Acoustic and Visual Telepresence Robot

By Avatar
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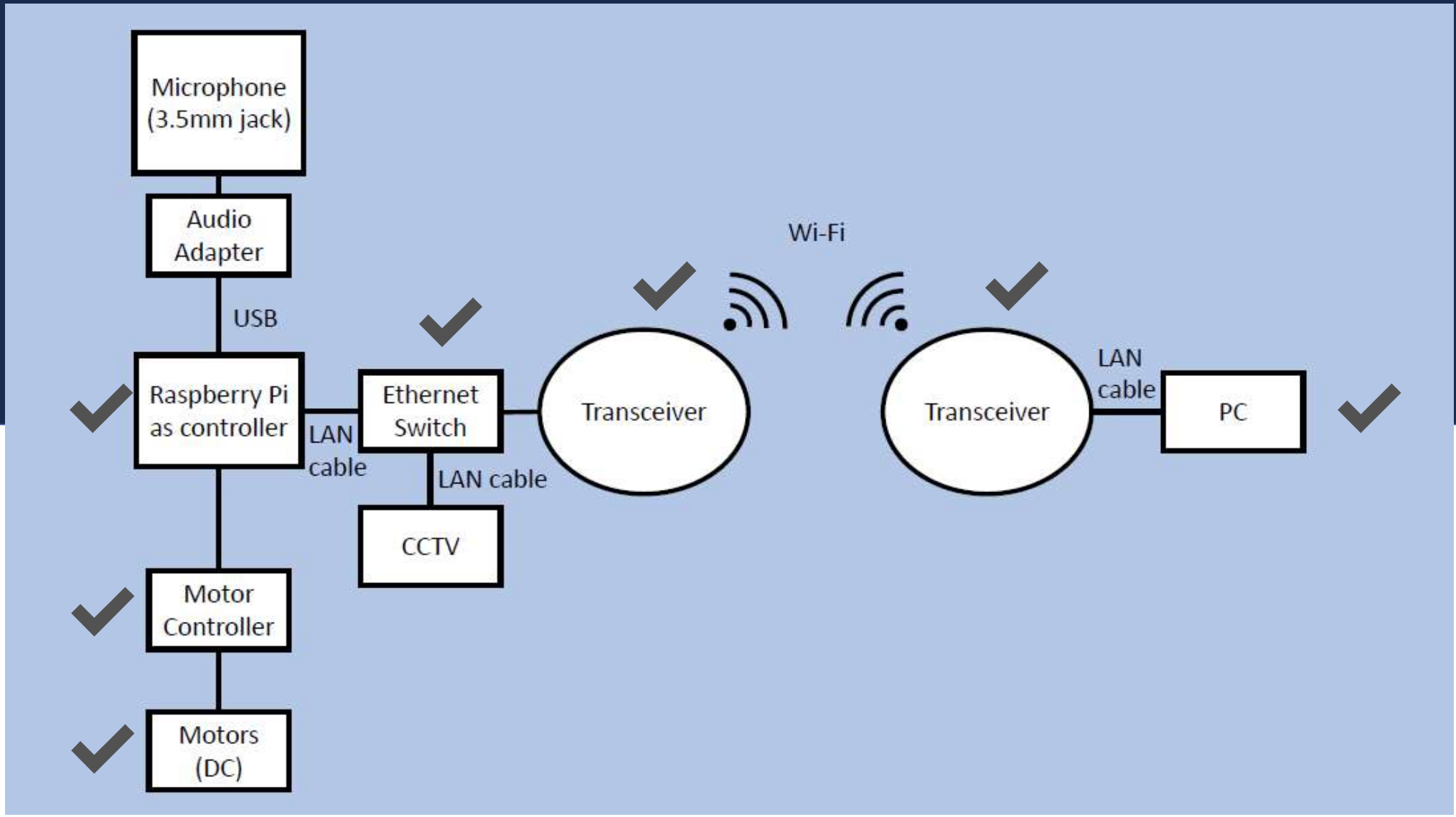
Overview

