STEAMVR™

Tracking Training

Generating Sensor Placement

STEAM®VR
Tracking Training

**VALVE**

Overview

- Prepare sensor and obstacle shapes

- Create the HMD Designer Project

- Generate Sensor Placement

- View the output SCAD

- View 2D simulation results

- View 3D simulation results

- Archive successful simulation results

Preparing the Shape

- Sensor Shapes
  - Solid, not hollow
- Obstacles
  - Models of obstructing objects
  - Export on the same coordinates as sensor object
- Masks
  - Obstacles that mask unusable areas of the shape
  - Helps HMD designer place sensors efficiently
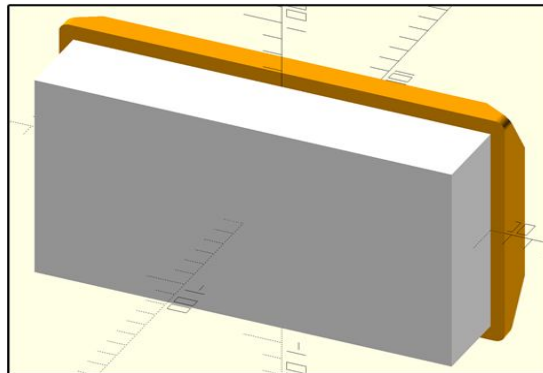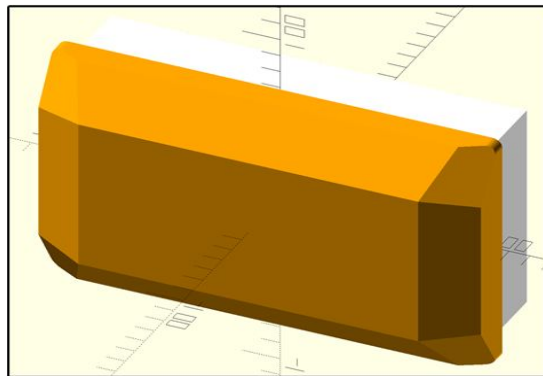
Let's Try It!

- Launch the HDK: "Launch Explorer in Design Files"
  - Copy "…\SteamVR Tracking HDK\training\exercises" to your desktop

- Open exercise: 050_generating_sensor_placement

- Pick a letter from a - h

- That's your shape in the 050_generating_sensor_placement folder
  - Take a look at the shape and mask SCAD files in OpenSCAD

- Launch HMD Designer GUI

# Creating the HMD Designer Project

- Add input files
  - Files are copied to the project's 'in' directory
- Select the sensor object
- Check the obstacles to include
- Set the number of sensors
  - 5 is the minimum, good for quick verification of shapes
  - 32 is the maximum, start with 32 to verify the shape
- Set the number of permutations
  - Generation is based on a random seed, no two will be the same
  - If you are running 1, why not run 8? Then, pick the best output.

Generate Sensor Placement

- Click simulate to start the process

- Progress is indicated to the right

- The quality number starts at 1000 and drops as placement continues

  - 1000 is the worst, lower is better

  - No one number is the right answer

- View button enables when generation completes

- Select the output to view in the upper right
  - 2D Plots
  - 3D Plots
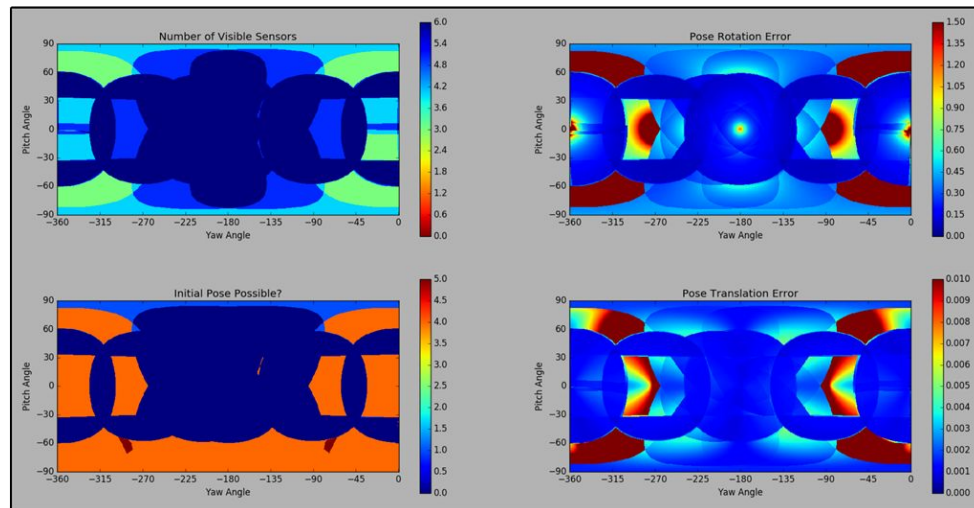 - Output SCAD

