Bluetooth Defense Axolotl - Project Timeline

William McAlister

2024-04-15

- Came up with the idea of using the axolotl head from our CPS stories assignment.
- Decided to use a pump as the actuator to advance my project for presentation on demo day.

2024-04-16

- Attended the Build studio workshop and wrote code to control the neopixels and a servo motor via the pinout interfaces of the Bluefruit.
- Read Adafruit's tutorial on Bluetooth proximity sensing and decided to use bluetooth as the sensor.

2024-04-17

- Followed Adafruit's tutorial to understand code that detects the proximity of Bluetooth devices.
- Wrote code to list all Bluetooth devices in the environment.
- Learnt to identify specific Bluetooth devices from their advertisements.
- Based on adafruit's tutorial. Wrote code to detect the proximity of a specific Bluetooth device,
- Struggled with stack overflow errors.

2024-04-18

- Tested how the pump works using a laboratory power supply.
- Figured out how to connect hoses to the pump.

2024-04-21

- Bought some plumbing fittings.
- Borrowed a 12v battery from my uncle.

2024-04-22

- Talked with Muhammed Asfour about the best way to control a DC motor.
- Used the laboratory power supply to test how a relay switch functioned.
- Progressed the code. Struggled with stack overflow errors (see image below).

2024-04-23

- Read Adafruit's documentation on the pinout interfaces.
- Wired the pump and the Bluefruit together via the relay switch.
- Wrote simple code so that the Bluefruit would periodically switch the pump on and off (see test_relay_switch.py)

2024-04-24

- Combined the sensor and actuators together so that the pump ran when the axolotl detected the stork in close proximity.
- Tested using a battery to power my pump.
- Completed a viable set of code for both the axolotl (see axolotl_combined.py) and the stork.