- Current Progress
- Upcoming Plans
- Budget and Expenditure


Microphone
(3.5mm jack)
Audio
Adapter
USB
Raspberry Pi
as controller
LAN
cable
Ethernet
Switch
LAN cable
CCTV
Transceiver
Wi-Fi
Transceiver
LAN
cable
PC
Motor
Controller
Motors
(DC)

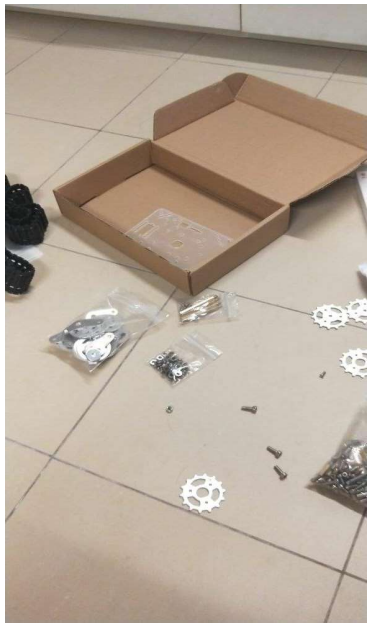
Current Progress – 4 main parts

- ✓ Tank
- ✓ Functions of Tank
- ✓ 3D designs
- ✓ Putting the tank together

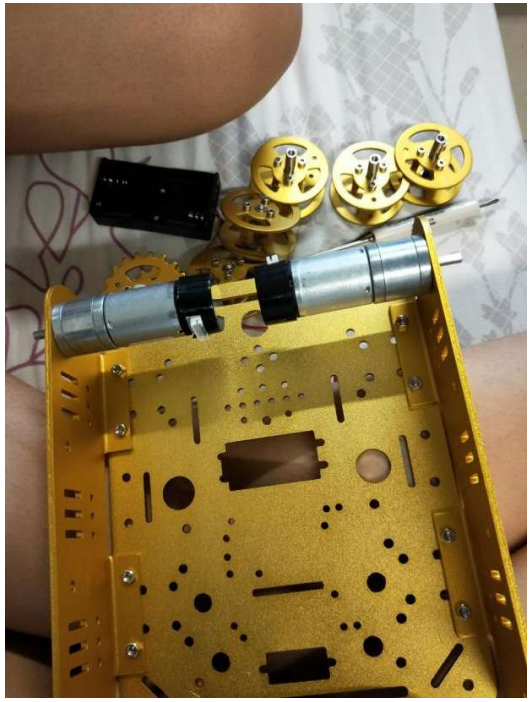
The tank

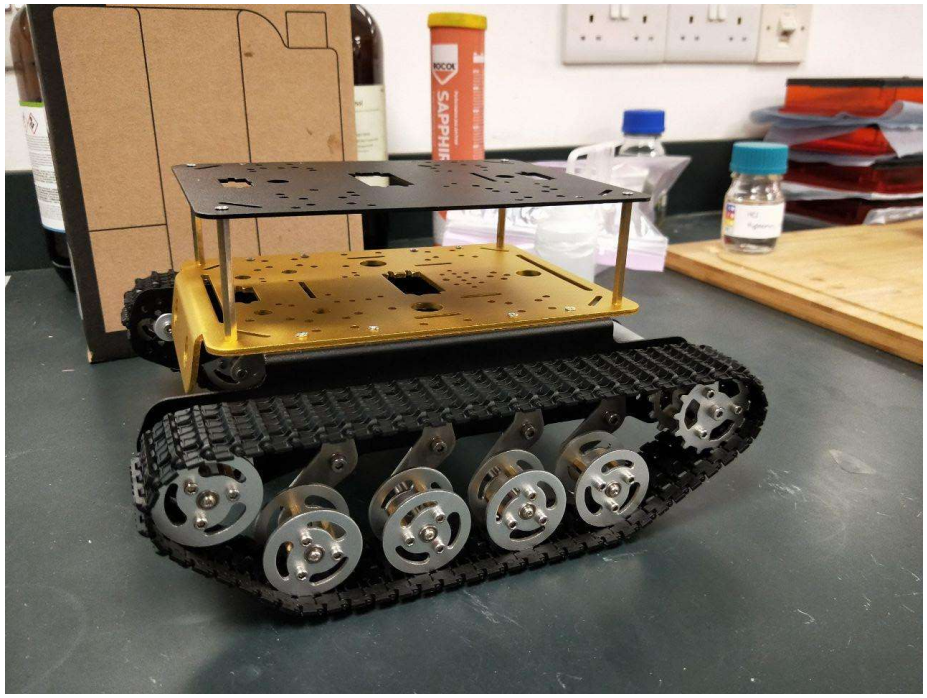
- Built the tank from the unassembled parts given to us by seller
- Coded for the directions of the tank
- Controlled tank remotely
- Modified the code to improve the tank's moving capability

