**CTurtleBot – A Turtle Inspired Soft-Robot**

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**ABSTRACT**

The goal of this project is to design and prototype an untethered soft-robot, capable of traversing across 2D surfaces, as a test bed for hysteresis-based control systems. To achieve this, we chose cable-driven, silicone rubber actuators as the primary method of movement, due to their compliant and elastic nature. In addition, we created and 3D-printed a prototype chassis as an intermediate for testing the actuators. Lastly, we designed a custom PCB to control the actuators and enable an untethered design.

Since silicone rubber has a high coefficient of friction, the biggest challenge of this project is overcoming the friction of the actuators in only one direction to create a net motion. To overcome this, we first tested different types of rubbers of varying stiffness to determine a balance between the force required to actuate the actuators and the capability of the actuator to move the robot with its elasticity. After choosing a material to work with, we experimented with having the actuators flat on the ground versus approaching the ground at an angle, introducing curvature into the actuator. Analyzing the results through motion capture and videos, we found that the “curved” actuators created more net movement, since the edge of the actuator caught and pushed off of the ground more compared to the flat actuator. Finally, we added different shapes to the edge of the actuators to see if we could further improve performance.