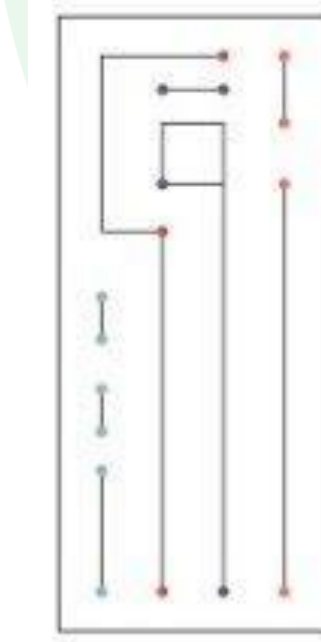


Team: Q-Mermaids
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An ROV for Underwater Pipelines Inspection



QATAR ACADEMY FOR
SCIENCE & TECHNOLOGY
أكاديمية قطر
للعلوم والتكنولوجيا

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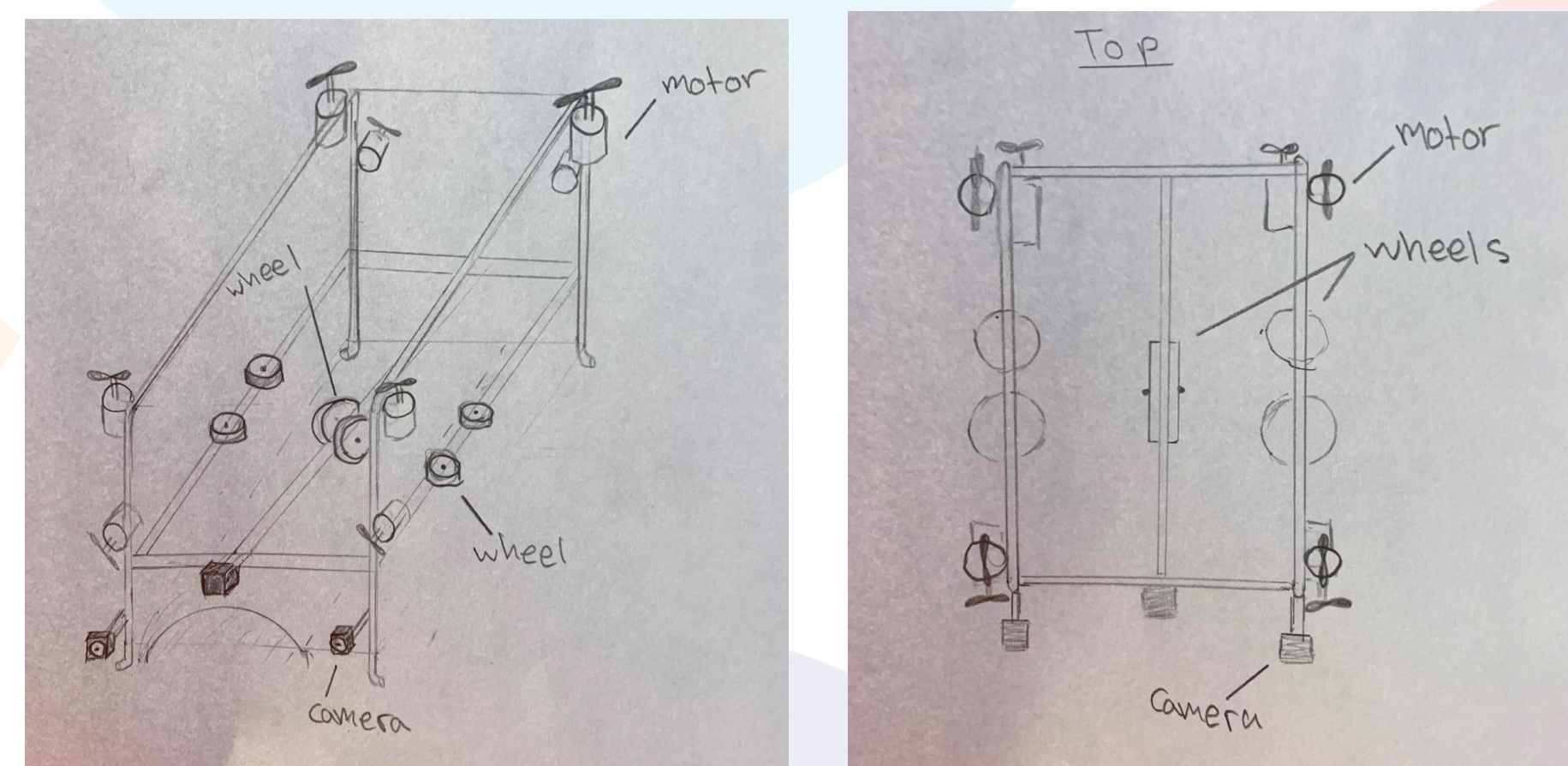
Research Problem

Oil and gas are often transported from oil wells underwater in very long pipelines. Any failure in these pipelines, would cause severe effect to the environment and economic loss for the industry. Early detection of cracks and corrosion will enable further protection of the environment and save money for the companies.



