Make a Wireless Alternative Controller Game

By Julia Makivic

About Me

- Designing alt-control games for ~5 years
- Worked at an IoT startup and designed various projects using wireless technologies
- You can view some of my other work here: http://juliamakivic.com

What are Alt-Control Games?

- Any video game that uses a non-standard interface, or uses a standard interface in an unusual way
- Unique, custom designed interfaces
- Not mass produced
- Usually meant to be played on location, similar to an arcade

Alt-Control Games

- Line wobbler: https://wobblylabs.com/projects/wobbler
- Bot Party: http://playbotparty.com/2018/01/24/WhatIsBotPartyl-prep/
- Rustle your leaves to me softly: https://www.youtube.com/watch?v=CFZkinLhDY4&embeds_euri=https%3A%2F%2Fjeka.games%2F&source_ve_path=OTY3MTQ&feature=emb_imp_woyt
- More examples: https://shakethatbutton.com/

What is IoT?

- IoT (Internet of Things) consists of many embedded devices that communicate with one another
- Has applications in various industries (agriculture, military, etc)
- Raises issues of privacy and surveillance

Agriculture

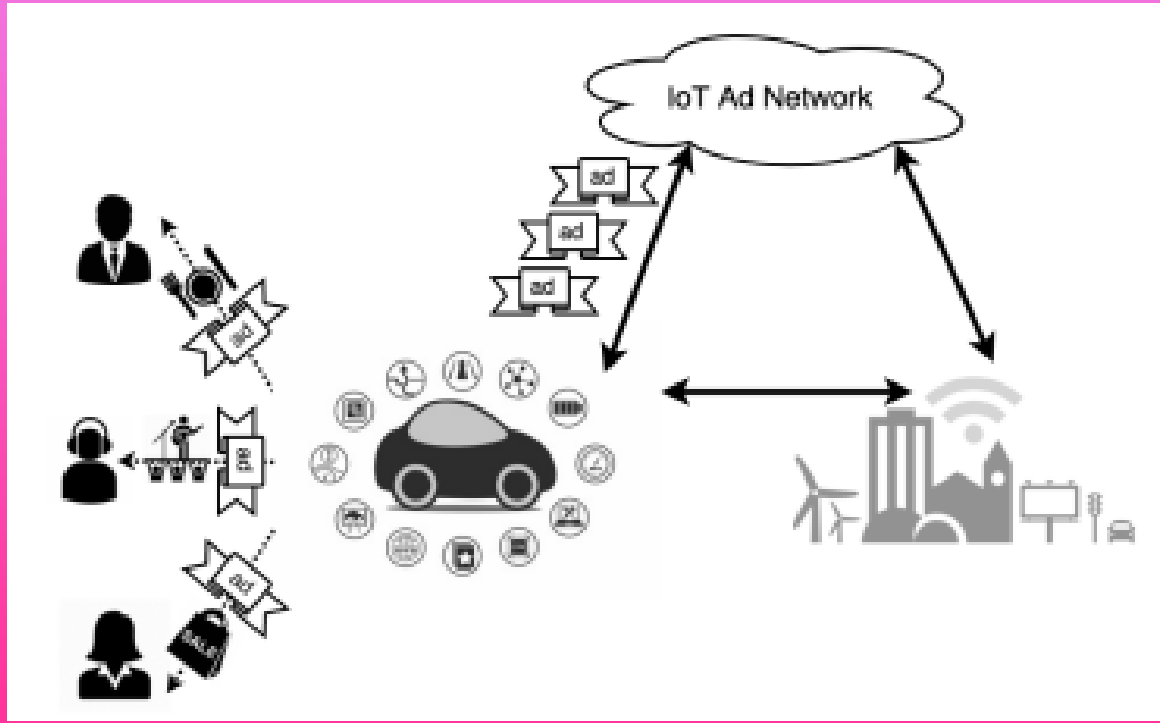
- Infarm
- Modular farming techniques
- Optimize conditions to grow each type of crop
- IoT allows for autonomous monitoring and adjustments for each crop

Military

- Drone warfare
  - Monitor the landscape
  - AI-enabled target identification
    - Predict enemy behaviour
    - Weather conditions, topological bottlenecks, news feed analysis
- Health Surveillance
  - Sensors in soldier’s clothing can give live updates on their location and health status

IoT and Advertising

- Facial recognition
  - Market according to your demographic
- Access mobile phone information
  - Number
  - Address
- Networked advertising:
  - Research here



Why make wireless alt-control games?

