Robotics 311 : How to build robots and make them move

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ROB 311 – Lab 3

- Today:
  - Get your materials
  - Begin designing your plates / motor mount
  - We will walk around and help you
  - But dive in and starting playing with the provided files!

ROB 311 – Lab 3

- Please come pick up:
  - 3x Pololu 37D gearmotors

  - 3x motor couplers

  - 4x acrylic sheets – choose your colors!
    Be sure to leave the protective film on— this prevents damage to the surface finish during cutting

  - 2x strips of Velcro

  - 6x omni wheel halves
    These will be assembled into 3x omni wheels

  - 1x basketball

  - 1x metric hex set + 1x imperial hex set

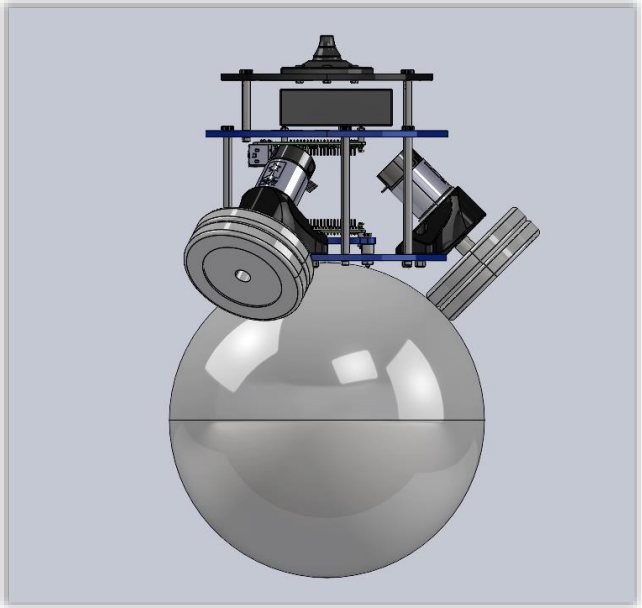
  - 1x your RPi Pico board

  - 1x Blink M LED

  - 2x wired mouse

ROB 311 – Lab 3

- First begin with:
  - Open `rob311-ball-bot.STEP`
  - This will let you look at our ball-bot design as a STEP file
  - Look at the different components and get a feel for how everything fits together
  - Once this has opened and you feel like you understand the different components you can move to designing the plates and motor mount
  - You're welcome to use our RPi isolator plate file / layout



rob-311-ball-bot.STEP
This file will allow you to view / manipulate the assembly, but it won't show the operations that created the parts

Lab 3 – Designing Ball-Bot Structures

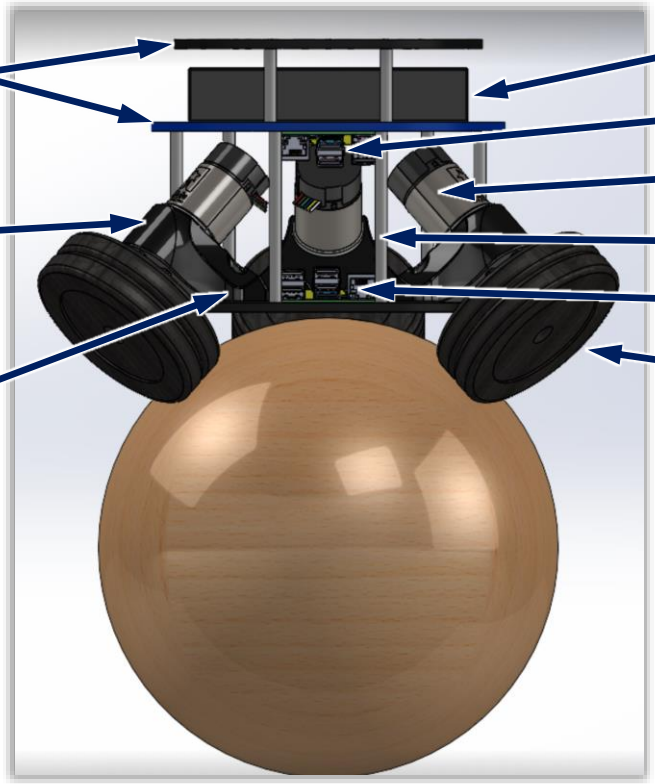
- Over the next few labs, we will build the structures of the ball-bot
- We will begin with the motor mounts then move to the acrylic structures
- You will use these part files to have your designs made