Concept Design

Literature review is conducted on similar rescue machines. Then, the initial design for the proposed ROV is developed. The concept design consists of rectangular frame which carries GoPro cameras, motors and flashlights. The frame has 12 wheels to move on the pipe.



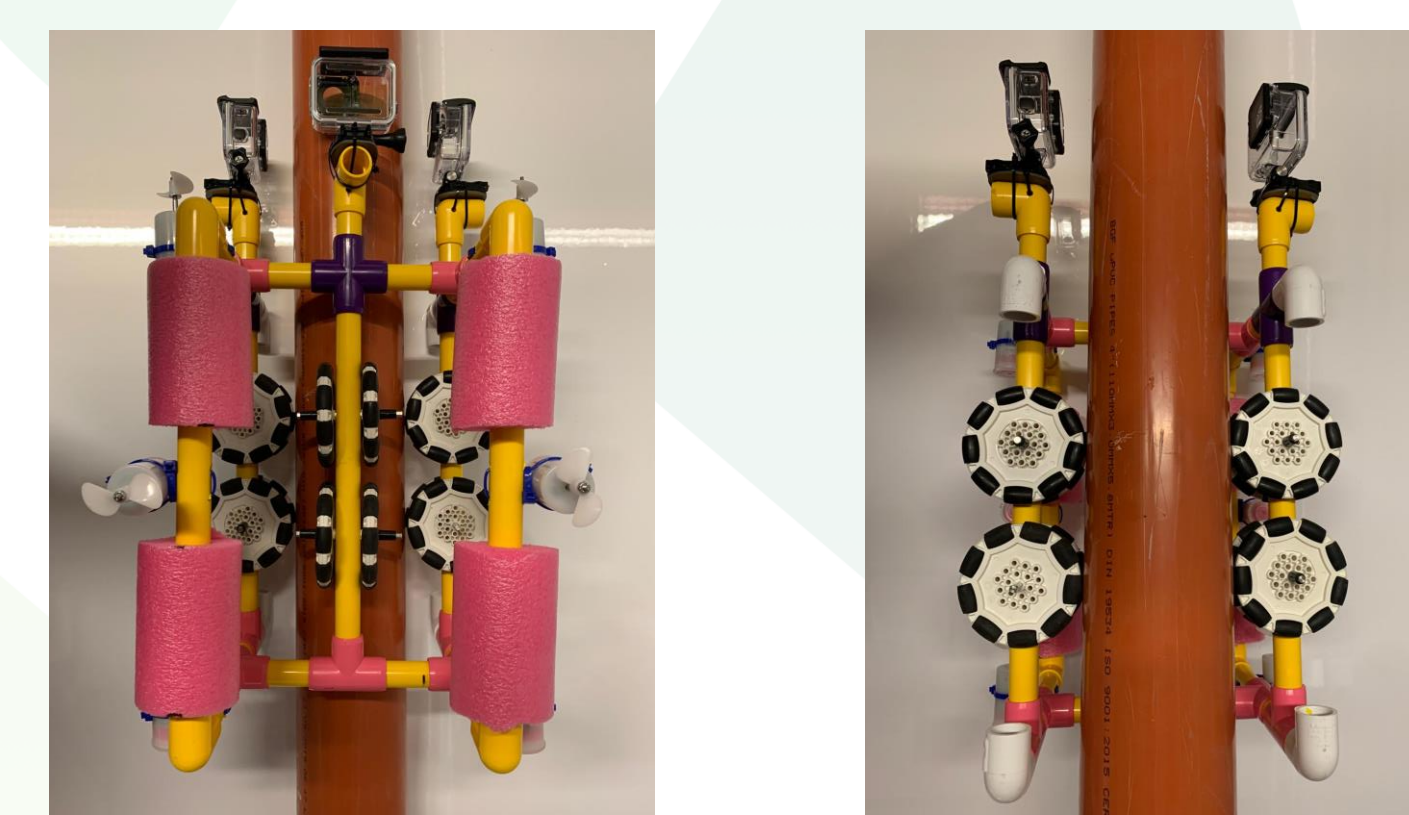
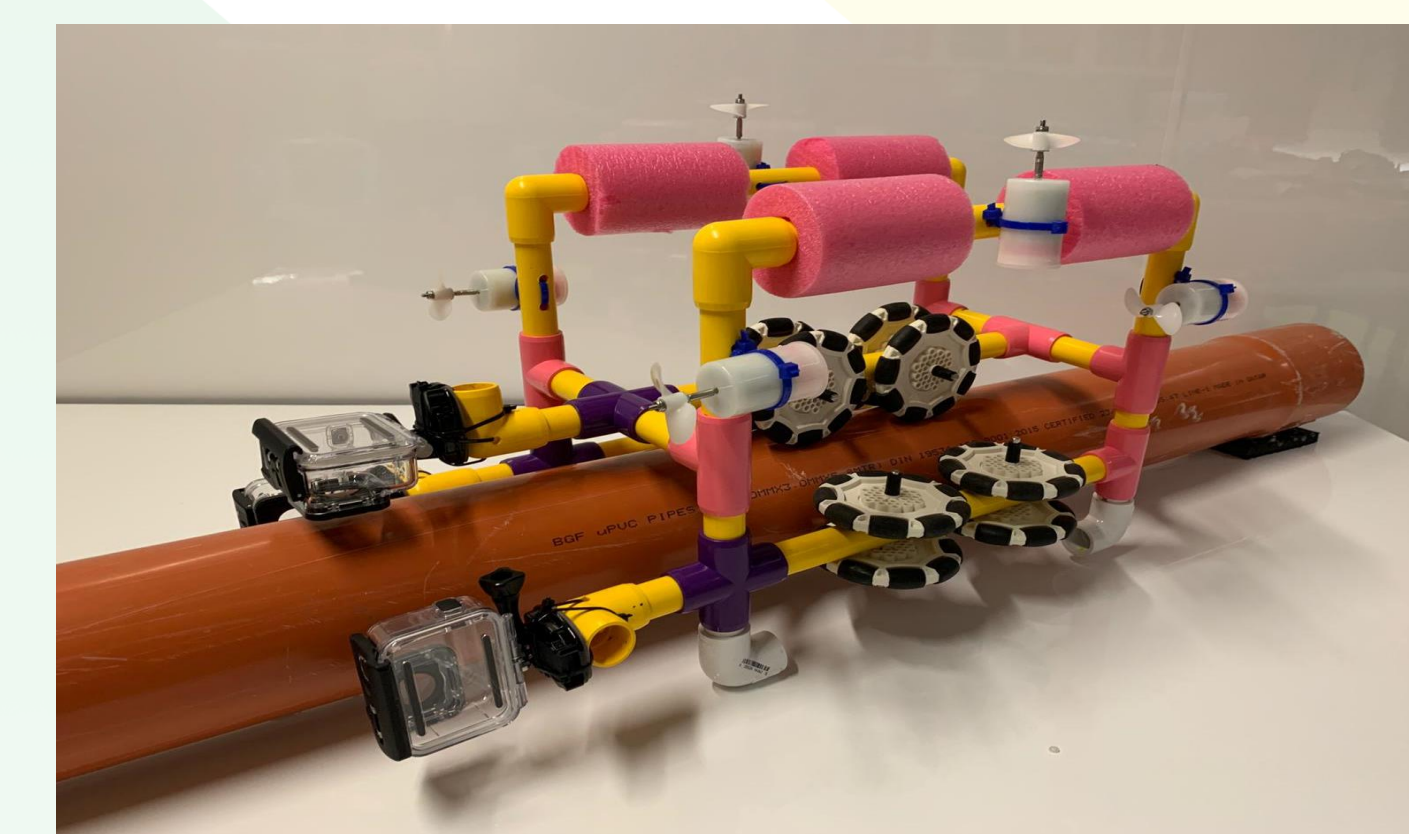
Design Iterations

An initial frame prototype is built before building the final prototype. The iterations are made to ensure the stability of the ROV and a suitable size for the mission.



