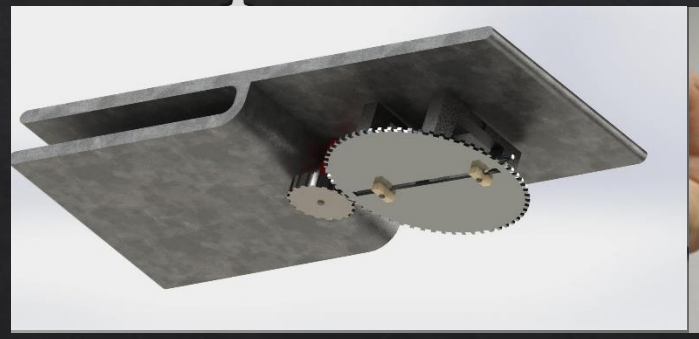
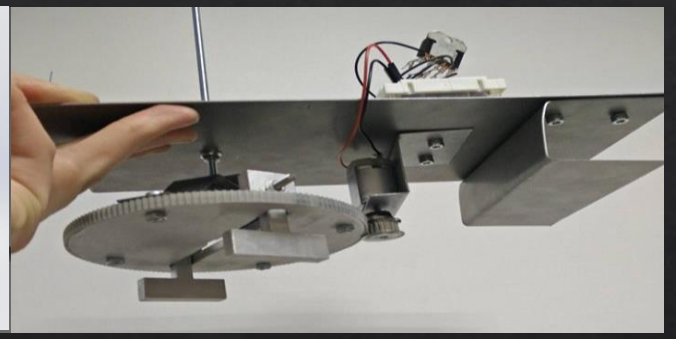
Trinity College Dublin
Coláiste na Tríonóide, Baile Átha Cliath
The University of Dublin

Open Arms
Open Your Mind

3B8 Universal Design Innovation
Group 11 – OPEN ARMS





MISSION STATEMENT : *"TO DESIGN A DEVICE FOR OPENING AND CLOSING JARS AND BOTTLES FOR USERS WITH REDUCED SHOULDER MOBILITY "*

DEPARTEMENT OF MECHANICAL & MANUFACTURING ENGINEERING

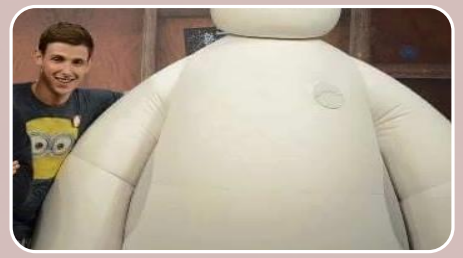
GROUP 11

Ciarán

* SOFTWARE
* FEA

Edward

* HADRWARE
*GRAPHICS



Denis

*CAD
*VIDEO

Jamie

*METAL WORK
* ASSEMBLY

THE WHY ? NEEDFINDING

THE GROUP CONDUCTED RESEARCH INTO "*SUCCESSFUL AGEING*" BY VARIOUS METHODS:

- ONLINE SURVEYS
- GATHERING A STAKEHOLDER GROUP
- BACKGROUND READING
- INITIAL INQUIRIES

THE RESULT OF THE NEEFINDING WAS THE GROUP GENERATED A MISSION STATEMENT OF:

"TO DESIGN A DEVICE FOR OPENING AND CLOSING JARS AND BOTTLES FOR USERS WITH REDUCED SHOULDER MOBILITY "