We're going to design and make these

Three different acrylic plate structures
Laser cut

Motor mounts (x3)
3D printed - FDM

RPi isolator plate (acrylic)
Laser cut

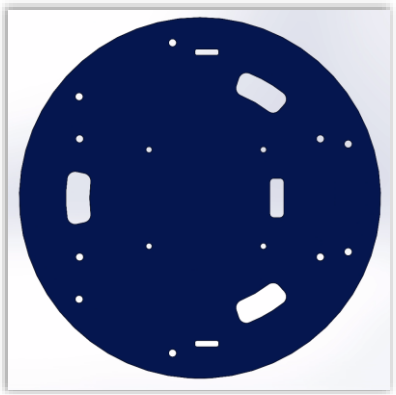


Motor mounts – medium difficulty
Acrylic plates - easy

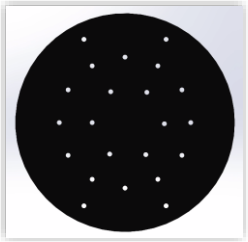
Lab 3 – Designing Ball-Bot Structures (2D)

- Acrylic plates that need to be designed

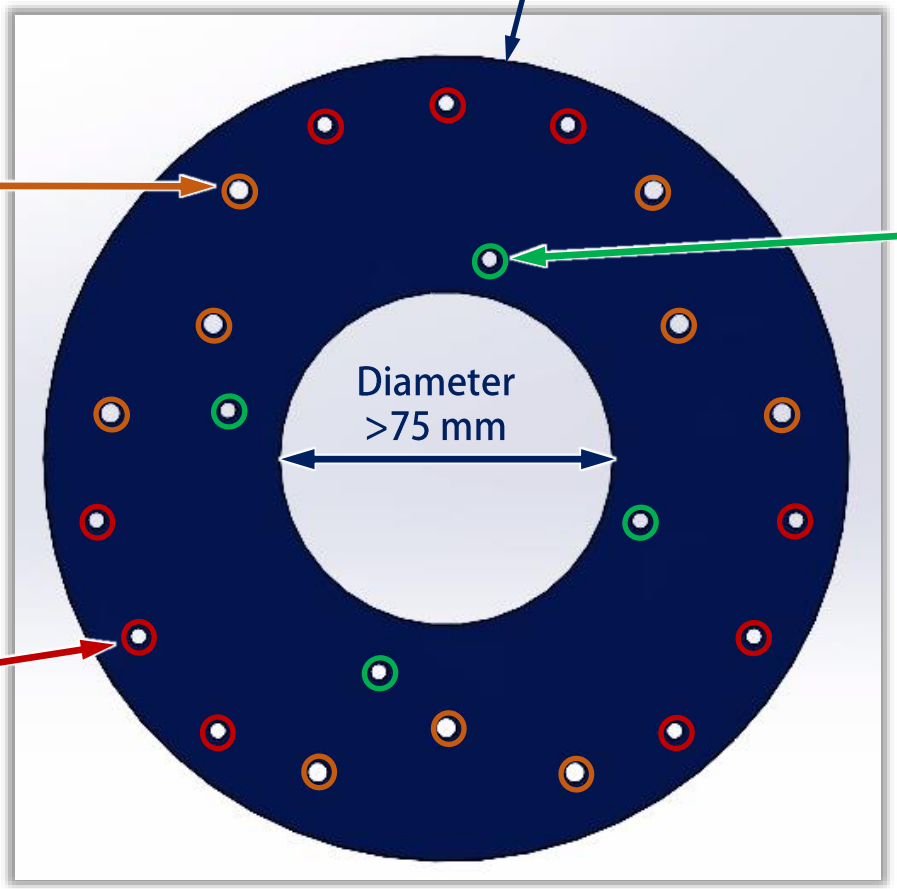
RPi isolator plate



Middle plate



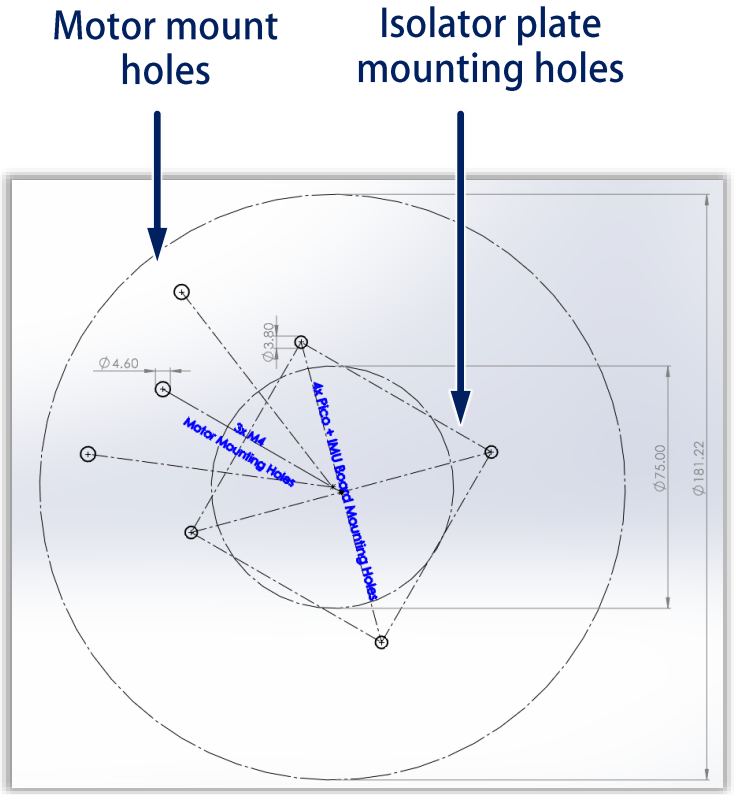
Top plate