- Puts the power of technology in your hands!
- Lots of opportunities for networked play
- Alt-control games are inherently subversive
  - Defy hegemony in games
  - Empower players to build their own interfaces

What will we be making today?

- A simple wireless controller
- Two buttons and two LEDs
- The controller will take input from the buttons and send them to a web server

Making our wireless alt-control game

- Pico
  - Breadboard
  - Sensors
  - Wires
- MQTT
  - The standard messaging and data exchange protocol for IoT
- Webserver
  - Display data from your microcontroller in a fun way
  - P5.js creative coding library
  - Websockets to connect server to frontend

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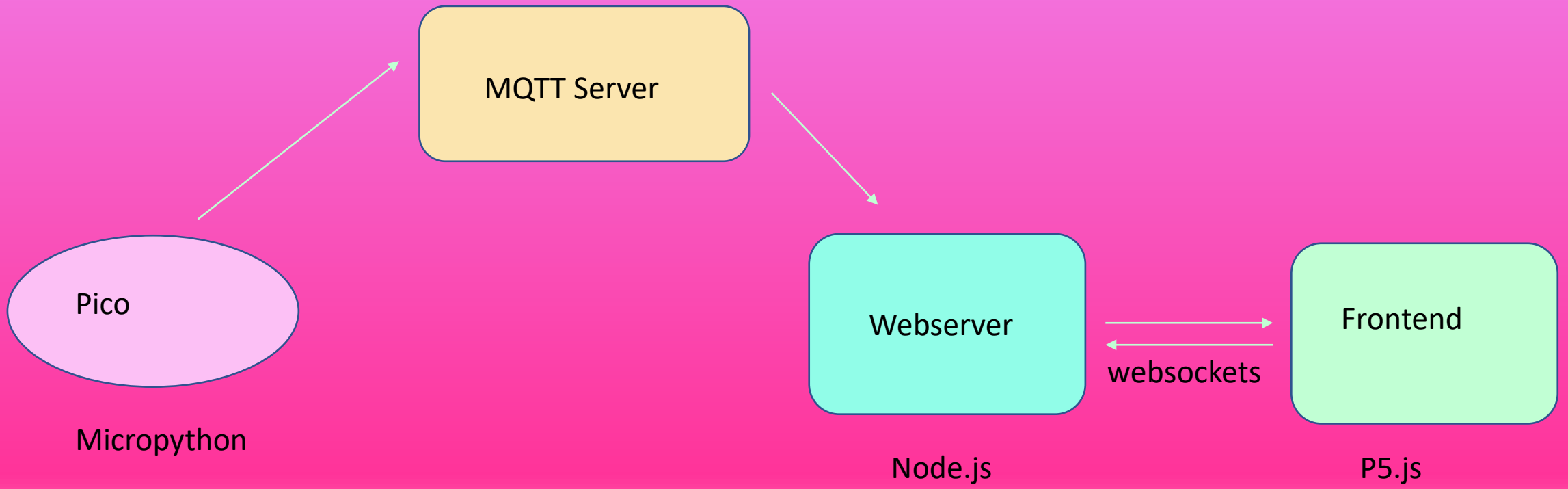
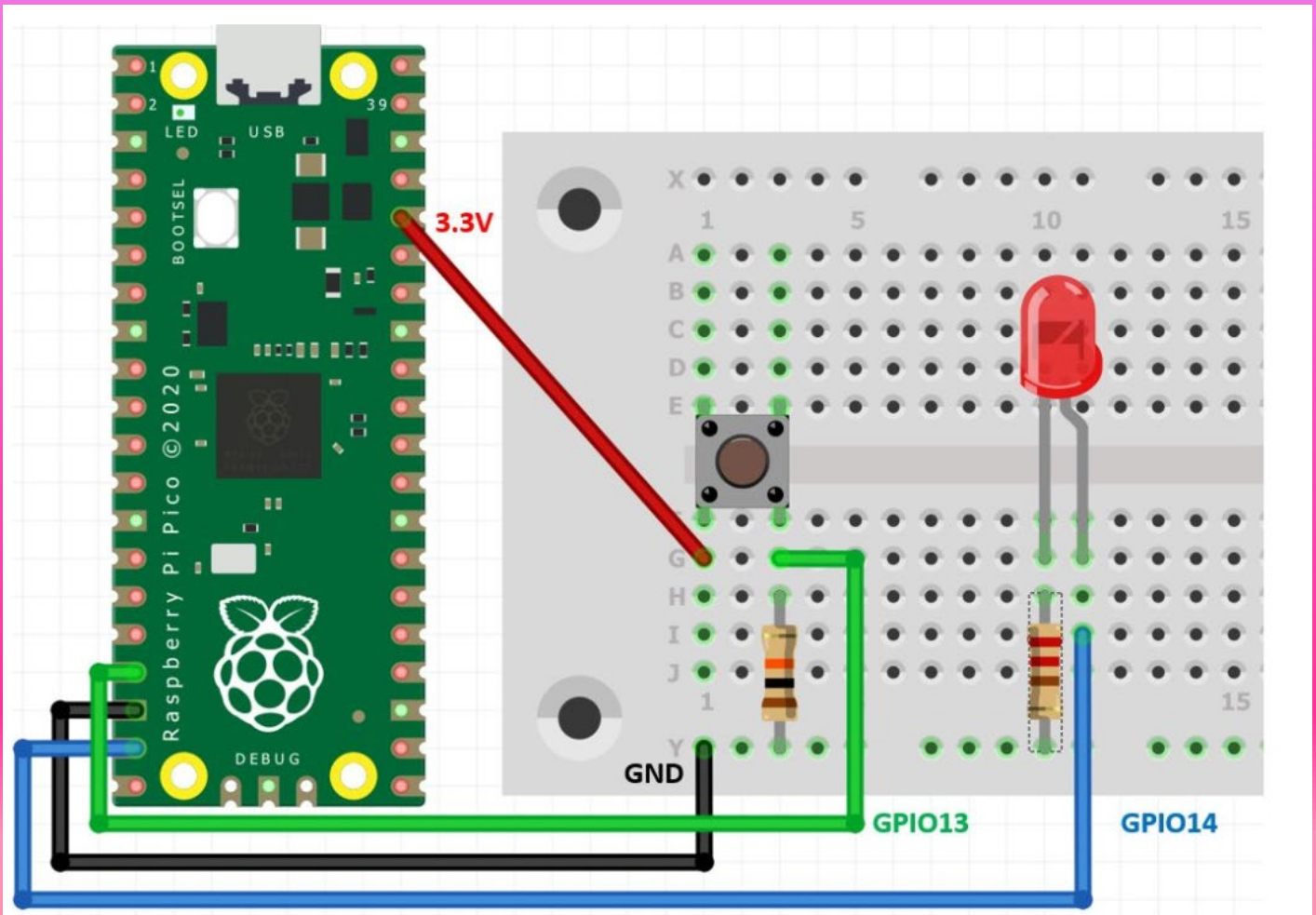

