ECE 470 Project Update 1

Team Name: Future of F1 Robot Mechanics

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Project Update

After carefully examining the project that we have chosen, which is to use robots for tire changing in F1, we have decided that instead of working with a full-scale Formula 1 car and tire, which are hard to model and are large objects, we would work with scaled models. This allows us to use robots that we are more familiar with, like the universal robot family, and gazebo, but still achieve the goal of changing tire as the model is scaled.

For gripping the tire, we are thinking about using either an adaptive gripper with human-like fingers, or a vacuum gripper with two 2 vacuums. ROBOTIQ has good examples of these kinds of end-effectors. Their 3F adaptive gripper has three human-like fingers for gripping the side walls of the tires, and their Airpick 2 Vacuum can grip the tire by sucking on it.

In terms of sensors, we would use a top mounted camera for sensing objects in 3D space. For the finger like gripper, we can use either a force or a strain sensor to sense whether the tire is gripped or not; and for the vacuum, we can simply sense it using the sensor on the vacuum.

For taking off the wheel nut from the car, ROBOTIQ also has a screwdriver end-effector. This can be programed to take off the wheel nut. We would need an end-effector mounted camera/sensor for locating the wheel nut, and a torque sensor on the screwdriver for sensing the torque needed for taking off or putting on the wheel nut.

For the code base that we have developed, first, we have code written that can move the robot to anyway point within its workspace. Second, we accessed gripper's vacuum sensor, which is a sensor that can provide both digital and analog output on whether the robot have suction on a part or not.

Links

Link to YouTube Video: https://youtu.be/9CE3HQv3kXo

Link to GitHub: https://github.com/jaehank2/ece470finalproject