Improving the Efficiency of a Sphero Robot in Water

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Introduction

- The Sphero SPRK+ Robot (shown below) can be used on land and water. It is slower in water than it is on land because it lacks traction. Our goal is to create an attachment to improve the efficiency of the robot while in water.

(PC: www.sphereo.com)

Objective

- Our objective was to build off last year's SHINE project but to achieve the same level of efficiency increase but reduce materials used.

Experimental Methods

- I learned how to use MATLAB coding to track the position of the Sphero in a picture and a video by manipulating the color of the image frame and the color thresholds.

- In addition, I learned the fundamentals of the CAD software, Solidworks, and also how to use a 3D printer, which I used to print the belts for the Sphero.
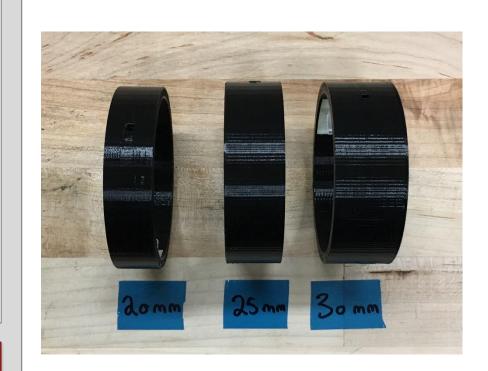
MATLAB   **SOLIDWORKS**

PC: www.mathworks.com (left)
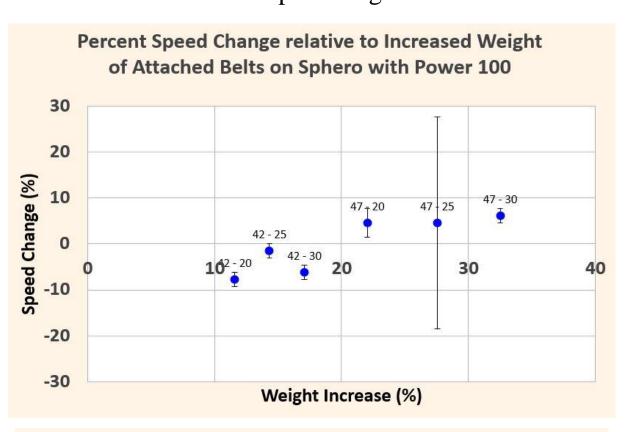http://www.cfn.group.cam.ac.uk (Right)

Results

- After testing the different size belts of the Spheros in the water, we managed to see which ones made the robot work more efficiently. We did this by plotting the percentage of speed change the Sphero had relative to the weight increase percentage. The graph showed the more efficient belt sizes to have a high percentage of speed increase and the less efficient ones to have a smaller percentage.
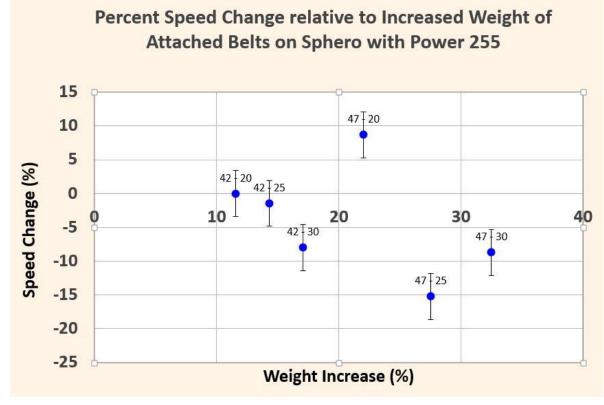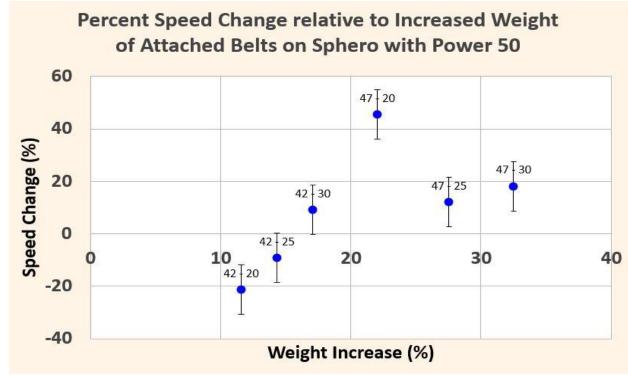
(PC: Alejandro Avilez)

These plots show the end results of the Sphero belt's efficiency at different powers levels with also the calculation of experimental error.

Percent Speed Change relative to Increased Weight of Attached Belts on Sphero with Power 100

Percent Speed Change relative to Increased Weight of Attached Belts on Sphero with Power 255

Percent Speed Change relative to Increased Weight of Attached Belts on Sphero with Power 50

Advice for Future SHINE Students

To the future SHINE students, do not take this program and all the help that is giving to you for granted. Not many students are able to experience this program and the opportunities it comes with. Always ask for help if you're stuck or don't know what to do. Don't be afraid to speak your mind and question everything!

Acknowledgements

You can place your picture here or remove altogether.