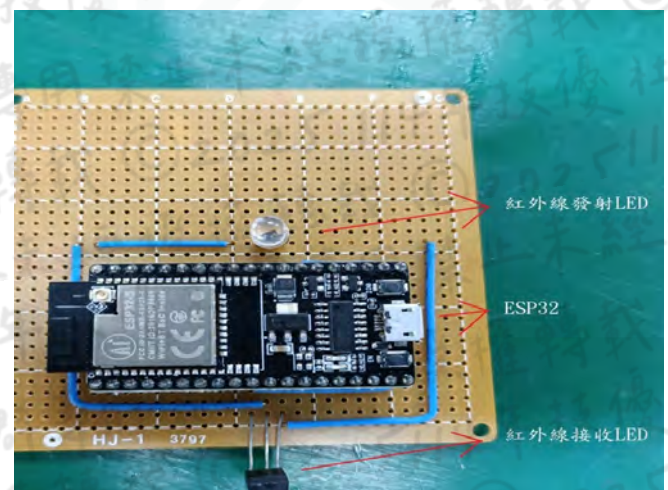
In an age where IoT devices are taking the appliance market by storm, controlling devices using a phone is becoming the norm. Older devices primarily use inferred remote controls as a means of controlling them. Keeping an IR remote for each device takes up valuable space, and replacing batteries is annoying and uneconomical. Therefore, **we made Cross-Platform Remote Controller (CPRC), a project attempting to smarten up old appliances in a modular, extensible manner.**



▲ Cluster diagram of the CPRC project

We chose the ESP32 microcontroller as our client for its low cost and low energy consumption. Via Bluetooth Low Energy, the microcontroller connects to a central computer (Raspberry Pi in this case) which provides a user interface on the web.

Using off-the-shelf components and standards-compliant format (JSON), **we designed a structure accessible for anyone to modify and extend.**



▲ a CPRC client prototype