Building the tank

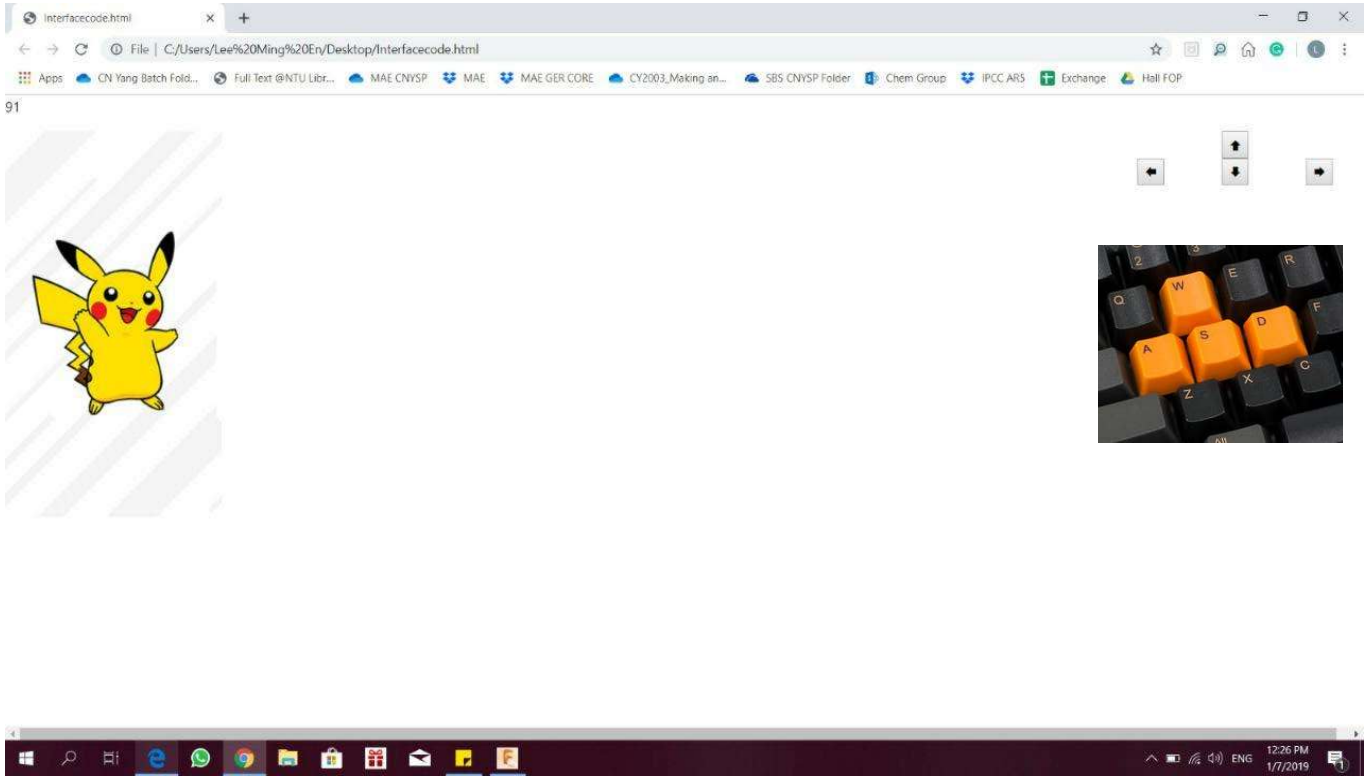


Building the tank





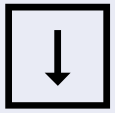
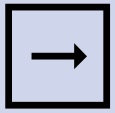
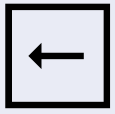
Web interface