MQTT Server
Pico
Micropython
Webserver
Node.js
websockets
Frontend
P5.js

Time to install things!!!

Boot your Pico

- Press the BOOT button and connect your pico to the computer with the cable
- A drive folder will appear
- Drop the UF2 file into the folder
- This is setting up the “operating system” inside of your pico

Make your circuit!



Raspberry Pi Pico with LED and push button connection diagram

https://microcontrollerslab.com/push-button-raspberry-pi-pico-tutorial/

Install Thonny

- Python IDE
- We will be using Thonny to upload code to your pico
- Download the appropriate version for your OS https://thonny.org/

Program your Pico!

- Open Thonny and let’s start programming!

Customize it!

- Add one more button
- Add one more LED
- If you want to challenge yourself, borrow one of my potentiometers and add it to your pico:
  - https://projects.raspberrypi.org/en/projects/introduction-to-the-pico/11

Let's connect it to MQTT

- https://console.hivemq.cloud/
- Make an account
- Access this page: https://www.hivemq.com/demos/websocket-client/

Install Node

- https://nodejs.org/en/download
- For Linux: https://linuxconfig.org/install-npm-on-linux
- For MacOS: https://treehouse.github.io/installation-guides/mac/node-mac.html
- For Windows: https://treehouse.github.io/installation-guides/windows/node-windows.html
- More info for Windows and Mac: https://radixweb.com/blog/installing-npm-and-nodejs-on-windows-and-mac

Install node packages

- Use npm to install the following packages
  - Express: npm i express
  - Socket.io: npm i socket.io
  - MQTT: npm i mqtt

Program your webserver

Open your favourite IDE for programming and let’s start!

Note: completed code will be provided after the workshop

References

- https://www.hivemq.com/blog/mqtt-raspberrypi-part03-sending-sensor-data-hivemqcloud-pico/
- https://www.hivemq.com/blog/iot-reading-sensor-data-raspberry-pi-pico-w-micropython-mqtt-node-red/
- https://www.tomshardware.com/how-to/send-and-receive-data-raspberry-pi-pico-w-mqtt