MONASH University
Engineering

ECE4095 Final Year Project 2019

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VR Grip Simulation

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Project Aim

By combining **3D printed** components fitted with **actuators**, digital and analogue **sensors**, and a Unity designed **VR game**, this project aims to showcase **Grip Simulation**; a coined term which means a system that brings the **physics of the virtual world to the real world**. When a User holds on to an object in the VR game, the Grip Simulation system aims to **stop the User's fingers** around the boundaries of the object in the **real world** to produce an illusion of a **tangible VR environment**.

ARDUINO

CYPRESS
EMBEDDED IN TOMORROW™

ANDROID

Wi Fi™

Grip Simulation
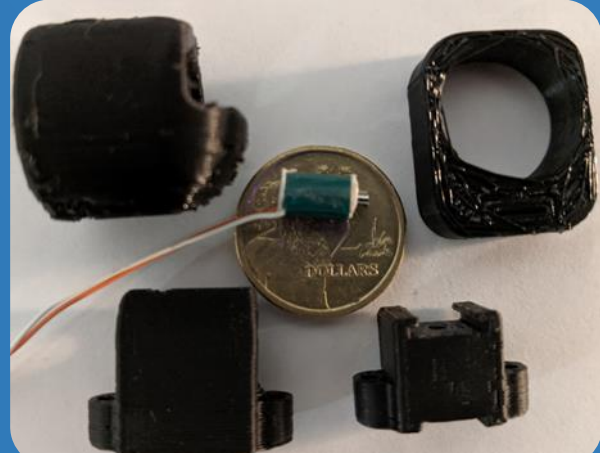
A sum of **CAD** designed and **3D printed** parts coupled with a **motor** used for stopping a tape that connects to the end of the finger.

3DS SOLIDWORKS

CURA.

Flex Sensors

Hand-made sensors using **Velostat** paper that **changes voltage** across the material when bent, allows to measure **bending of a finger**.
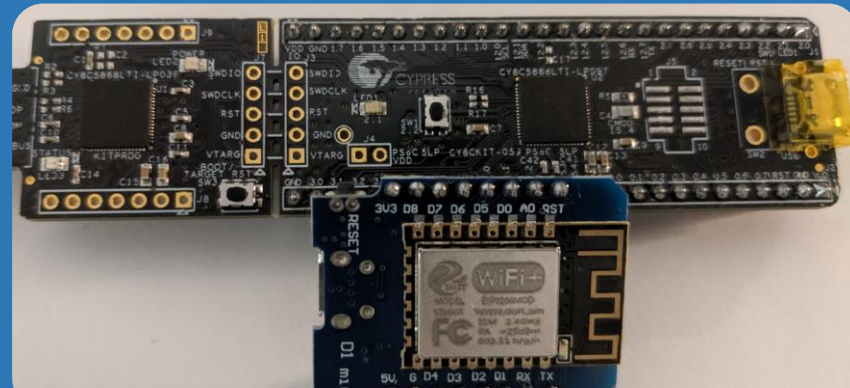
Rotation Mapping

An **MPU6050** sensor to measure **pitch, yaw** and **roll** for rotation mapping transferred via **I2C**.
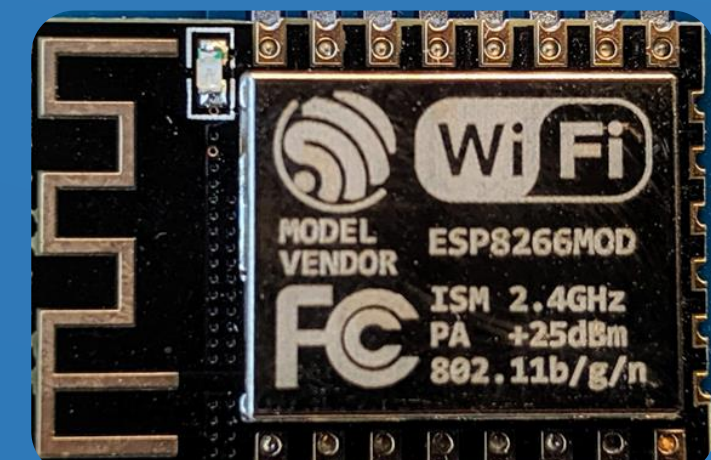
Haptic Feedback

Vibration motors made by Adafruit controlled with **PWM** to simulate **touch** on the fingertips when the User grips a VR object.

The Microcontrollers

The **Wemos D1 Mini** and the **PSoC 5LP** boards together make the brains of the system allowing **fast capture** and **sending of data** due to their 160 and 240 MHz clocks.

The VR Game

The game made on Unity and hosted on an **Android** smartphone features a **3-DOF hand model** which the user controls to **grip game objects**.

Wi-Fi Direct

The feature that allows the Wemos board to directly **connect** to the Android phone while **sending and receiving data** at **<5ms latency**.

unity

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