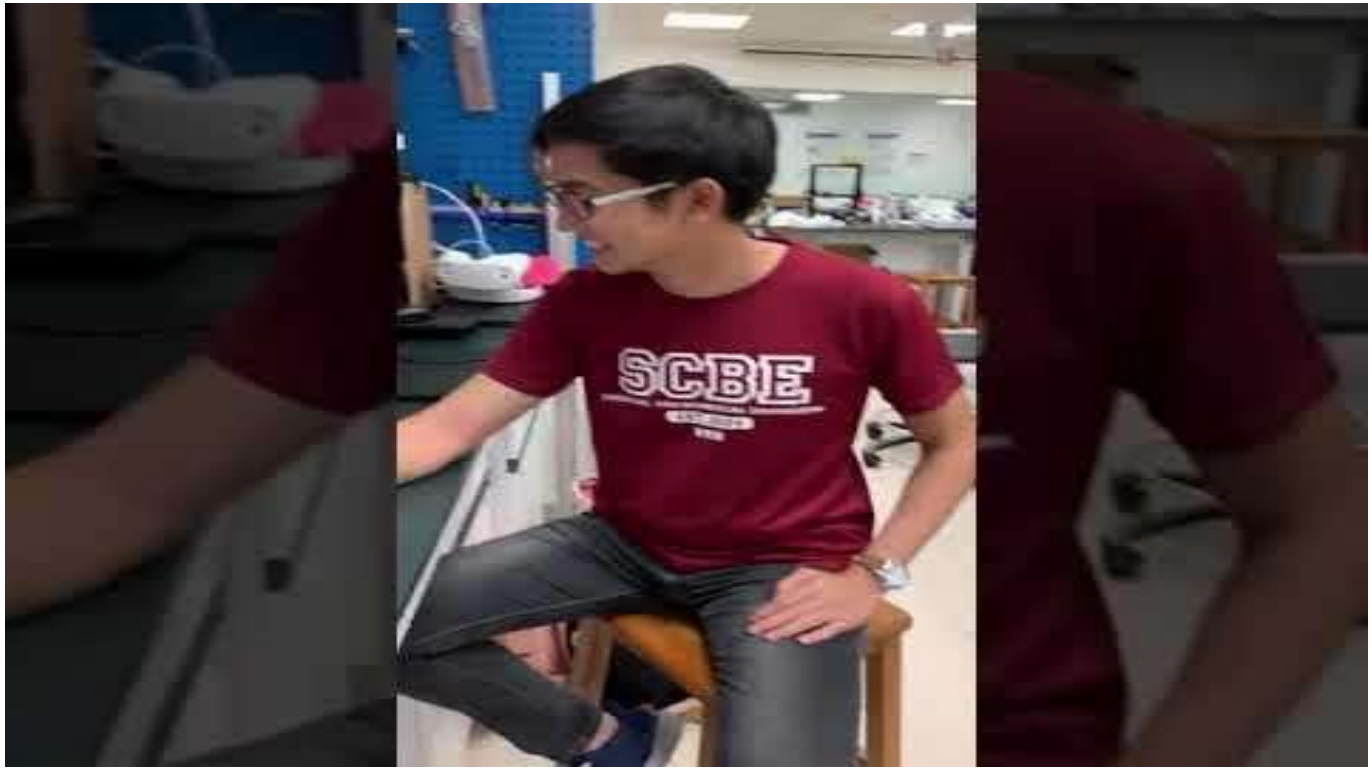
Controlled tank remotely

Modified code to allow for further movements -

Forward right, forward left, backward right, backward left

Directions	What to press	Directions	What to press
	W		W & D
	S		W & A
	D		S & D
	A		S & A

Controlling tank remotely



Functions of the tank

- Video: Tested live-streaming over LAN of video using pin-hole camera and normal CCTV camera
- Audio: Tested audio HAT module and binaural microphones

Live-streaming using pin-hole camera

Considerations

- Lighter in weight
- Available in the lab
- Possible lag time
- Lower quality of video

