

Semi-Automated Wheel Lift Mechanism

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Abstract

Cars are everywhere and are the primary source of transportation for most of the population. One of the responsibilities of owning a car is having to do maintenance such as tire changes. Over half of injuries in a car shop are due to tire changes. The Wheelyft is a semi-automated lift mechanism that can aid in installing wheel and tire assemblies. With the use of ultrasonic sensors and a remote-controlled motorized lift, an Arduino is used to store the height value so that it can be recalled after the user is ready to re-install the wheel on the car. Also, with manually adjustable rollers, the lift can accommodate a wide range of wheel and tire sizes. The Wheelyft can be used by anyone in a shop or at home by DIYers that require an easy, stress-free solution to mounting wheels on their cars.

Introduction

Objectives:

1. Reduce back injuries in the workplace
2. Affordable compared to similar lifts
3. Automation
4. Ease of use
5. Wireless
 - a. Use of Arduino IR remote and receiver to control lift actuator with programmable buttons on remote

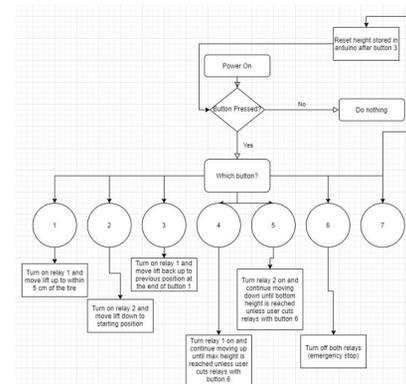


Figure 1: Logic diagram

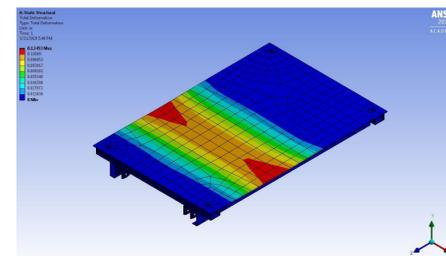
Methods and Materials

Materials:

- Low carbon steel, aluminum channels, Grade 5 hardware, Delrin blocks

Analysis: FEA (ANSYS)

- 1000 lb static face load to represent small SUV dropping on top of lift
- Small deformation values prove design has high factor of safety



Results

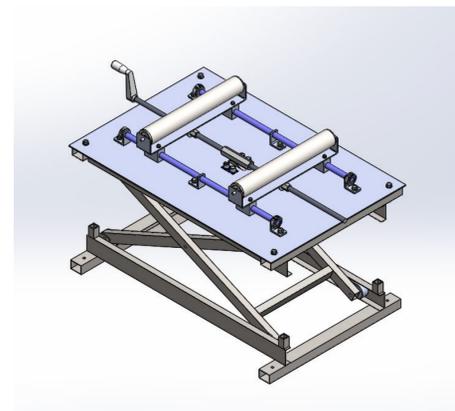


Figure 2: Final Design

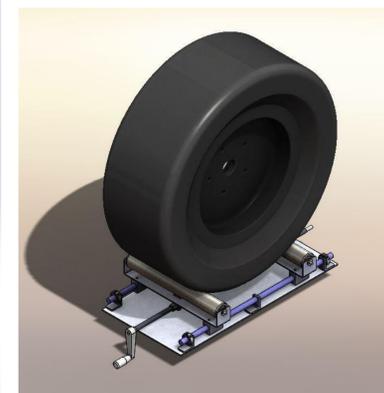


Figure 3: Proof of concept

Discussion

Customer input can be used to improve the current model and better accommodate customer needs for future iterations of the model.

Budget and Costing

BUDGET: \$1000
COST: \$601.15

Compared to other products that are not as advanced, our mechanism is priced much lower and under budget. Some products that were researched during the design phase were \$1000-1200.

Conclusions

Due to COVID-19, the team has transitioned all efforts to a virtual model. The model and code is working as intended virtually. Code has been tested with the arduino and sensors only since no relays could have been ordered in time.

Acknowledgements

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