SCUTTLE Designer's Guide

REVISION: 2022.10.31

In This Guide:

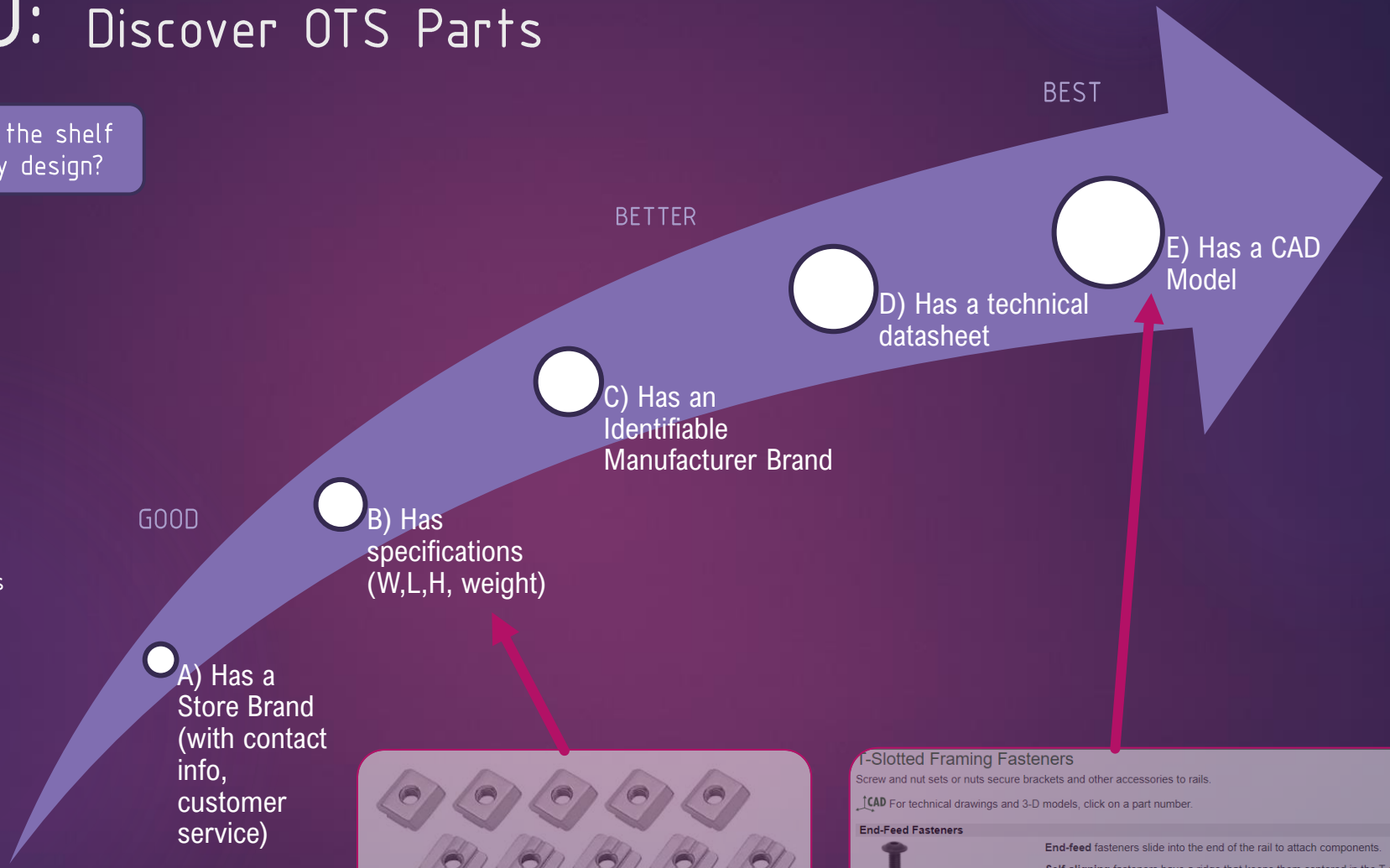
STANDARDS, PROCESSES, & HOW-TO DESIGN + PUBLISH

HOW TO: Discover OTS Parts

How can I select the best off the shelf (OTS) parts to integrate in my design?

