# METR4202

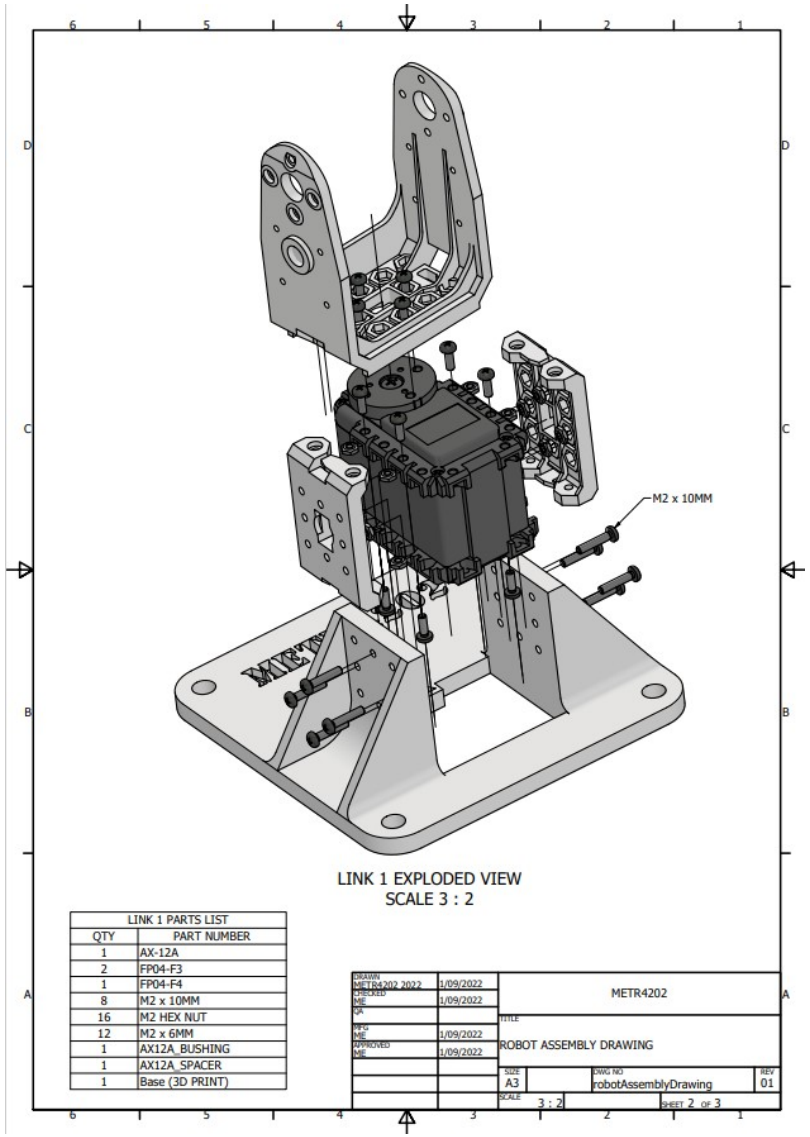
## Robotics & Automation

## Week 8: Practical - ROS Architecture, Gripper and Robot Assembly

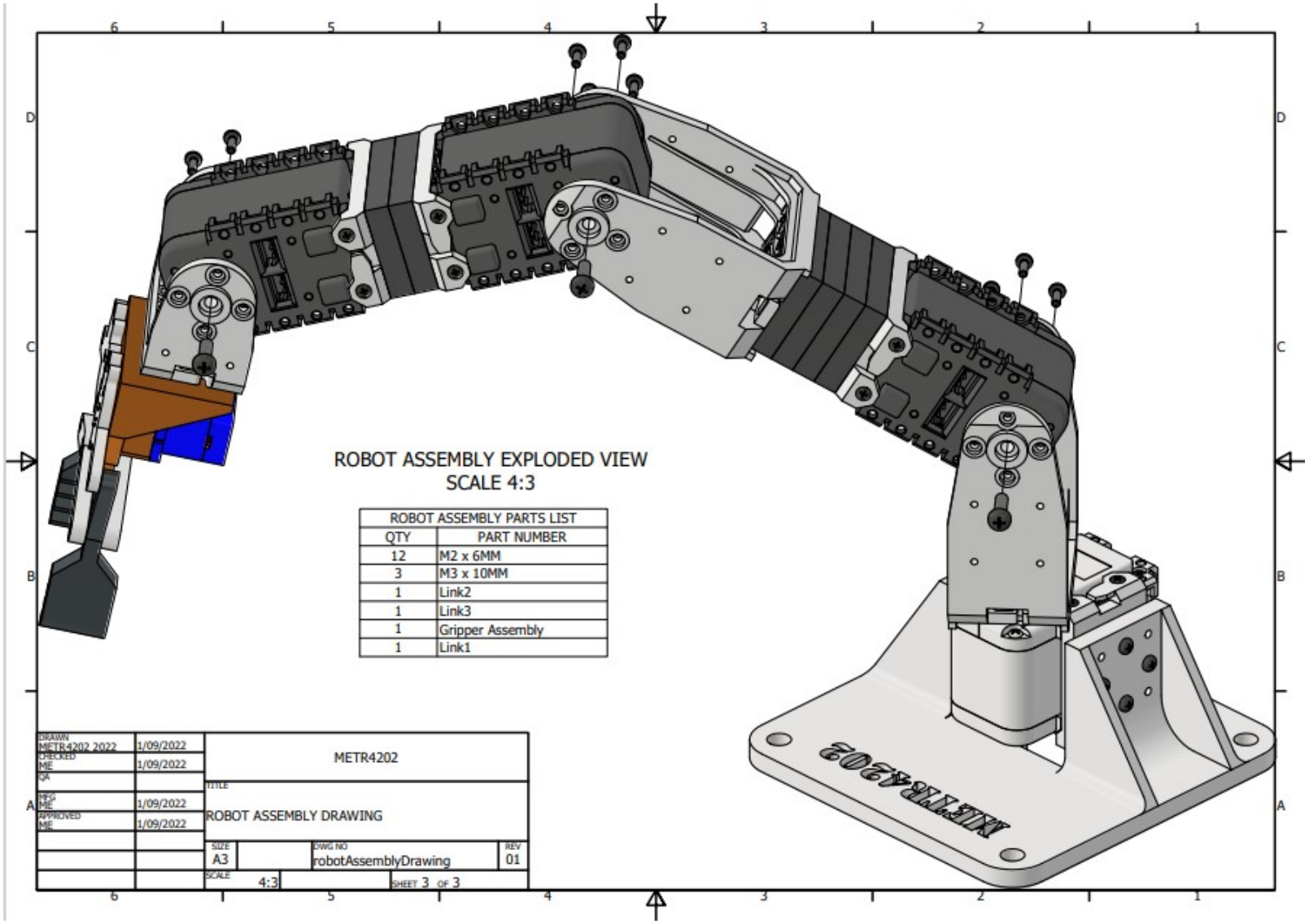
# Summary of Today's Session

- Handing out Camera mounts and bases. Construction of the Robot and Camera Mount (30 Mins)
- Gripper Code and Usage (30 Mins)
- ROS Architecture Discussion (30 Mins)
- General Help (30 Mins)

# Robot Base


M2 x 10MM
LINK 1 EXPLODED VIEW
SCALE 3 : 2
LINK 1 PARTS LIST
QTY | PART NUMBER
1 | AX-12A
2 | FP04-F3
1 | FP04-F4
8 | M2 x 10MM
16 | M2 HEX NUT
12 | M2 x 6MM
1 | AX12A_BUSHING
1 | AX12A_SPACER
1 | Base (3D PRINT)
DRAWN METR4202 2022 1/09/2022
CHECKED ME 1/09/2022
QA
MFG ME 1/09/2022
APPROVED ME 1/09/2022
METR4202
TITLE
ROBOT ASSEMBLY DRAWING
SIZE A3
DWG NO robotAssemblyDrawing
REV 01
SCALE 3 : 2
SHEET 2 OF 3

