

RWA 2 - Reference Frames and Sensor Integration

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Build Instructions

Download the ARIAC 2020 package from the official ARIAC repository

```
$ mkdir -p ~/ariac_ws/src
$ cd ~/ariac_ws/src/
$ git clone https://github.com/usnistgov/ARIAC.git
$ cd ~/ariac_ws/src/ARIAC/
$ git checkout ariac2020
$ cd ~/ariac_ws/src/
$ git clone https://github.com/osrf/ariac-gazebo_ros_pkgs -b
ariac-network-melodic
```

Download the current repository in the same source files

```
$ cd ~/ariac_ws/src/
$ git clone https://github.com/sandeep-kota/ARIAC_Group_1.git
$ catkin build
```

Run Instructions

Run the rwa2.launch file

```
$ source ~/ariac_ws/devel/setup.bash
$ roslaunch rwa2_group_1 rwa2.launch
```

Logical Camera Callback Function

We check if there is any available data in the logicalCameraImage message. If there are more than 0 detected parts, we parse the color and type of each object. Then we parse the pose of the part relative to the sensor and transform it to the world frame. We add it to the list of parts. Finally, we remove all the duplicates.

Frame Transformation

For this assignment, we use the tf module to compute the pose of all parts detected by all the logical camera sensors in the environment. We initially store the transformations of each sensor coordinate system to the global/world coordinate system using the lookUpTransform method. After caching this, we use these transformations in the sensor callback function. Here, for each detected part for each sensor, we transform the pose relative to the sensor to a pose relative to the world frame.

Sensor Locations

Sensor Name	Global Position [x,y,z]	Global Orientation [r,p,y]
logical_camera_0	[0, 7.17, 1.8]	[0, 90, 0]
logical_camera_1	[0, -7.17, 1.8]	[0, 90, 0]
logical_camera_2	[0, 3, 1.9]	[0, 90, 0]
logical_camera_3	[5, 1.750927, 1.82]	[0, 90, 90]
logical_camera_4	[3.0, 1.750927, 1.82]	[0, 90, 90]
logical_camera_5	[5, -1.750927, 1.82]	[0, 90, 90]
logical_camera_6	[3.0, -1.750927, 1.82]	[0, 90, 90]
logical_camera_7	[3, 3.6, 2.49]	[0, 90, 90]
logical_camera_8	[5.05, 3.6, 2.49]	[0, 90, 90]
logical_camera_9	[3, -3.6, 2.49]	[0, 90, 90]
logical_camera_10	[5.05, -3.6, 2.49]	[0, 90, 90]
logical_camera_11	[-13.60, 0, 2.49]	[0, 90, 90]
logical_camera_12	[-15.65, 0, 2.49]	[0, 90, 90]
logical_camera_13	[-13.60, 3, 2.49]	[0, 90, 90]
logical_camera_14	[-15.65, 3, 2.49]	[0, 90, 90]
logical_camera_15	[-13.60, -3, 2.49]	[0, 90, 90]
logical_camera_16	[-15.65, -3, 2.49]	[0, 90, 90]
breakbeam_0	[-0.004795, 4.492549, 0.879306]	[0, 0, -90]