Opportunity and Significance
The idea to help a user with changing a spare tire. The problem is the amount of work the user needs to put in lifting the vehicle and removing the lug nuts. Each lug nut requires around 150 ft/lbs of torque to remove. The user needs to use manual force to complete the spare tire change. Our design will a motor with switches that will help the user control everything without using much force.

Technical Objectives
Create a multifunction system to lift the car and remove the lug nuts.
Find out how much torque is required to allow the jack to lift the car off the ground.
Obtain a motor to turn the lug nuts and raise the jack.
Car measurements
- Gear analysis
- Shaft analysis

Related Work and State of Practice
Previous group project was designed to remove lug nuts from a tire, but the design was very rudimentary. Our group is trying to motorize some of the applications and also lift the car while removing the lug nuts.

Technical Approach, Accomplishments and Results
The main objective of our project is to ensure that a driver can replace a tire while exerting little to no effort. We are taking in to consideration that this design must be something that a car novice can use without having to pull out a manual to instruct them on how to use it.

Next Steps for Development and Test
Order and machine all the parts required for our design. Test our product on the car that we did our calculations to ensure that the jack can lift the car and our motor can remove the lug nuts. All calculations are to be finalized by April 8th and testing must be complete by April 15th.

Commercialization Plan & Partners
Who did you work with?
Dr. Ali Ozbeki
Bob Kas-Mika
Amazon
McMaster-Carr

Who will you work with to commercialize the product or process?
Automotive industry

What are the main steps or hurdles to commercialization?
Cost
Compact design
Compatibility

References
Shigley’s Mechanical Engineering Design (9th Edition)