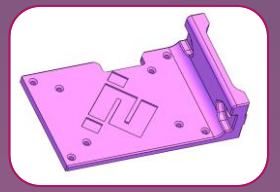
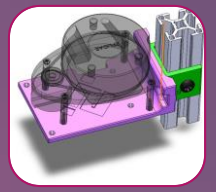
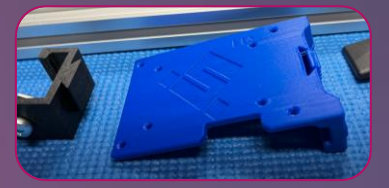
Look for:

- Better quality of parts. Usually offered for several years, consistent availability, offered in multiple countries. Has a customer service line.
- Also usually costs higher shipping rates, requires customer login on website,
- Usually has higher prices for small hardware, requires more bulk quantity of purchase.



HOW TO: Develop a Quality Bracket



Path A

Get Physical Sensor → Build 3D CAD model for sensor
- precisely measure key dimensions

→ Design 3D CAD model for bracket → Design CAD model for assembly
- check clearances

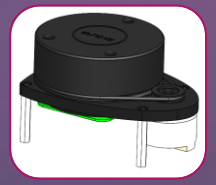
→ Print bracket, prototype
- built assembly
- check fitment

→ Adjust & reprint bracket, v1
- final check for fitment & clearance, rigidity, etc.

OR

Path B

Get CAD model online → Get Physical Parts
- verify they match key dimensions

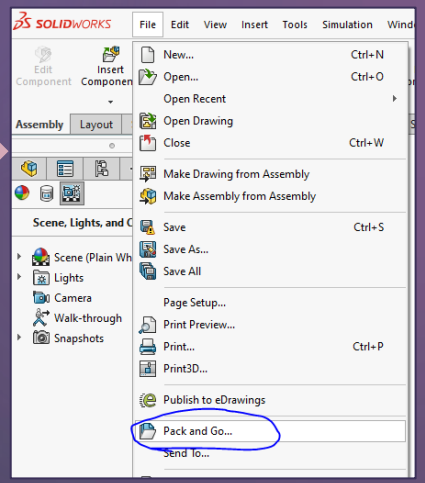



HOW TO: Share a Design on GrabCAD

How can I (contributor) post a CAD design for the best results?

Solidworks

- Use “Pack and Go” to generate simple Solidworks folder.
  - This omits unused files
  - Flattens all files into one folder
- Pack into a folder called SOLIDWORKS or other native CAD.
- Make a simple name: this will become the hyperlink permanently



Export STEP files, images, and original CAD.

For 3D-printed parts, please export STL files.

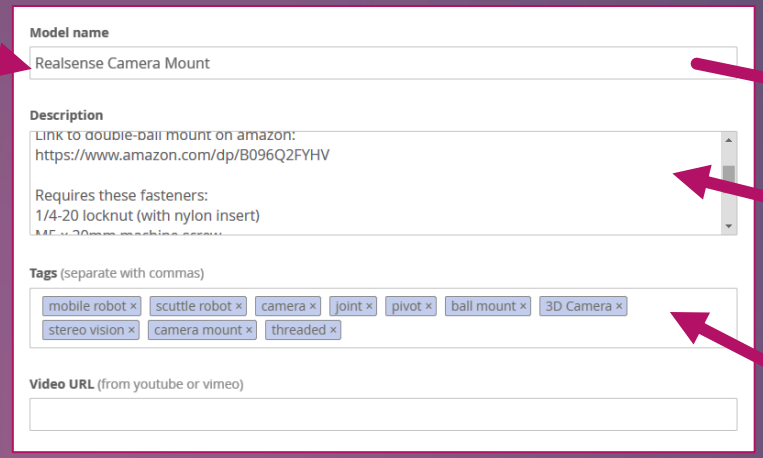
Put files in unique folders.

