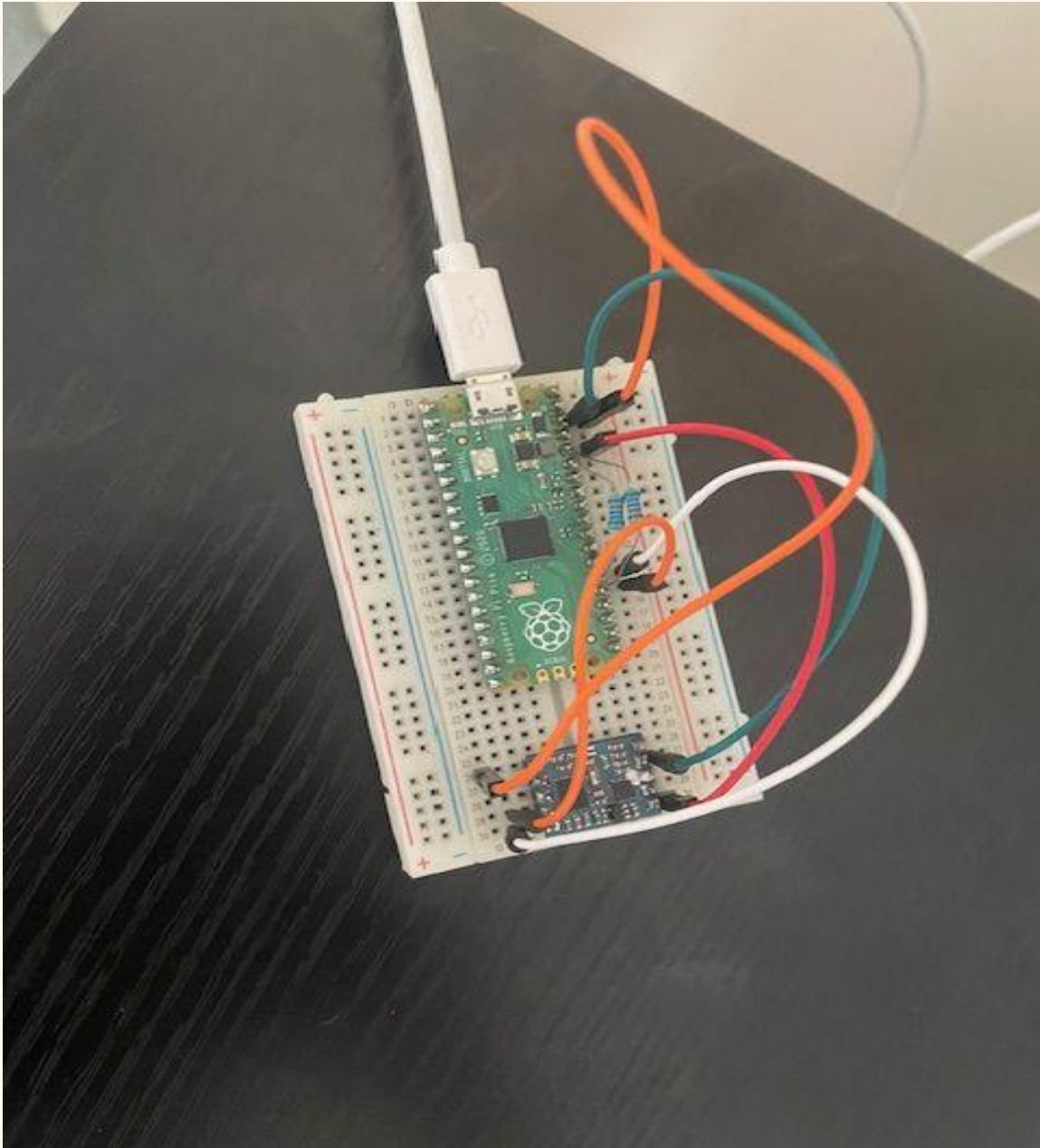


CS530 Systems Programming
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BN0055 Unity Controller

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BNO055 Unity Orientation Controller

This program aims to control Unity objects through BNO055 sensor using a RP2040 MCU.

