Huan-Yang Chang
Team G: Excalibr
Teammates:
Man-ning Chen, Yiqing Cai, Sambuddha Sarkar, Siddharth Raina

ILR10
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Individual Progress

1. Robot Integration- Environment setting up

In the SVE, we planned to demo the calibration system via robot arm. Due to the dome was still in construction, we needed to decide where to put the camera. Due to the safety issue and avoid the collision between robot arm and camera, we decided to put the camera in the existing open area, the door. However, the door area limited the number of the camera that could be set up, So we would just use 3~4 cameras as our camera setting(Fig 1), I thought it would be very likely the setting we would show in SVE.

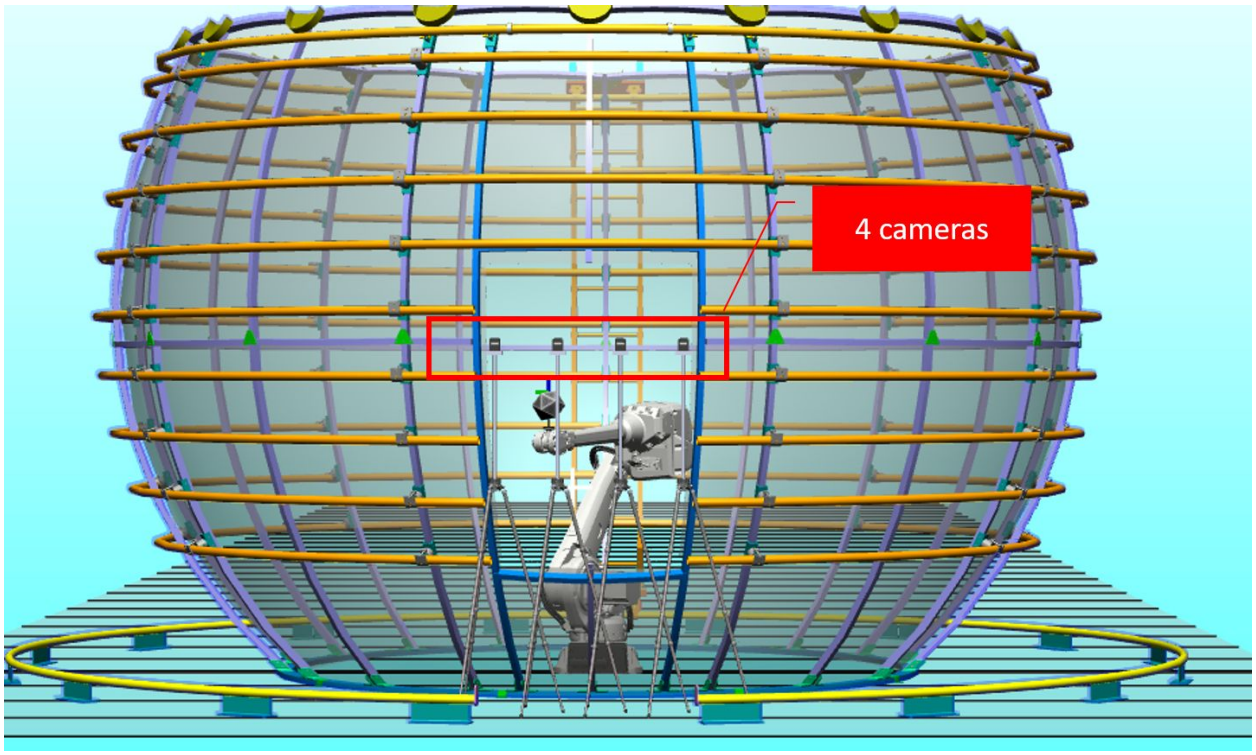

Figure 1. Camera setting up

2.Robot Integration-Simulation & RAPID code generation

In the previous PR, we already showed that the path optimization from Cece, could combine with the ABB robot arm RAPID code generation part. Because the simulation in RobotStudio is quite similar to running in the real world. It could help us to visualize the movement of the robot and debug before we made something wrong on the real robot.