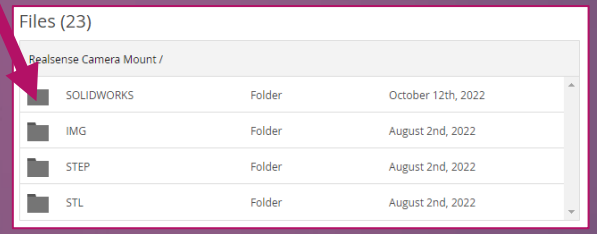
Upload Folders on grabCAD

Describe the design (BOM, prints, and links to get parts)

Set your featured image

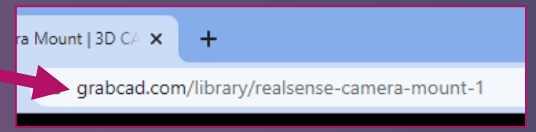
Link a video of your example





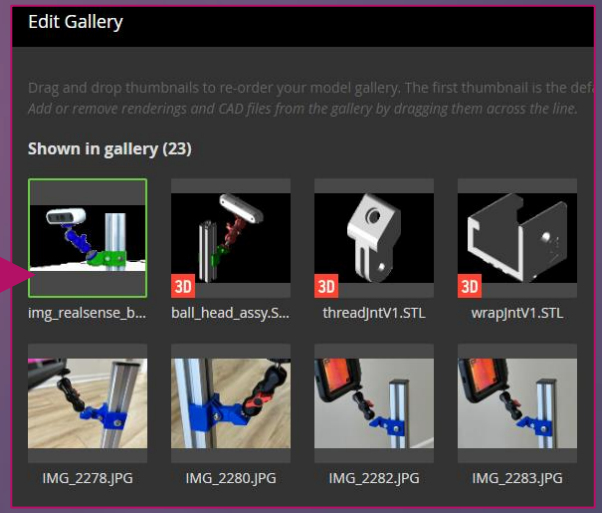
Edit Photos: Place the best photo as the first in queue. This will be the thumbnail. Set the STEP assembly second.

Video: If you have a video showing how to build the design, include the link.



Description:
- Describe the purpose of the design.
- Link parts found at vendor sites
- Describe required fasteners and their quantities.

Tags: please use “scuttle robot” as a tag – grabCAD gives immediate SEO for searches.



HOW TO: Get Questions Answered

Authors should:

Manuals

- Include appropriate email at the bottom of each PDF page

CAD Models

- For Native CAD, post online using your user login so you're notified when people comment.
- For STL files, post on gitHub so you (the designer) can be discovered.

Wiring

- Include your email at the bottom of a drawing page.

Users should:

User Manual

- inquire with email listed at the bottom of pdf pages

CAD model

- STL files – these are found on github. post an issue on github
- grabCAD files – ask a question in the comments at the bottom of the page

Wiring:

- Refer to Wiring Diagram
- Email the contact email listed on the PDF

Projects:

- Reach out to the project publisher.