Output SCAD

- Sensor shape is orange

- Obstacles are white

- Sensors are green
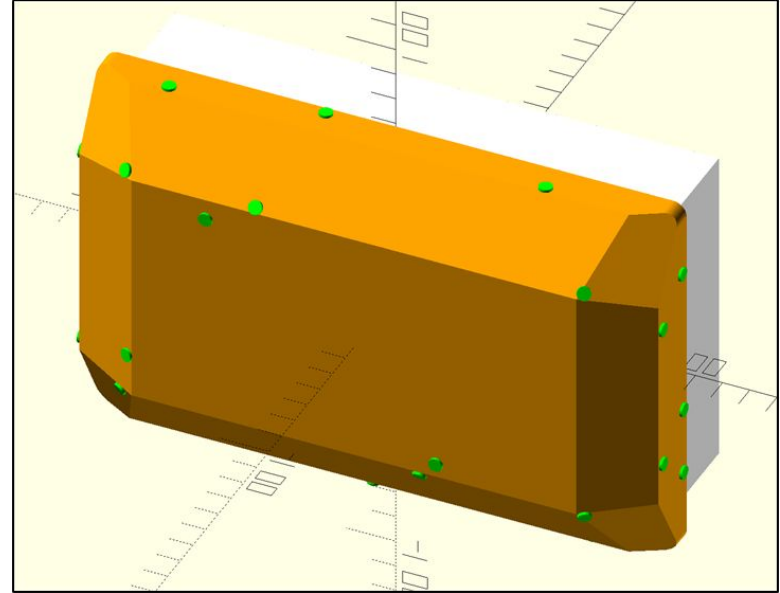
2D Plots

- Four plots
  - Number of visible sensors
  - Pose Rotation Error
  - Pose Translation Error
  - Initial Pose Possible?
- Blue is good
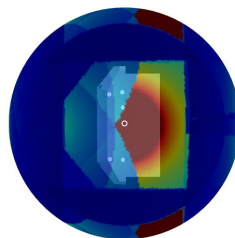- Red is bad
- Green is marginal
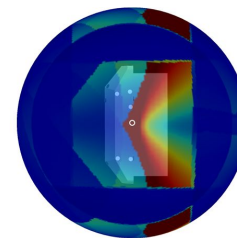
3D Plots

- Four plots
  1. Number of visible sensors
  2. Pose Rotation Error
  3. Pose Translation Error
  4. Initial Pose Possible?

- Blue is good
- Red is bad
- Green is marginal

- Visible sensors are highlighted

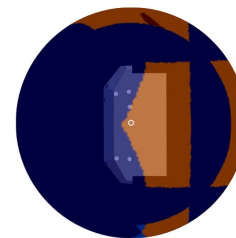- Model scale helps fit the model to the bubble
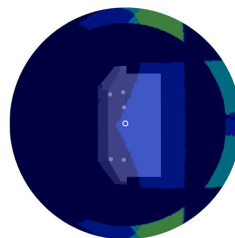
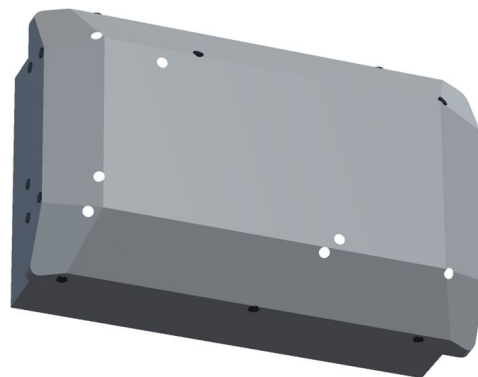1: Number of Visible Sensors   2: Rotation Error   3: Translation Error   4: Initial Pose Possible?

Under the Hood

- Inside the project directory
  - in
    - Files copied from originals
    - **Not changed during the simulation process**
  - out
    - Files generated from the input files
    - ASCII and binary STL formats
    - Modified JSON
    - **Regenerated with every simulation**
  - simulations\sim0-X
    - .json - generated sensor locations
    - .scad - OpenSCAD model
    - .png - 2D plots
    - .simTxt - raw simulation data
    - .simMeta - data about the simulation
  - archives
    - Copies of simulation output folders

VALVE

Full Simulation

Let's kick off a 32 sensor simulation while we discuss interpreting the output plots...

Simulation Complete!