Problems

- Lag time of 9s when connected using NTU Secure
- Video is low quality
- During preliminary trials to stream both the video and audio together, it did not work

Live-streaming using CCTV camera

Considerations

- Much heavier in weight
- More expensive
- Possible lag time depending on quality of video
- POE
- Camera not yet delivered so we can only test using other group's camera (of similar model and identical brand)

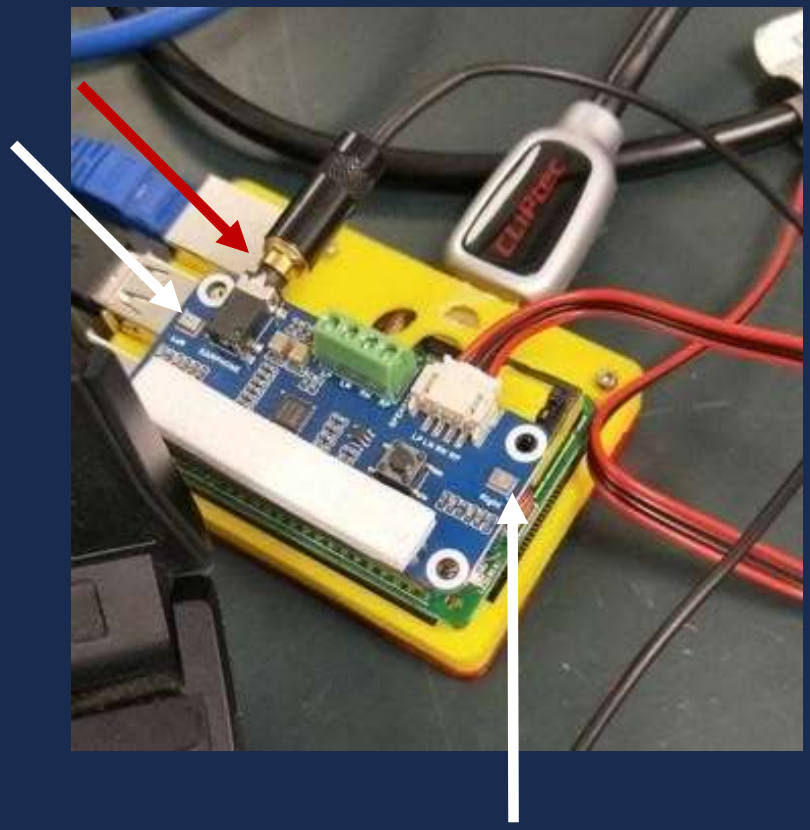
Problems

- Lag time of 1s over wireless LAN
- Heavier in weight so tank will consume more power and have shorter running time
- Have not tested our own camera

Tested audio HAT module

Considerations

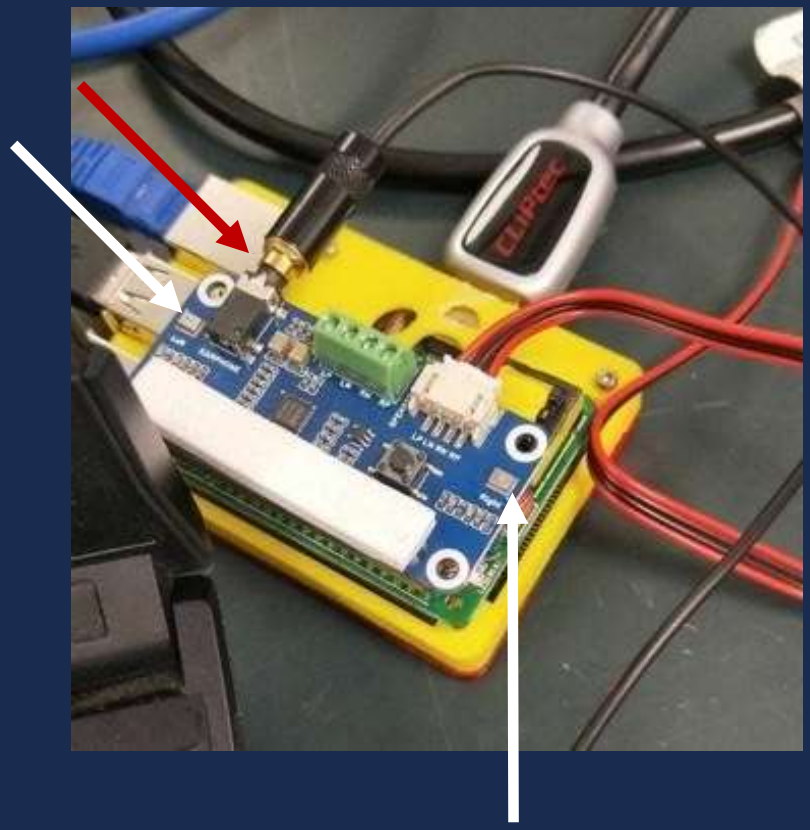
- Based on preliminary research, audio HAT allows for stereo sound processing in RPI
- Need to test the stereo input and output of the HAT module and see if it is compatible with the binaural microphones we bought



