Full name: AYUSH ASHNA
Department: ROS
Start date: 4 July 2022
Weekly Assignment (heading): Onshape-to-robot

AIM: To create robotic URDF from Onshape
Components used: ROS, RViz and other text editors to use URDF. URDF stands for Unified Robotics Description Format, and is a XML based description of a robot to view all the functioning of any robot with links and joints, so that we can simulate robot's most important functions easily. RViz is a simulation software where this happens. Onshape is essentially a simulation software but allows editing.

Day 1-3: First attempt – Create a URDF from the Onshape model Orangewood provided.
There is a direct way to create a URDF from Onshape model, i.e., directly create a URDF from a 3D model of the robot. The Onshape model already has all the details such as materials, thus creating elements like inertia and motion-limiters won't be hard to create. The issue is that I couldn't get the conversion working.

```
! ERROR (403) while using OnShape API
! {
  "moreInfoUrl" : "",
  "message" : "Resource does not exist, or you do not have permission to access it.
  "status" : 403,
  "code" : 0
}
```

I tried to do it on my mac, but different issue there. Turns out it needs ROS to operate, and ROS doesn't work on Mac.

I contacted Mr. Dhanush on this, and he said that he himself is facing issues on this conversion, so he told me to drop this approach. (In fact, there is a stack overflow question posed by an Orangewood employee on this very topic)

Second Attempt:

I tried another approach: I would ask for the robot URDF file directly, and add the robotic end-effector to it.

Day 4-6: The file received was a single URDF with .stl meshes linked to it. My supervisor suggested me to try to add a Robotiq two finger 140 mm reach end effector to it by adding the xacro file of the end effector to it. This approach was fruitless since I realized that Robotiq xacro files are provided by a third party and thus the collision data from the xacro files was a bit messed up.

Conclusions:

URDF – It's the XML description of a robot to be used in simulations like RViz or Gazebo.

Xacro – In robots, there are parts that don't need to be defined anew all the time. Like, describing a wheel 10 times isn't efficient. Thus, xacros work like functions,

on description and you can do whatever with the base description.

Onshape – A 3D simulation software, similar to SolidWorks or Autodesk.

I would seriously recommend SolidWorks, since most of the people use it and there are a lot more tutorials on it than Onshape.

Of course, I could convert Onshape file to SolidWorks file and then work on from there, but SolidWorks only works on Windows, which I don't have.