- View the 2D and 3D plots

- Identify some problem areas

- What would solve the problems?

  - Can you edit the OpenSCAD to make a quick improvement?

- Are there opportunities for optimization?

  - Reducing sensor count?

  - Simplifying the shape?

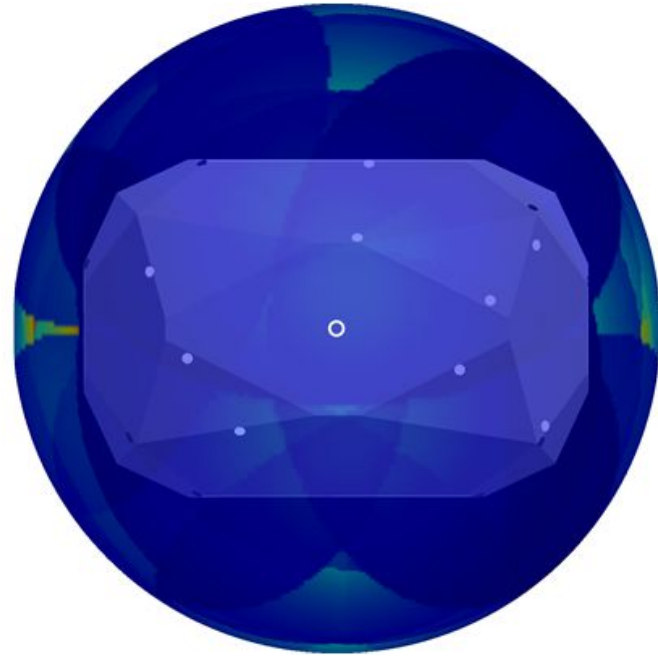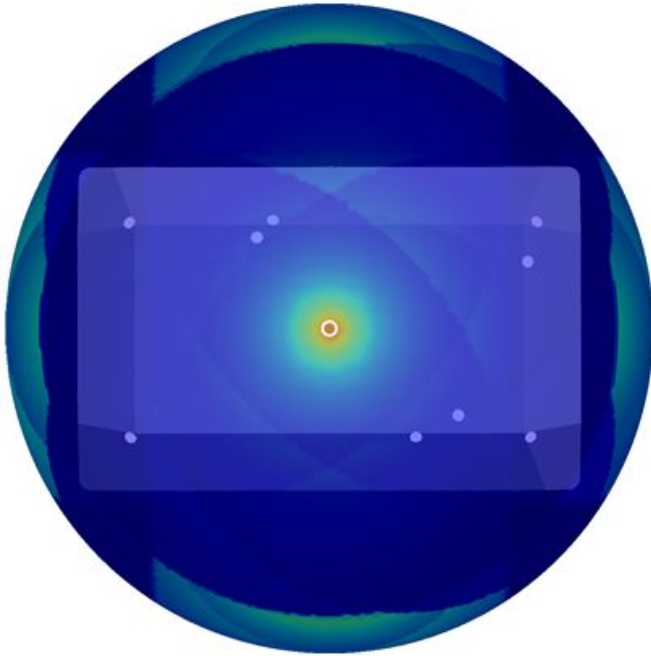- Try another shape. How does it differ?

Refinements

- Number of Visible Sensors
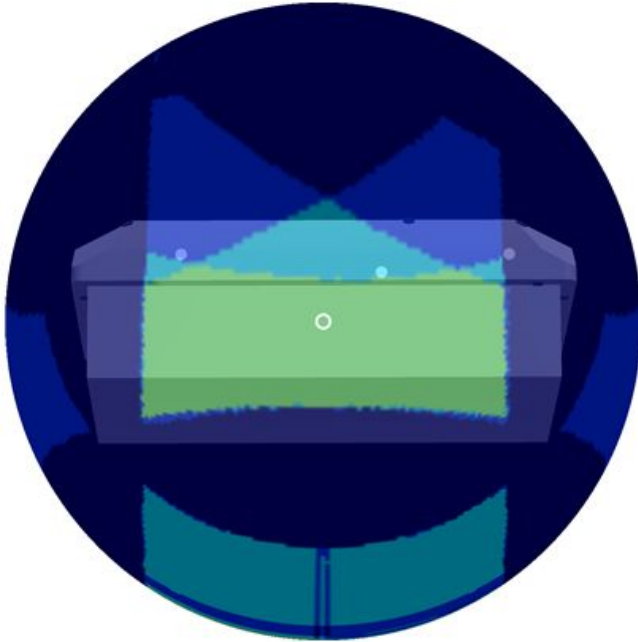
Refinements

- Pose Rotation Error

Refinements

- Pose Translation Error