Tested audio HAT module

Problems

- Audio hat module only allows for stereo input using the integrated microphones on the HAT itself
- Audio jack only allows for stereo output through headphones but not stereo input



USB sound card adapter

Problems

- Each adapter only allows for mono microphone input
- Does not allow for stereo input when we tried to record using the binaural microphones

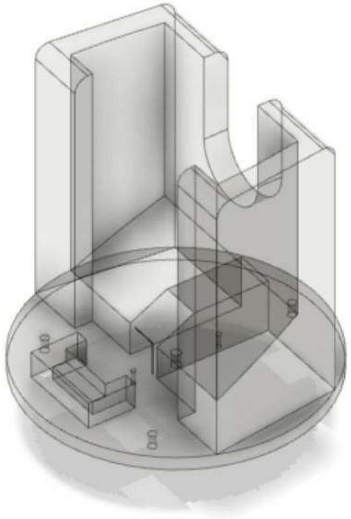
Possible Solutions

- Upcoming Plans

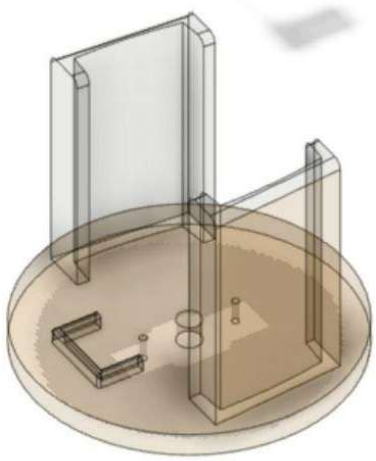
3D Designs

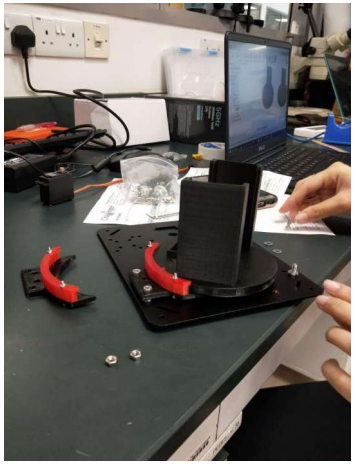
- Design for transceiver turntable
- Design for disc stabilisers to hold turntable in place
- Design for platforms to better organise parts on tank and Increase space to place parts