This project can be conceptualized into 3 main parts

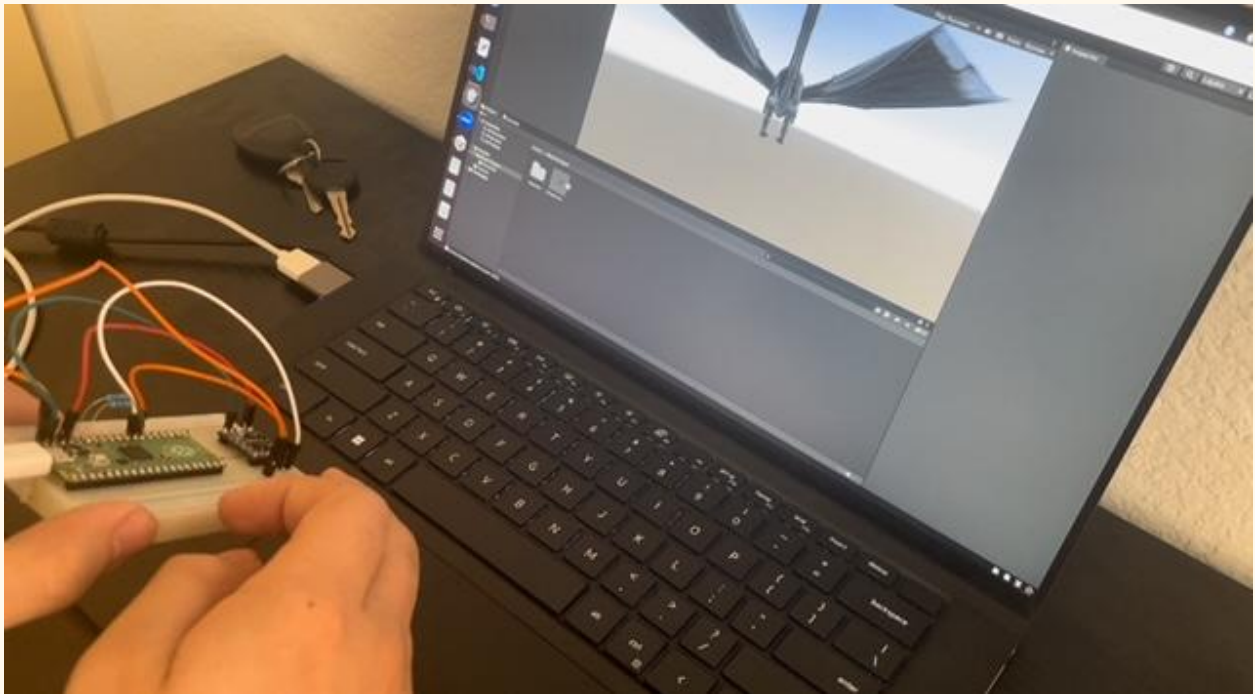
1. Embedded driver for BNO055 to query orientation data
2. Socket-Based Middle Layer that funnels data from sensor to unity
3. Unity scripts that handle the incoming data and translates that to appropriate movements in the engine

Implementation

1. The embedded code revolves around asking for the right values from the sensor and making sure it is configured correctly. The Raspberry Pi communicates with the sensor over the i2C bus. It must write to the appropriate register to prompt the BNO055 to return the needed values which can then be read and analyzed. It writes these to the serial device in linux over USB.
2. The socket code is a middle layer that aims to read the sensor data from USB and get it into a high-level program. This middle-layer will then provide the data in a more useable format on a socket that any server could listen on.
3. The unity code is pretty simple but involves writing some C# socket server code to grab the data from the middle layer. Then it places the values into the right format to be used in unity. From there a simple script can be made that can be attached to any object which would cause the object's rotation field to mirror the appropriate values.

Functionality

The sensor will continually send yaw, pitch, and roll values to unity which can translate these to the appropriate movements for any object. As you can see here, the sensor is pitched down which causes the dragon to match its orientation.



Future Possibilities

This device could be made into more of a full-blown controller for a game. One example could be a game where meteors continually come at the dragon and you could use the controller to accomplish the appropriate movements to dodge all the incoming objects. The BNO055 sensor is capable of giving more than just orientation, so a more complete embedded driver could be written to utilize linear acceleration and other values. These could be used to make a more complex controller.