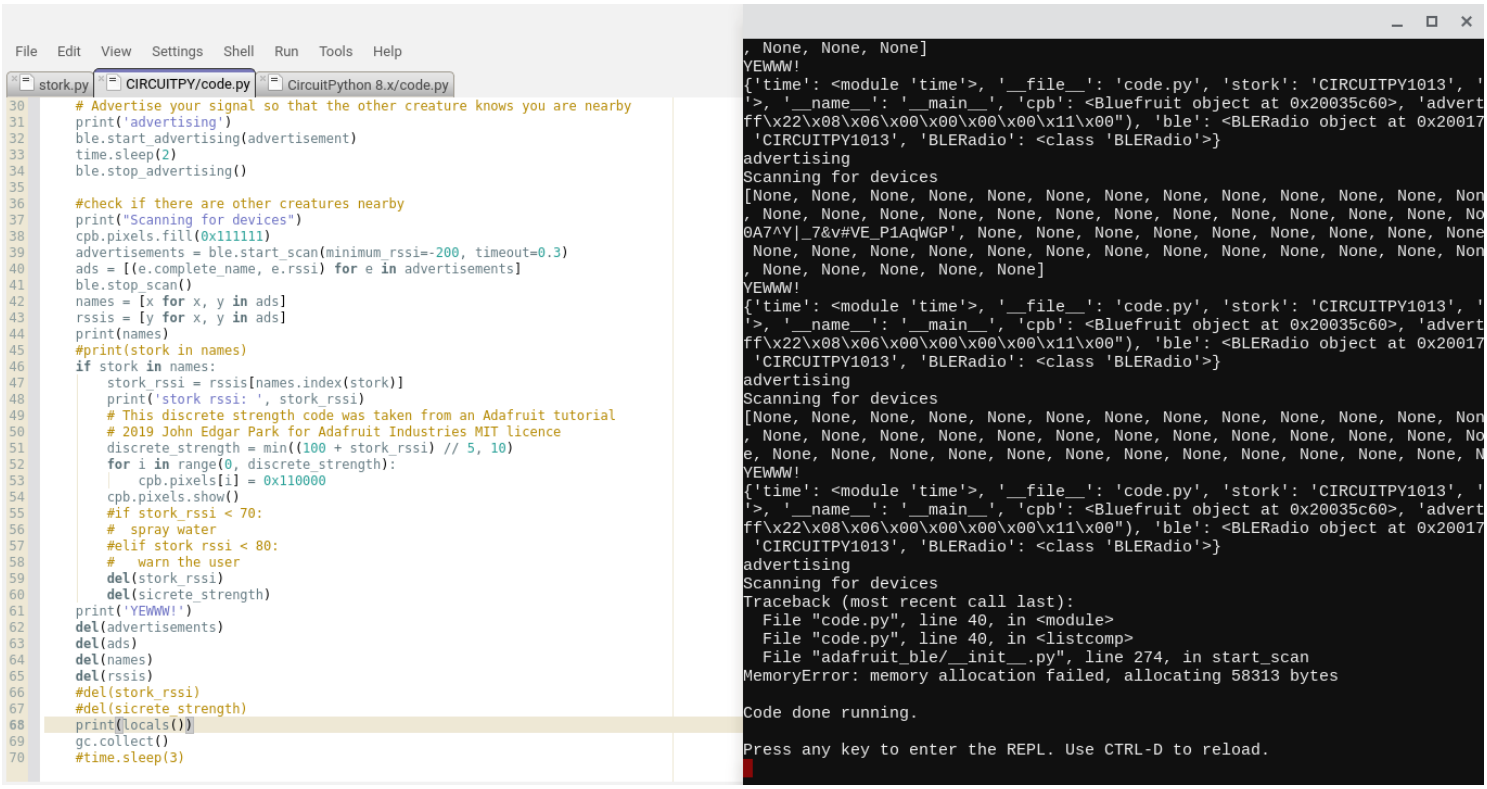

Figure 1: Too much Bluetooth, not enough RAM

- Major struggles with stack overflow errors in the lab environment presumably because of the number of Bluetooth devices around.

To-Do 2024-04-25

- ☒ Draw the Axolotl eye
- ☒ Solder the axolotl eye
- ☒ Fit the eye to the head
- ☒ Attach the battery into the head
- ☒ Attach the relay to the side of the head
- ☒ Fix the stork code to broadcast reliably
- ☒ Code the warning into the axolotl
- ☒ Code the eyes for the stork
- ☒ Tidy up the wiring
- ☒ Do a full assembled test outdoors
- ☒ Get a video of me playing with it
- ☐ Eliminate stack overflow issues in the code

Video

Why?

- ☐ I've made two creatures that interact via Bluetooth.
- ☐ I've learnt to use the Bluetooth sensor.
- ☐ I've also learnt how to control a 12v circuit with a 4v circuit and a to control a flow of water with a flow of electricity.
- ☐ I chose to make an axolotl and a stork because of an in-joke that started with our CPS stories presentation.
- ☐ I didn't have much time this fortnight so I decided to re-purpose an existing creature rather than starting from scratch.
- ☐ I chose to use these sensors and actuators because I am aiming to employ the same components in my maker project.
- ☐ The choice of Bluetooth caused some headaches. I think it was pushing the limits of the Bluefruit hardware.

What?

- ☐ Explain how the stork works.
- ☐ Explain how the Axolotl works.

- ☐ Explain how to setup the axolotl to see it working.
- ☐ Explain what can go wrong.
- ☐ Explain the challenges: Stack overflow from BLE, electrical connections are a bit flimsy, the pump can stall with air bubbles.

How?

- ☐ Talk about the sensor, actuator and physical components as three separate streams of development that were brought together at the end.
- ☐ Refer the user to the supplementary docs to see a couple of iterations of the code.
- ☐ To make the Bluetooth sensor, I followed a tutorial from Adafruit.
- ☐ It was a really satisfying experience. The code worked immediately when loaded onto my two Bluefruits and I easily understood how the code worked and was able to make changes. I learnt a lot about bluetooth from the tutorial.
- ☐ I think Adafruit does a phenomenal job with their tutorials and I really like that they release their code open-source.

Acknowledgements

- ☐ I basically need to thank everyone this fortnight.
- ☐ Biggest thanks to Tianee for making the axolotl costume in the first place and for being my videographer.

Supplementary Docs

- ☐ Include this to-do list
- ☐ Augment this to-do list to show the timeline of what I did on each day and a couple of reflections.
- ☐ Include some of the intermediate python code linked from the text.
- ☐ Include a screenshot of some errors.