STEAMVR™
Tracking Training

STEAM® VR

Tracking Training

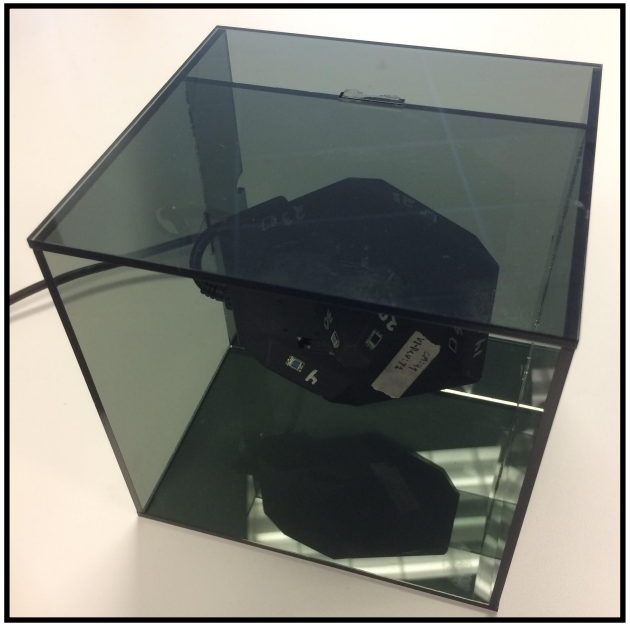
Object Calibration

Why Calibrate?

- IMUs have manufacturing tolerances that affect gain and bias
- Sensor placement in manufacturing is not ideal
- Sensor covering can change the effective location of a sensor
- Every object is slightly different
- Calibration gets the best performance from every object
  - Prototype objects in the lab
  - Production objects on the assembly line

IMU Calibration

- Accounts for scale and bias variations in the IMU
- imu_calibrator.exe
  - Located in the tools directory
  - Performs calibration by averaging readings along six axes
  - Produces a snippet of JSON for the “imu” member
- A calibration jig is very useful for this step!



IMU Calibration Exercise

- Download the JSON file from your object
- Run `imu_calibrator.exe`
- Take readings in all six axes
  - Accelerometer fit error should be < 0.1 for successful calibration
- Copy and paste the JSON output into the JSON file
- Save the new JSON file
- Upload the new config to the object

```
Calibrating to gravity sphere, radius 9.8066
0.04417 accelerometer fit error (6 sample vectors x 8 subsamples per vector)
```

Optical Calibration

- Accounts for manufacturing tolerances in the placement of optical sensors
- vrtrackingcalib.exe
  - Located in the tools directory
  - Averages multiple readings from sensors to compute the best fit
  - Produces a new JSON file from an uncalibrated JSON file
- Some guidelines for best results
  - Only use one base station
  - Move around in the space
  - Show many orientation to the base station
  - **Always start from an uncalibrated JSON file!**

Optical Calibration Exercise

- Use the JSON file with the new IMU calibration data
- `vrtrackingcalib.exe /usedisambiguation framer /bodycal imu_updated.json 800 200`
  - Minimum 800 readings
  - Minimum 200 hits per sensor
- Produces a new JSON file decorated with the serial number
  - `auto_<serial_number>.json`

```
Realigning point cloud to original model:
> RMS: 0.000536
> Ceres Solver Report: Iterations: 12, Initial cost: 1.082954e-005, Final cost:
4.598913e-006, Termination: CONVERGENCE
```

- Upload the new JSON file to the object

Summary

- Calibration is required for the IMU and the optical sensors in each object
- imu_calibrator.exe for the IMU
  - A calibration jig may help some designs
- vrtrackingcalib.exe for the optical sensors
  - Only use one base station
  - Start from an uncalibrated JSON file
  - Move around in the space
  - Show many poses to the base station
- Calibrate every object in the lab and on the production line