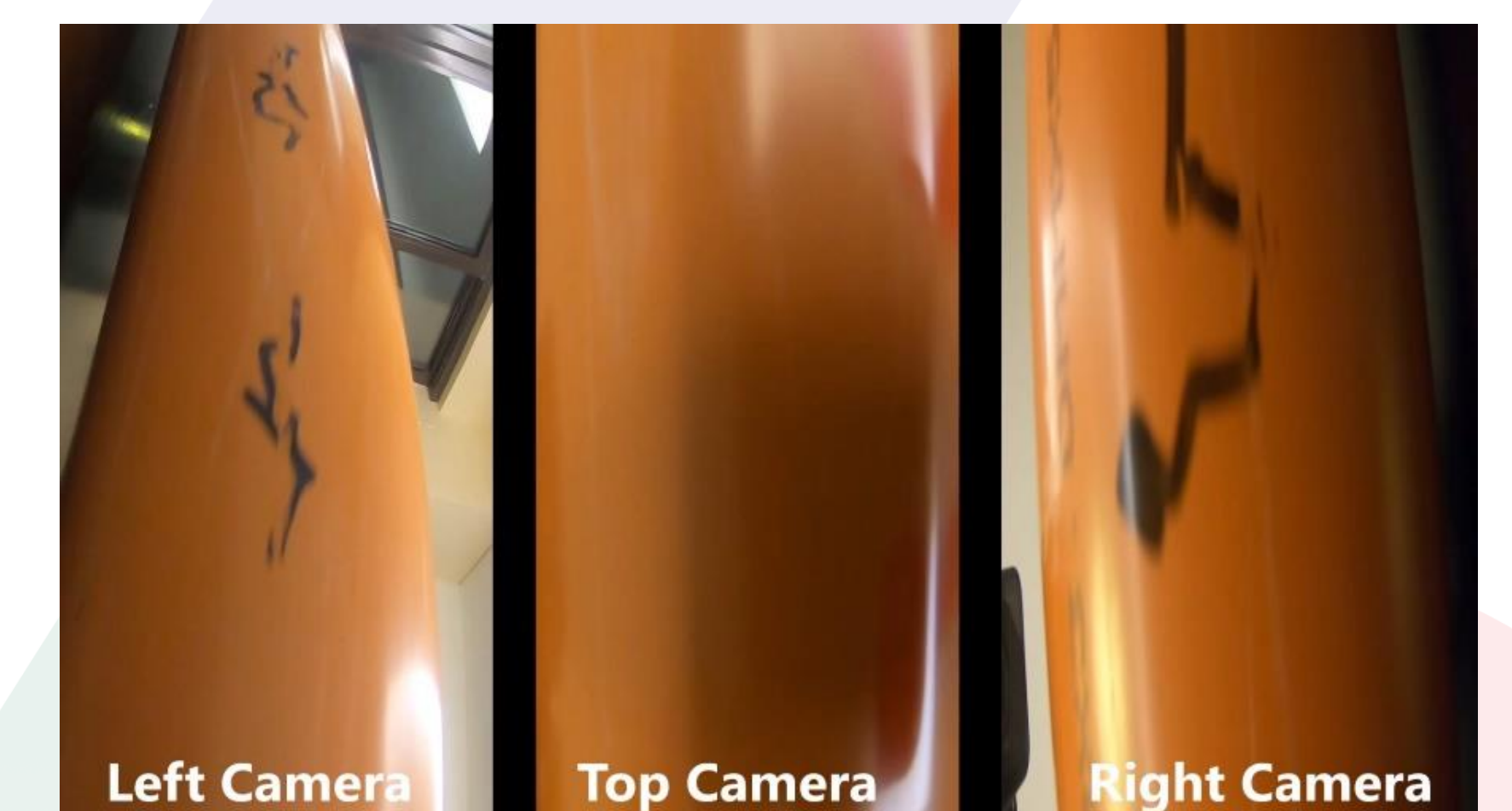
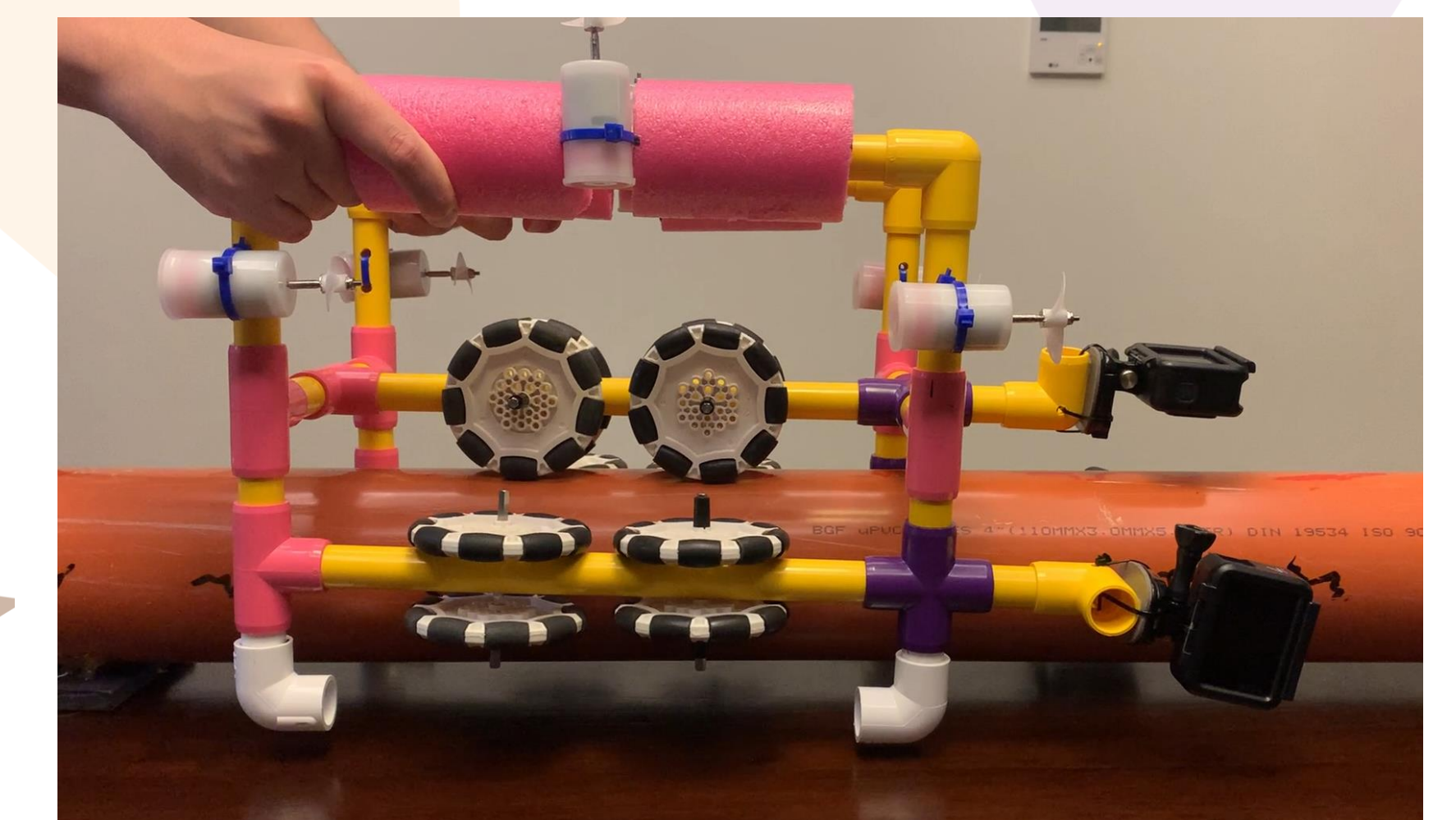
Final Prototype

final ROV consists of PVC pipes, 4 types of fittings, 6 motors, 12 wheels, and 3 cameras. Four motors are used for forward and backward motion to enable the ROV to move smoothly over the pipe. Three cameras are used to provide wide visualization for all sides of the pipe. The ROV frame is designed using 22 PVC pipes (1, 2, 5, 12 inches), 11 elbows, 7 tees, 2 4-way connector,



Experiment

The ROV is tested manually on the ground using a large pipe with markers on top, left, and right side. We used GoPro to take images and videos while moving on the pipe. Colored markers are used to draw cracks on all sides.



Project Objectives

In this project, a novel pipeline inspection ROV is designed, built, and tested. The ROV is designed for diving and aligning itself on the pipe. Then, it maintains its alignment using several wheels touching the pipe from the top, left, and right sides. The ROV has the following features:

- The ROV is made to help in an important industrial problem.
- Elegant, stable, rigid and modular design.
- Customized frame with wheels to move along the pipes.
- It has three cameras to scan the pipe from all sides.
- Powerful forward and backward propulsion using four motors.

CAD Designs

The ROV is digitally designed using the vperch online platform. This website provides the necessary components to convert the sketches into 3D models. The software was helpful to determine the measurements and test problems before building the prototype.



Acknowledgment

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