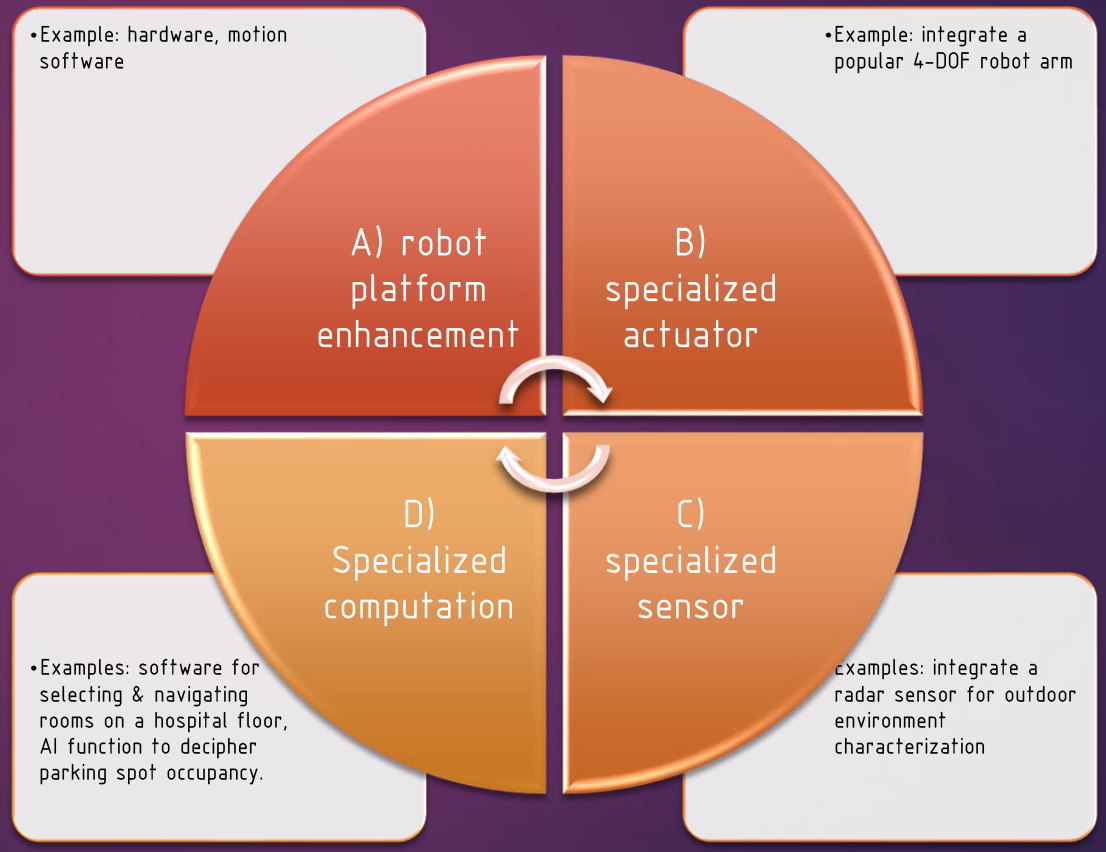
Videos

- Log in and comment on the video – the author will get a notification.

HOW TO: Generate Robotics Idea

How to choose a design to build?
Where does my creation fit into the SCUTTLE community?

Categories of Potential Designs



More Resources: ASQ.org

HOW TO: Build a Student Video Contribution

(updated 2021.12.09)

REQUIRED

- The video shows one added element such as:
  - New actuator
  - New sensor
  - New function
  - (new means not documented so far)
- Audio is clear and coherent
- Video is posted properly on youtube:
  - 1080P or 4K resolution
  - Listed on youtube (not "unlisted")
  - Title clearly describes what's unique
    - Bad: "Our Final Project for MXET 300"
    - Good: "Scanning Bar Codes with a Mobile Robot
  - Description tells what's in the video.
  - Do not select "made for kids" as this prohibits adding to playlists
- Video footage clearly shows sensor/actuator/function in action
  - (not just footage of ppt slides)

DESIRED

- Length less than 6 minutes
- Include links to software
- Tell where you got your parts
- Include links to components
- Describe what external library was used
- Confine the video to just 1unique topic (don't explain everything about the project)
- Use a script to make your audio recording
- Include as much close-up footage of your sensor/actuator/functions as possible

STANDARDS: Licensing

Creative Commons	• We will begin to use a creative commons "attribution" license in 2021. • Attribution 4.0 International
Copyrights:	• SCUTTLE Robotics LLC to register copyrights as advised.
Software Hosting	• What are the implications of hosting CAD models on grabCAD? • See grabCAD Terms
Publishing Explanations:	• Background on Creative Commons found in Youtube Video (link on thumbnail) ▶

Attribution-ShareAlike 4.0 International (CC BY-SA 4.0)