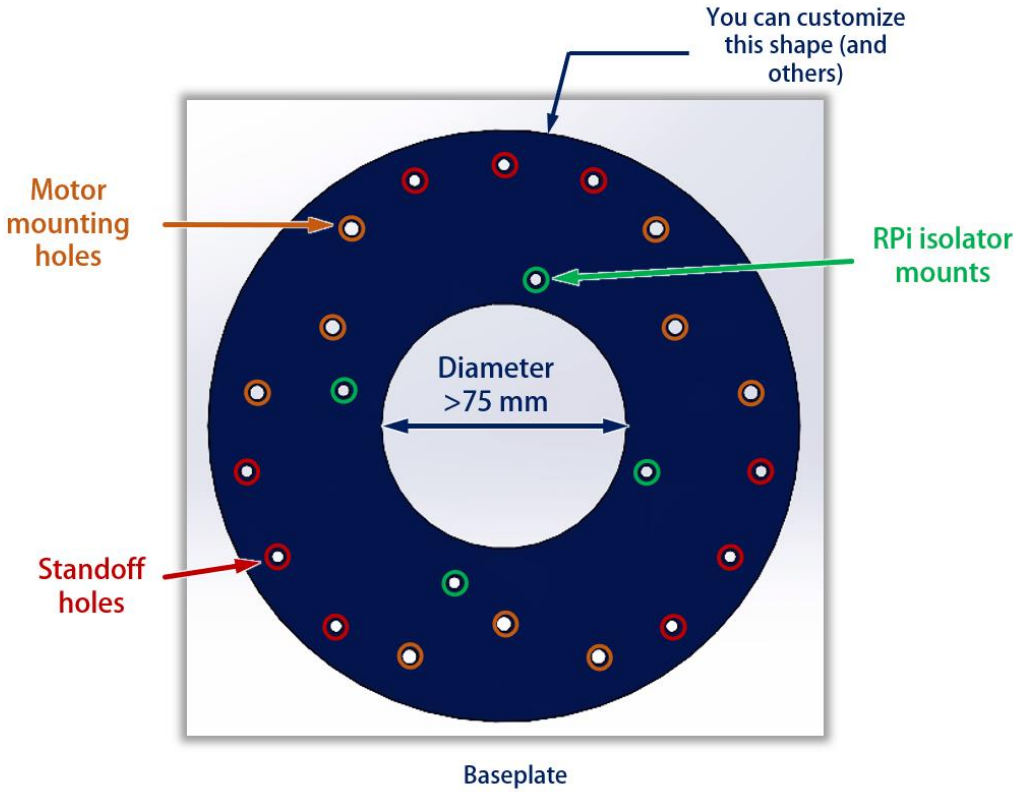


Baseplate

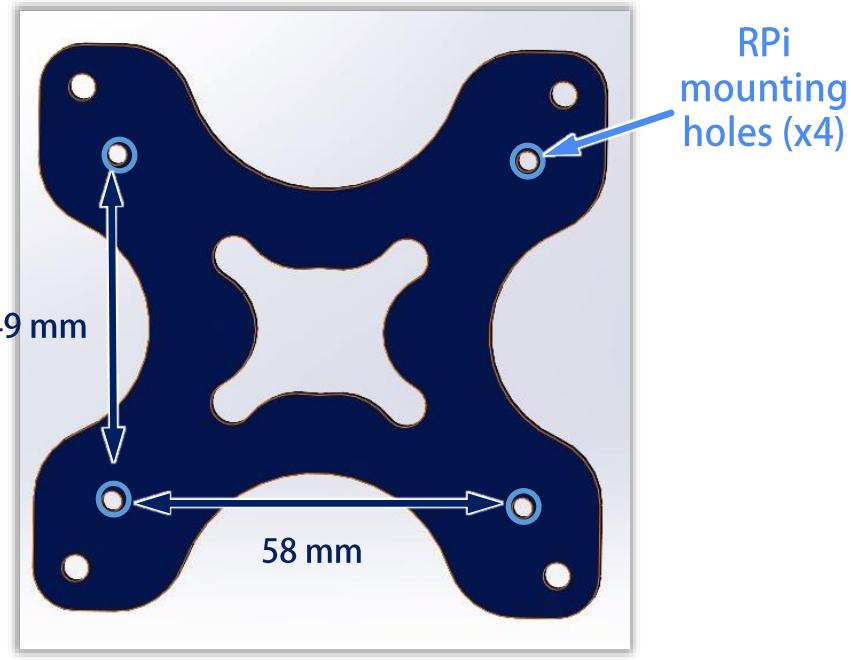
Lab 3 – Designing Ball-Bot Structures (2D)

- Baseplate and template

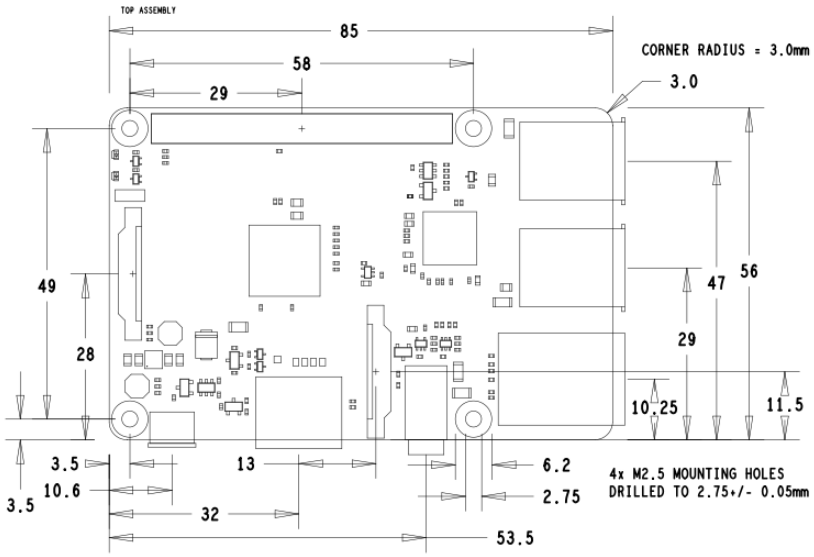




Lab 3 – Designing Ball-Bot Structures (2D)