BENCHMARKING

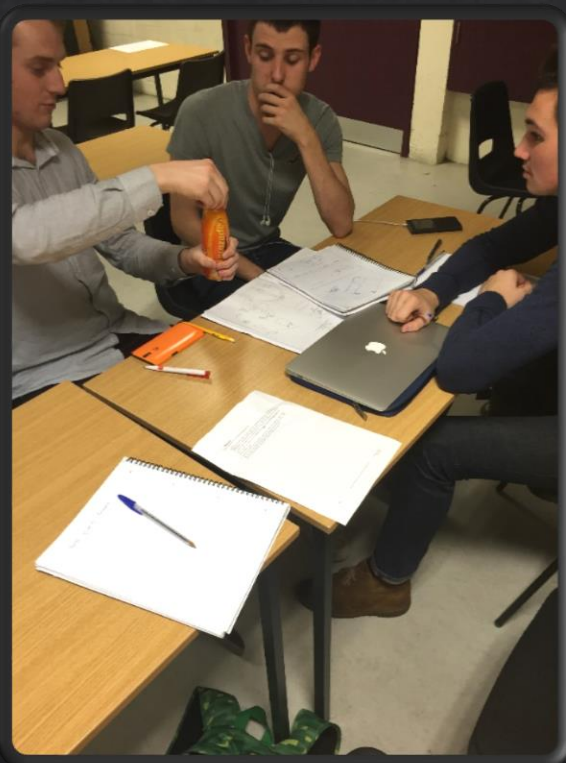
WE RESEARCHED CURRENT SOLUTIONS AND FOUND THE FOLLOWING SHORTCOMINGS:

1. FAILED TO OPEN THE LID
2. UNSIGHTLY
3. PERMANENT
4. LARGE DEVICES HIGHLIGHTING THAT THE USER STRUGGLES WITH DEXTERITY & MOBILITY.

CONCEPT GENERATION

GROUP BRAINSTORMING SESSIONS FOR IDEAS ABOUT HOW TO FULFILL OUR MISSION STATEMENT AND DESIGN REQUIREMENTS

- REQUIREMENTS
  1. UNIVERSAL
  2. EASE OF USE
  3. REMOVABLE
  4. SLEEK DESIGN
- SPLIT CONCEPT GENERATION INTO TWO SECTIONS .
  1. LOCATION
  2. OPENING METHOD

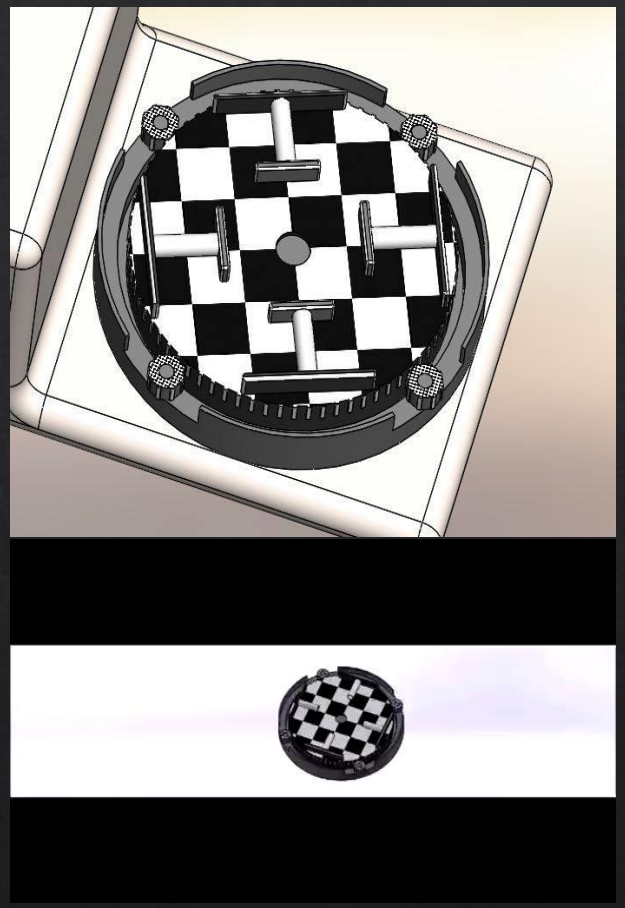


OPENING METHOD

- MOVING CLAMPS ON A ROTATING DISK WAS THE CHOSEN METHOD TO OPEN THE CAN.

BENEFITS OF THE CLAMPS:

1. UNIVERSAL
2. CAN BE ENGINEERED WITH ONLY 2 MOTORS
3. ACCURATE CONTROL USING ARDUINO MICROCONTROLLER



LOCATION

THE REQUIREMENTS FOR THE LOCATION CONCEPT:

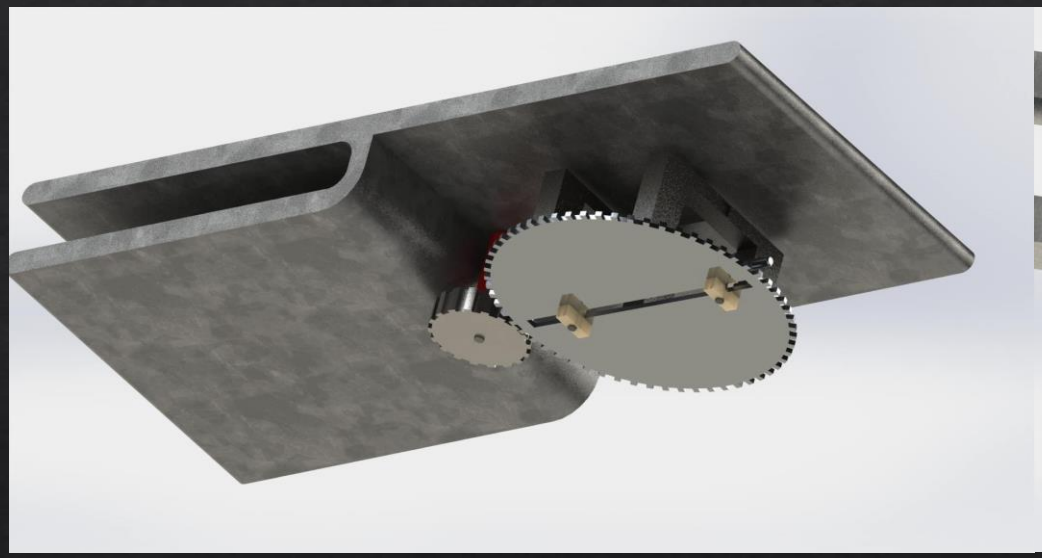
1. REMOVABLE
2. EASE OF USE FOR USERS WITH REDUCED SHOULDER MOBILITY

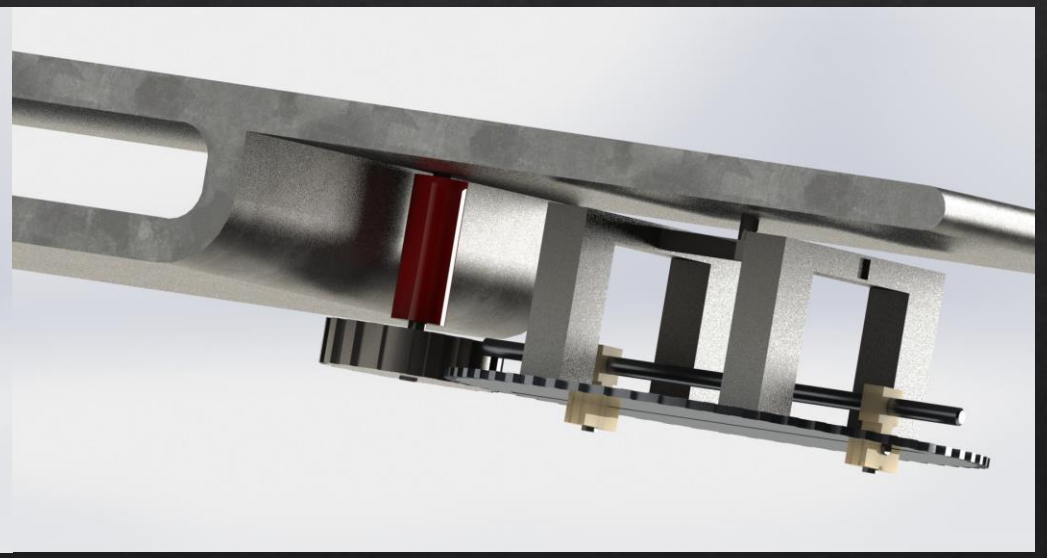
- THE OPENER WILL BE REMOVABLE FROM THE UNDERNEATH OF A KITCHEN COUNTER TOP

PICTURED ARE THE FINAL COUNTER-TOP DESIGN & THE CONCEPT PROTOTYPE