STANDARDS: Publication

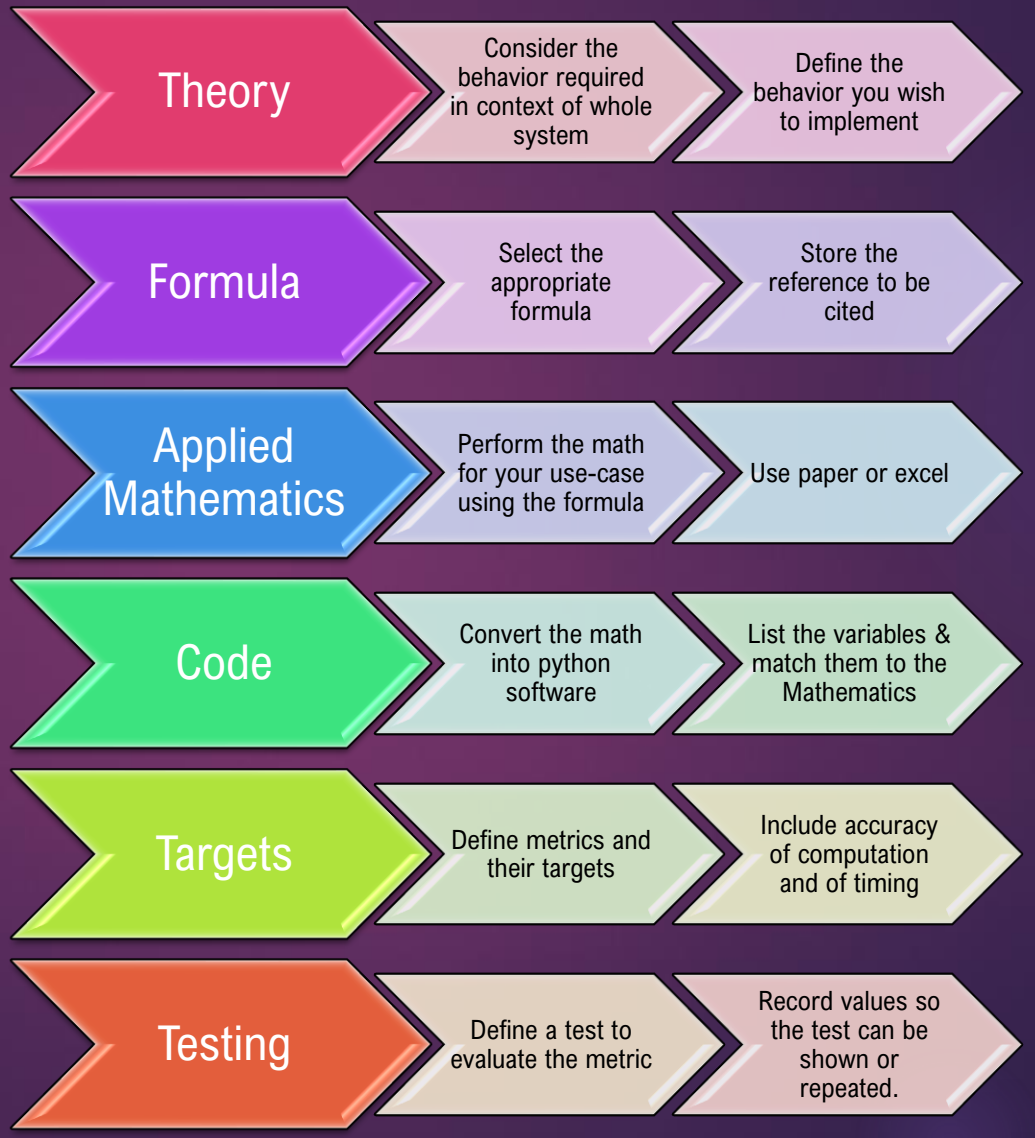
- Font for titling:
  - **DS ISO BOLD**
- Names:
  - Refer to project: SCUTTLE Robot Project
  - Refer to the machine: SCUTTLE Robot
- Branding:
  - Content published by SCUTTLE Robotics LLC team should feature trademark:
  - Example SCUTTLE™ with "TM" (use ALT-0153 short key)
- Hashtags:
  - #SCUTTLErobot, #SCUTTLEproject
- Colors:
  - SCUTTLE Blue color: #0A6ECC
  - Background Color: #064074