In this part, we would test the every point is reachable and the orientation of the calibration target will not be occluded by the robot itself in some pose.(Fig 2)

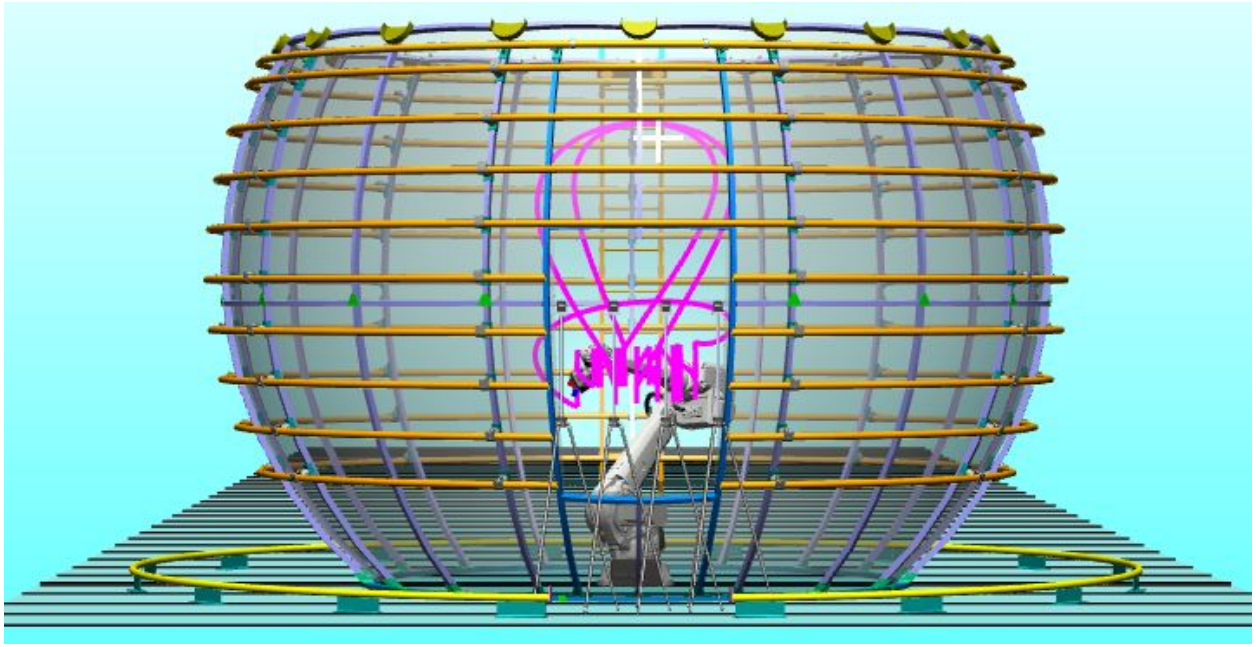

Fig 2. Robot simulation in the design path.

3. Data collection

For data collection, we could use the four EVT camera for data collection. We plan to capture the image that could align to what we simulate. Hence, we would storage the image at each designed position. And would use these data to adjust our simulation model. However, due to the poor setting up, we now not able to get the useful image that could be used. We had two major problems needed to be solved. First was to put camera to roughly the position where we set, or we cannot even see the object in some pose(Fig 3.a), The second one was the focus area of the camera. Because we wanted high resolution images and needed it be focused, hence the depth of Focus should be add into consideration when we do the path planning, or would generate the non-focus image(Fig 3.b).

Fig 3. (a)left, the wrong pose of the camera lead to wrong view.(b)right, out of focus image

Challenges

Due to this was our first time to integrate the camera system with the robot arm system, we found out that there are still some problem we had to fix before we could get the valid calibration data. The correct enough camera setting up was necessary for us to get the data to improve our model. We planned to use the simple geometry measurement and distance meter to improve our setting up in the next test. Besides that we will add the depth of focus into our path optimization function as a key selection criteria. We believed these methods could fix these two problem and at least give us the data that could able to do camera calibration. Then we could use the camera pose from calibration to refine our model setting.

Teamwork

Work	Work is done from last PR	Name
Sensor noise	Read and Shot noise	Sid
Color calibration	Test color mapping function with nonlinear model	Mandy
Robot simulation and control	Integration the robot system & camera system	Peter
Path planning	Improve the path optimization function and help to integrate the camera system	Cece
3D Scene generation	Blender Pipeline & Target modeling	Sam

Future Plans

1. More careful environment setting
2. Collect the image for geometry camera calibration.