Transceiver turntable



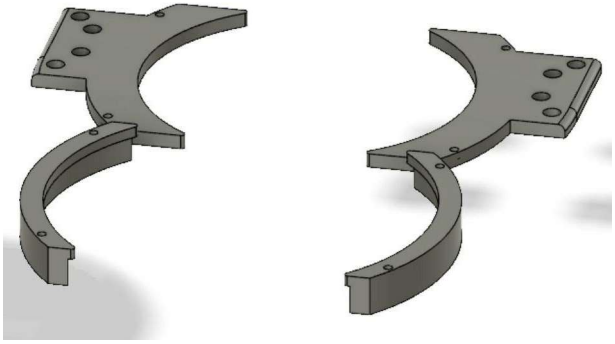
Design 1

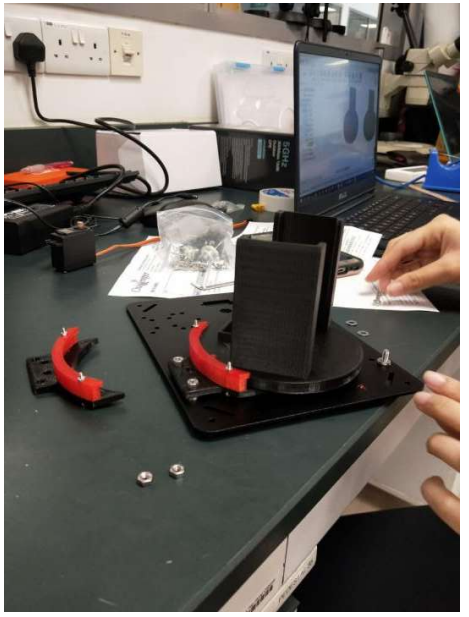




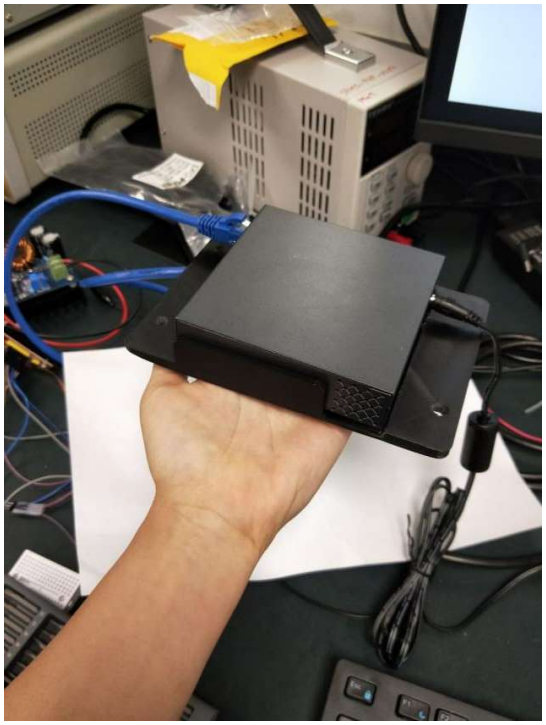
Design 2

Disc stabilisers





Platforms – Ethernet switch holder



Putting the tank together

- Design considerations of how to put the tank together
- Weight considerations

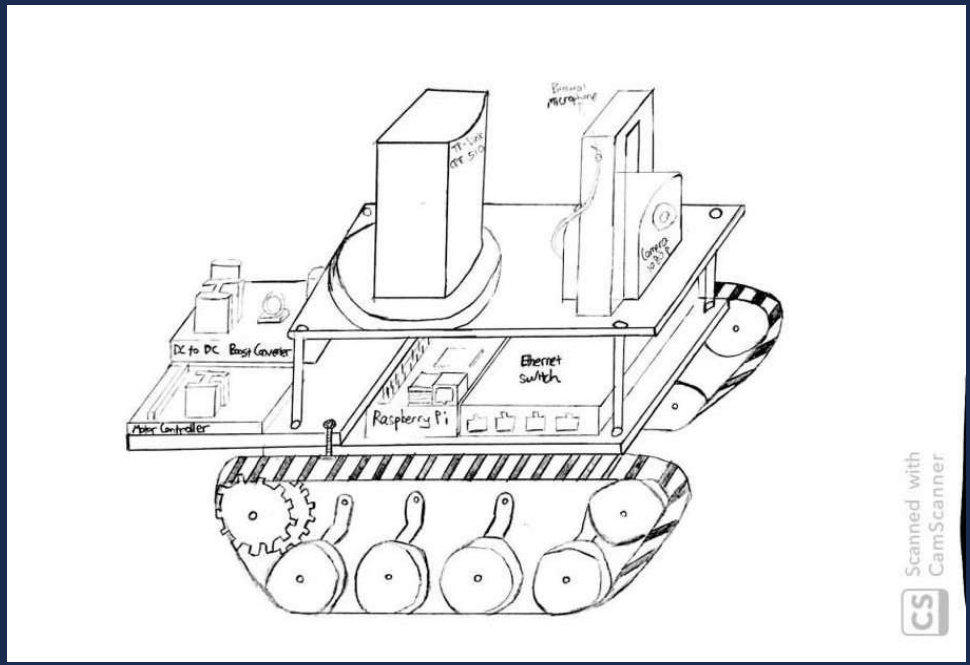
Design Layout (Initial)