Color: #0A6ECC

Color: #064074

PROCESS: Software Development

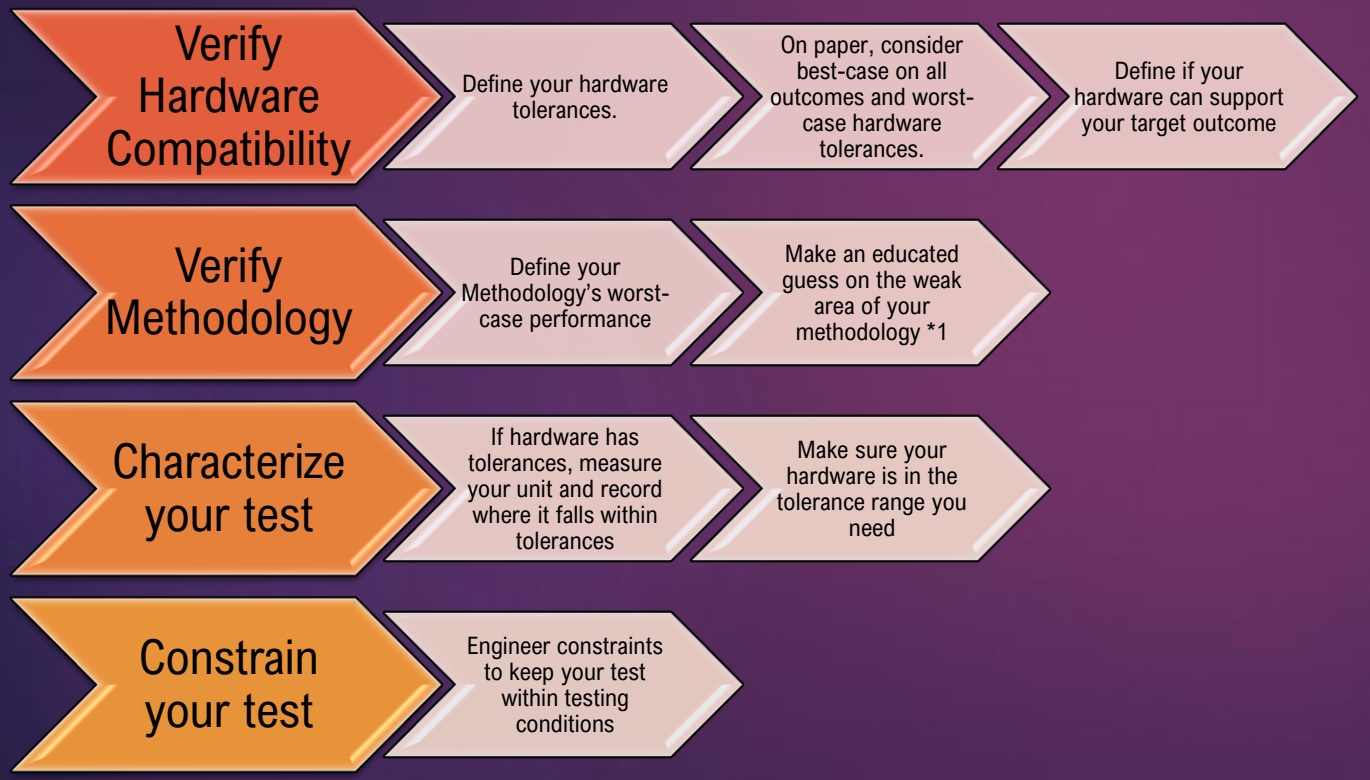
How can I (contributor) develop software that meets the desired quality of the SCUTTLE brand?



PROCESS: Calibration

Calibration is the task (as a verb) and the data (as a noun) that lies between the sensor and the clean information that a robot can act on. It is the main task required in integrating a new sensor. It is the main task required to refine existing sensor data for a new application.

Design of Experiments Part 1 [validate your experiment plan]



We pursue successful calibration with a similar path to the scientific method. The hypothesizing, testing, and validating of your trials should be repeatable by other teams if done correctly. Try to follow a process to calibrate your robot actuator instead of the infamous guess-check-revise strategy from childhood experiments. Being methodical (and recording the method thereof) allows your mistakes (and generated data) to serve the next trial. This makes research far less costly, because even if your trial result is a failure, your data can serve the trials that follow. Over time, amassed data allows a team to perform many calibrations without any experimenting at all.