RPi isolator plate



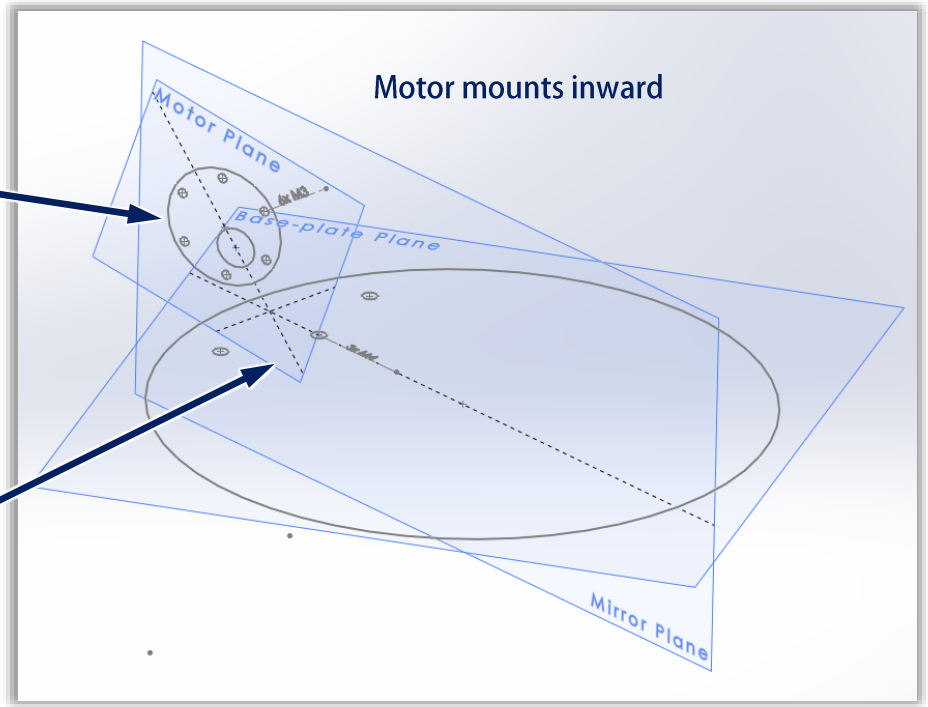
- The isolator plate holds the RPi Pico and IMU off the baseplate, mounted with rubber grommets
- Key idea is to reduce motor vibration impact on the IMU readings
- The RPi mounting holes will need to match the layout on the Raspberry Pi
- The isolator mounting holes can be anywhere, as long as they mount to holes on the baseplate
- The mounting holes for the RPi Pico are the same as the regular RPi

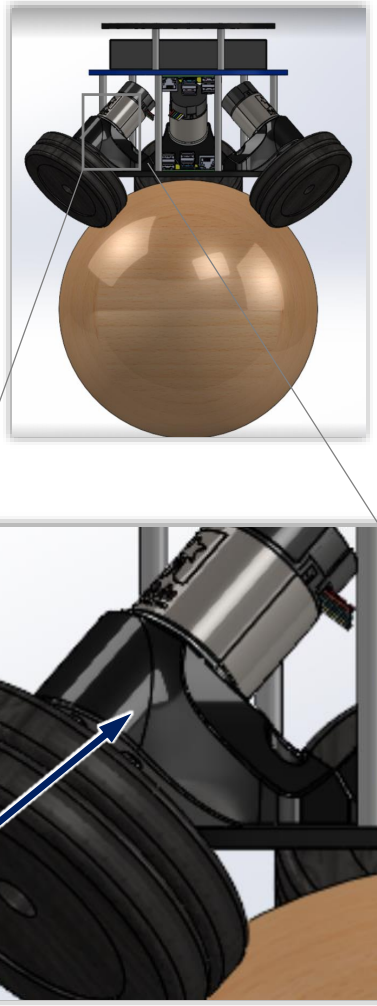
Lab 3 – Designing Ball-Bot Structures (3D)

- Provided part file with pre-made sketches:

Motor mount sketch

Sketch w/holes for mounting to baseplate (3x)





Motor mount
leave space for the motor