Build Guide

Link to GitHub - https://github.com/Hxpnot1c/Digital-Stethoscope

Print all 3D models in 'Digital-Stethoscope/3d_models':

- PLA_Stethoscope_Head.stl should be printed in PLA with 100% infill
- PLA_Stethoscope_Ring.stl should be printed in PLA with 100% infill
- TPU_Stethoscope_Connection.stl should be printed in TPU with 100% infill

Note: Our models were printed using a Creality CR10 Smart Pro 3D printer. Most FDM 3D printers will be sufficient.

We also used the default setting on Cura slicer (with 100% infill).
For Stethoscope Ring: Supports ON - Normal

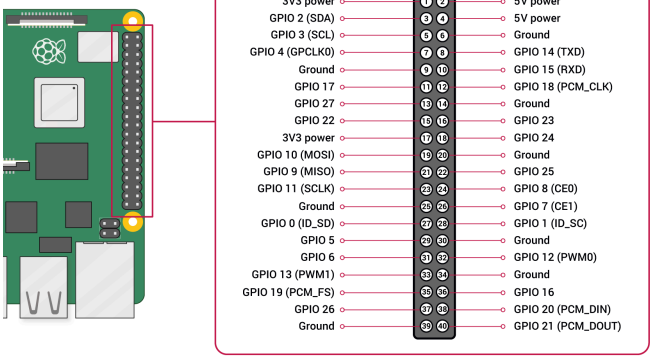
For the diaphragm, we used a 40mm diameter silicone piece with a thickness of 0.35mm

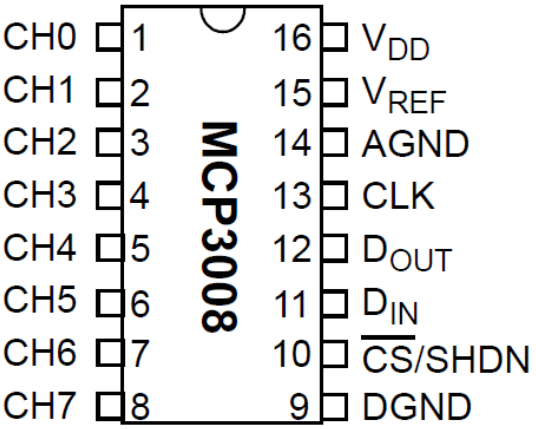
See Assembly Video below for a 3D rendering of how to assemble the 3D printed parts and the diaphragm.

All connections require no adhesive and rely on a friction fit. In order to attach the Ring some pressure will be required, this will then provide a tight fit.

The microphone will then also provide a tight fit into the TPU connection piece

The following connections may require soldering and the use of breadboards. Please see the below pinout images to demonstrate pin connections.
Connect V_{DD} on the MCP3008 ADC to 3.3V on the Raspberry Pi using pin 17
Connect V_{REF} on the MCP3008 ADC to 3.3V on the Raspberry Pi using pin 17
Connect AGND on the MCP3008 ADC to GND on the Raspberry Pi using pin 25
Connect CLK on the MCP3008 ADC to GPIO 11 (SCLK) on the Raspberry Pi using pin 23
Connect D_{OUT} on the MCP3008 ADC to GPIO 9 (MISO) on the Raspberry Pi using pin 21
Connect D_{IN} on the MCP3008 ADC to GPIO 10 (MOSI) on the Raspberry Pi using pin 19
Connect CS/SHDN on the MCP3008 ADC to GPIO 8 (CE0) on the Raspberry Pi using pin 8
Connect GND on the MAX9814 microphone to GND on the Raspberry Pi using pin 25
Connect V+ on the MAX9814 microphone to 3.3V on the Raspberry Pi using pin 17
Connect OUT on the MAX9814 microphone to CH0 on the MCP3008 ADC





Install the following dependencies using pip:

- adafruit_mcp3008
- librosa
- matplotlib
- pandas
- pyqt5
- sound file
- torch

Download 'Digital-Stethoscope/src'

Run the following commands in the terminal to run the program:

- *'sudo chrt 99 python src/model_prediction.py'*
- *'sudo chrt 99 python src/gui.py'*
- *'sudo chrt 99 python src/data_acquisition.py'*