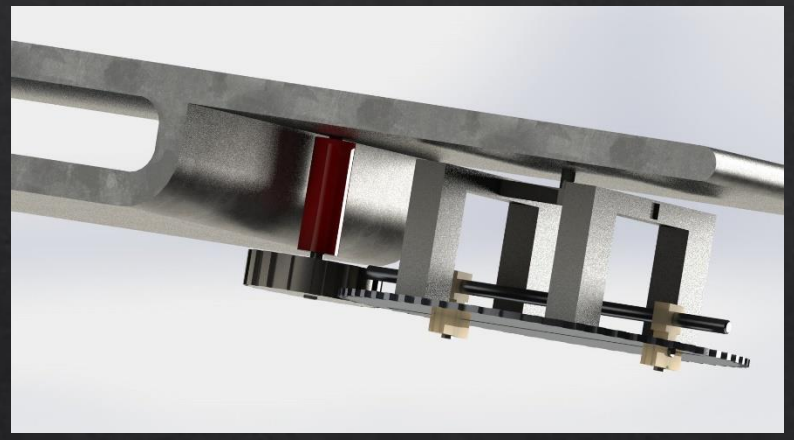
FINAL DESIGN

THE FINAL DESIGN IS A COMBINATION OF THE OPENING METHOD AND THE LOCATION CONCEPT:





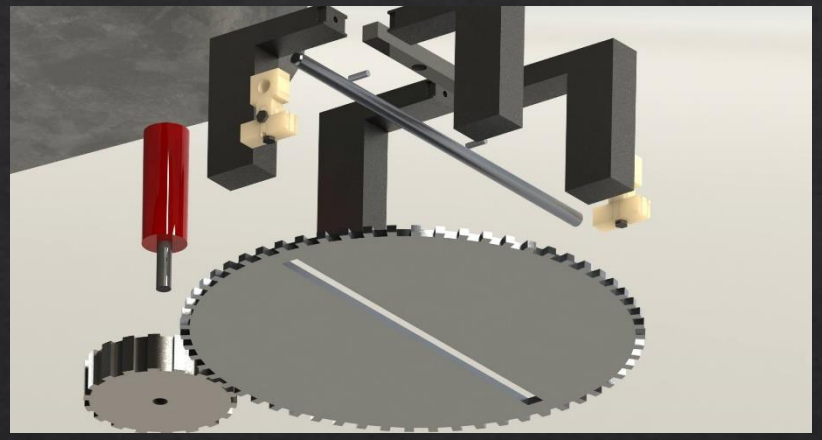
HOW IT WORKS



A MOTOR AND WORM GEAR TURNS THE BAR THAT THE CLAMPS ARE ON .

THE CLAMPS ARE OPPOSINGLY TAPPED.

