DEPARTMENT OF MECHANICAL ENGINEERING

TEAM 16

Elder Assist Engineers

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Problem Definition

Elderly and disabled people who are still independent generally cannot easily reach the top shelf of their cabinet.

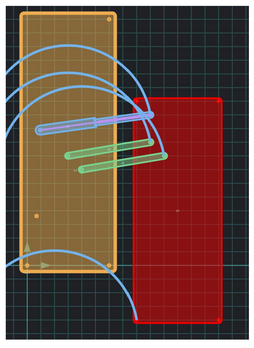
- Strain in their shoulders, elbows, and wrists.
- Amplified due to natural weakening of bones.
- Joint degradation due to wear and tear overtime.

Our product aims to automate bringing the shelf closer to the user.

Design Calculations & Analysis

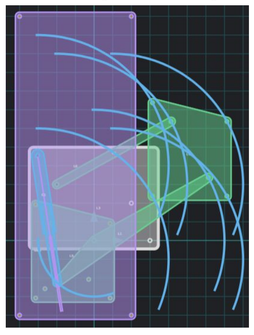
For motorization we used linear actuators.

Primary Subsystem



From our calculations, our linear actuator should be rated for a force of at least 237 pounds. Stresses in linkage bars were minimal.

Secondary Subsystem



From our calculations, our linear actuator(s) should be rated for a force of at least 70.5 pounds. Stresses in linkage bars were minimal.

MotionGen allowed us to model the motion for our subsystem configurations

- Spacing, dimensioning and orientation of components

We leveraged SolidWorks to model our components

- Verify assembly of components

Final Design

Main Subsystems

- Primary- Allows the shelving unit to come out of the cabinet
- Secondary- Allows for lowering the top shelf to a height lower than the bottom shelf

Mechanical Components:

- **Four linear actuators**
- One motor RF Forward Reverse Switch**
- One wireless remote controller**
- One Lithium Ion Rechargeable Battery**

Key Features

- Wireless automation
- **Lowering of top shelf**
- Efficient conversion of linear to rotational motion
- Three degrees of freedom

Prototype & Test Results