# Complete Assembly

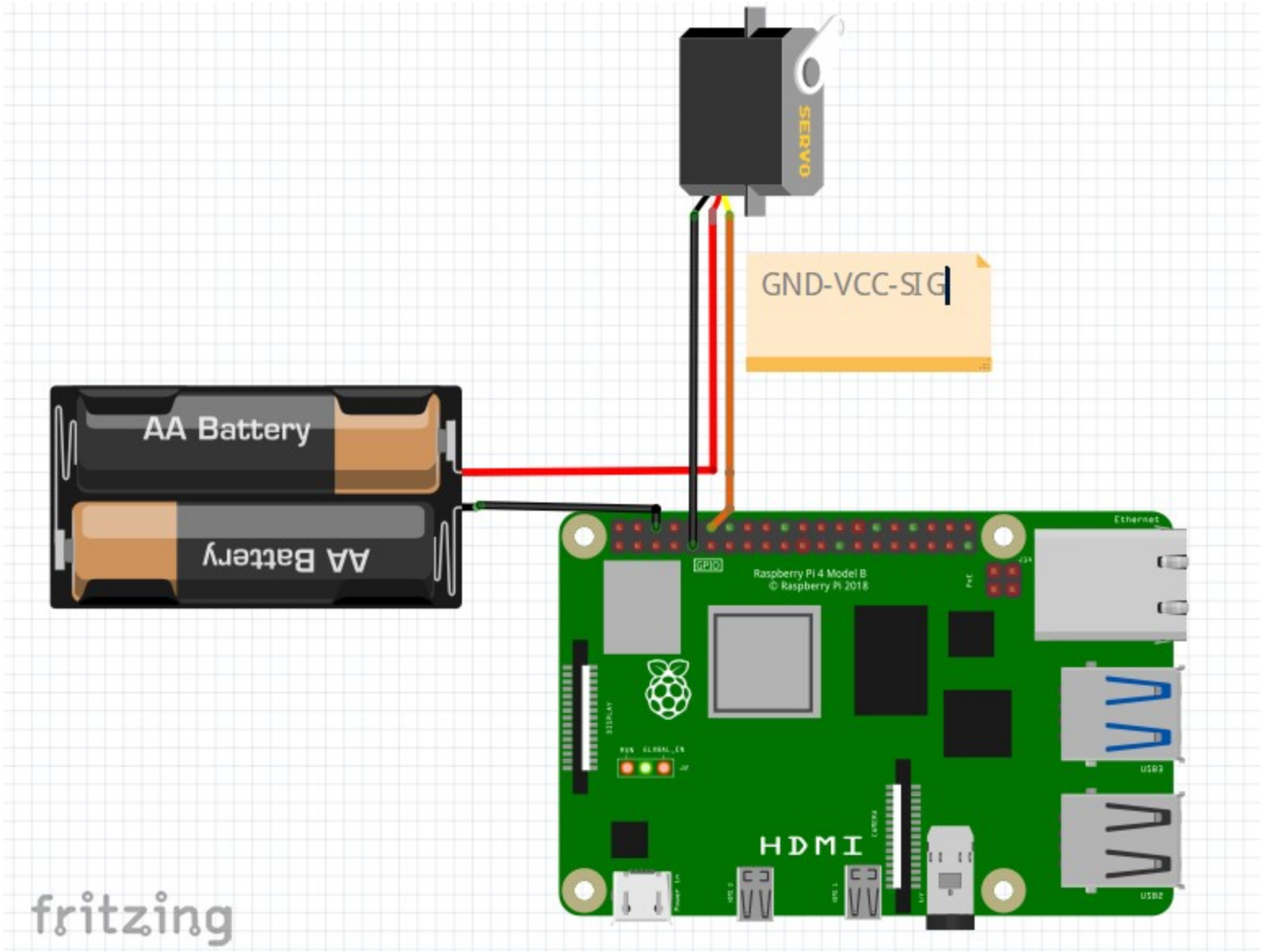


# Using the Gripper

Connect the gripper as follows:

- Connect the Red Wire of the Battery Connector to the Red wire on the Servo
- Connect the Black Wire of the Battery Connector to a GND pin on the Raspberry Pi
- Connect the Orange Wire of the Servo to Pin 18 of the Raspberry Pi
- Connect the Black Wire of Servo to a GND pin on the Raspberry Pi

# Wiring Guide



# Driving the Gripper

The gripper can be driven with code available from the METR4202 git repo. To drive the gripper you need to install the `pigpio` library. Instructions are on the git repo.

- The first step is to enable the pigpio daemon with the command `sudo pigpiod`
- ENSURE THAT THE SERVO IS ZEROED BEFORE RUNNING ANY CODE

# Driving the Gripper

- Firstly, zero the servo, demo to be shown
- The code details how to send a different pulsewidth to PIN 18
  - 1000 Corresponds to closed
  - 2000 Corresponds to Open
  - 1500 is the sufficient width to collect a block

# Helpful ROS tools

With ROS, communication between various scripts is made easier, and ROS comes with a suite of tools to help you debug and make workflow faster.

Some Examples:

- `rqt_graph` Used to visualise how nodes and topics communicate with each other
- `rqt_plot` Can be used to plot how a topic changes over time by plotting its value over time

# Any Questions?