Considerations

- Space Constraint
  - Extended Platform to hold Motor Controller and Boost Converter
  - 2 Level Platform

Problems

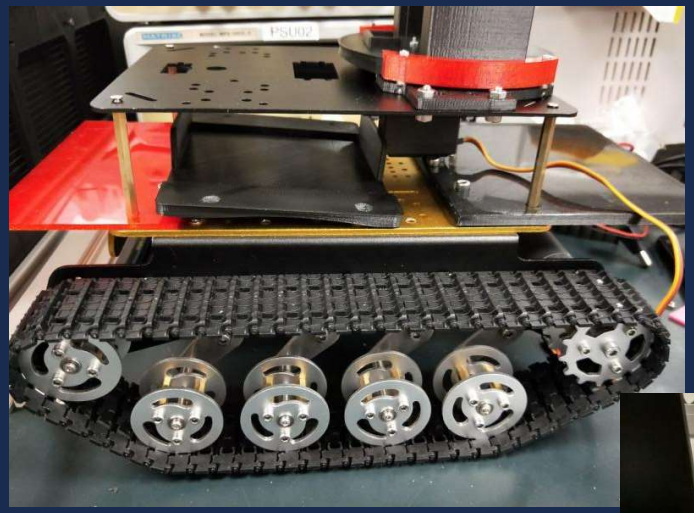
- CG off center which leads to decreased stability

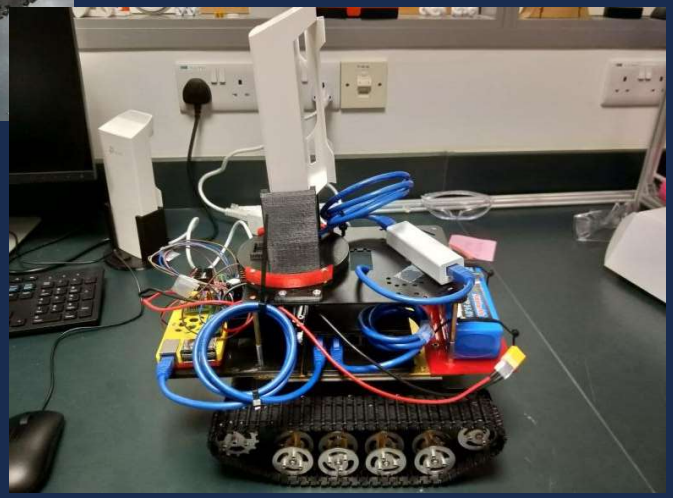


Design Layout (Plans to improve)

Considerations

- CG and Stability concerns
  - Re-organize the parts by placing heavy parts at opposite sides so torque balances out
- Ethernet Switch Holder
  - Re-design and print to hold the switch and make sure the part fits
- Cable Management
  - Less Entanglement
  - More orderly



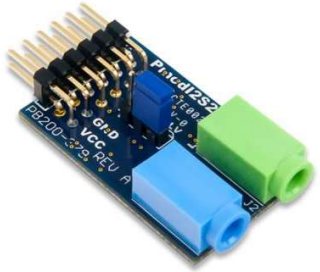


Upcoming Plans

- Resolving audio problem and integrating the audio with the 3D ears we printed
- Coding such that the robot will stop moving after losing connection
- Mounting everything together on the robot and designing a casing so the robot looks better
- Using the IMU and servo motor to maintain transceiver alignment

Resolving the audio problem

- Using audio splitter
- Buying specific USB sound cards that allow for stereo sound input (very few brands + out of stock)
- Buying another module which allows for stereo sound input (Pmod I2S2: Stereo Audio Input and Output)



Budget & Expenditure

- New Expenditure

New Expenditure

Parts	$$	Received
USB Sound Card Adapter	36.80	Yes
4x Flat Lan Cables	25.15	No
Audio Splitter	?	No

Total Expenditure: $1394.72

Thank you and have a nice day!

Any questions?