Gas Cap Opener
DESIGN RATIONALE

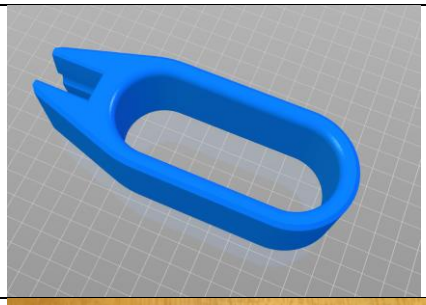
Makers Making Change
A Neil Squire Program

Introduction

Some people with limited grip strength/limited hand function may have difficulty opening the gas cap on their vehicle. There are several commercial and DIY options available for opening vehicle gas caps, but most designs focus on users with limited grip strength, leaving few options available for users with limited hand function.

Research

Commercial			
Name	Picture	Price	Link
Freedom Gas Cap Wrench		$17.95	Link
Bandwagon Gas Cap Aid		$32.11	Link
DIY			
Name	Picture	Price	Link

Gas Cap opener		N/A	Link
RV Locking Gas Cap Wrench		N/A	Link

Requirements

Goals

G01	To allow users with limited hand function to remove and replace the gas cap on their vehicle

Functional Requirements

F01	Device must open and tighten the gas cap on any passenger vehicle
F02	Device must be usable by users with limited hand function

Non-functional Requirement

NF01	Each component printable in less than 8 hours
NF02	Device must be printable with minimum supports

Constraints

C01	Built with 3D printable and off the shelf components

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Prototyping

The initial concept was inspired by the Freedom Gas Cap Wrench. Each round of testing identified a new flaw in the design, and a new prototype was created.

Testing

The initial prototype was tested on a Toyota Rav4. It removed the gas cap of the vehicle, but the handle was found to be uncomfortable and difficult to grip. Additionally, the bolt attachment points had to be removed for it to fit into the gas cap cavity.

The handle was redesigned along with the new bolt attachment points, and it was tested again on a Rav4 and a Toyota Corolla. This time it was able to remove the gas cap on the Rav4, but it did not fit over the gas cap on the Corolla. The edges were found to catch onto the strap holding the cap to the car.

The width of the gas cap slot was increased for the next prototype, and a chamfer added around the outer ring.

For the final version, the bolts were replaced with 3D printed pins and nuts.

Opportunities for Improvement

- The device could be redesigned to eliminate printing supports