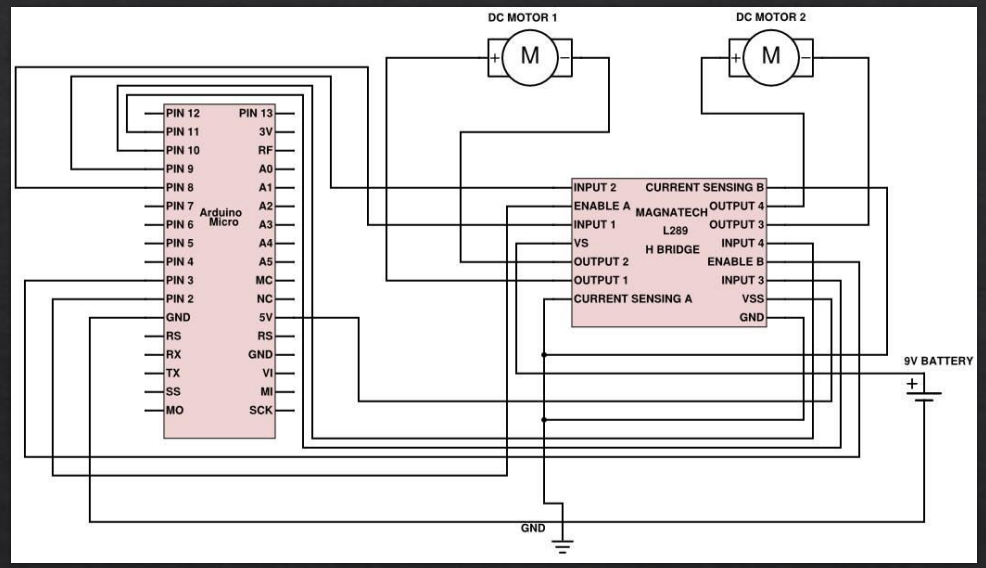
THEY CONVERGE ON THE LID

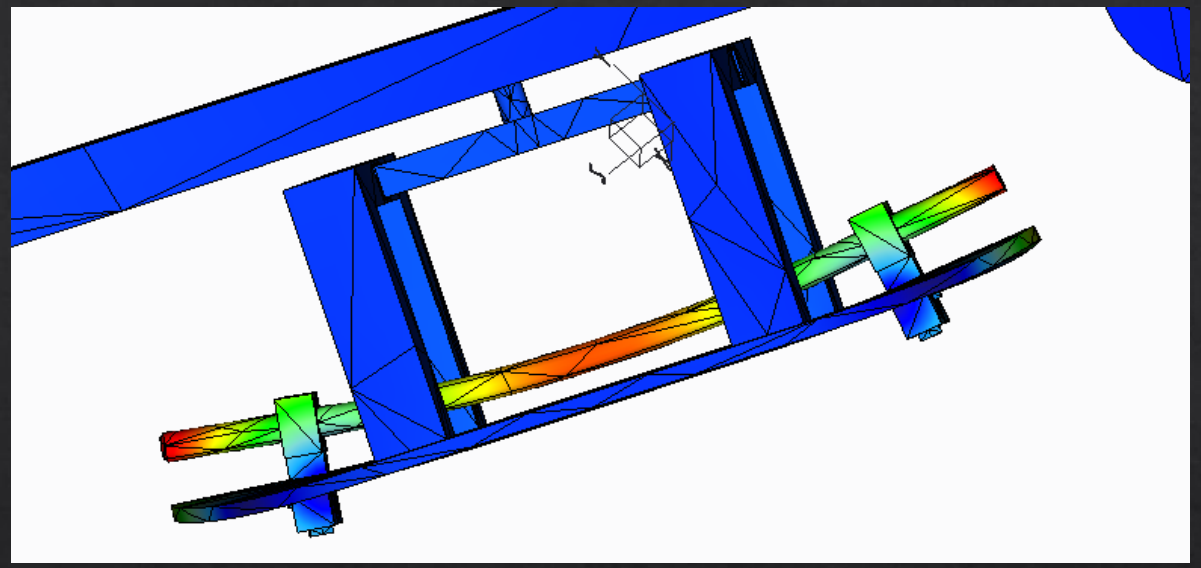


ONCE THE CLAPMS HAVE GRIPPED THE LID.

THE LARGE MOTOR TURNS THE DISK UNTIL THE LID IS OPENED.

HOW IT WORKS





THE MOTORS ARE CONTROLLED BY AN ARDUINO MICRO.

THE ARDUINO COMINED WITH A H-BRIDGE IS CAPABALE OF ROTATING THE MOTORS IN BOTH DIRECTIONS.

ONCE THE JAR IS OPEN, THE ARDUINO INSTRUCTS THE MOTORS TO RELASE THE CLAMPS AND RETURN THE DISK TO ITS START POSITION

FINITE ELEMENT ANALYSIS SHOWED THAT OPEN ARMS CAN TOLERATE ITS PREDICTED LOADING CONDITIONS WITHOUT PLASTICALLY DEFORMING

PROTOTYPE

A PROTOYPE OF OPEN ARMS WAS FABRICATED USING ALUMINIUM & STEEL TO GAIN AN INSIGHT INTO THE OPENERS CAPABILITIES

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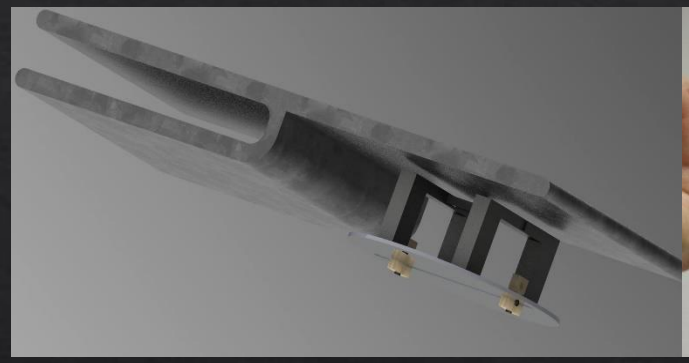

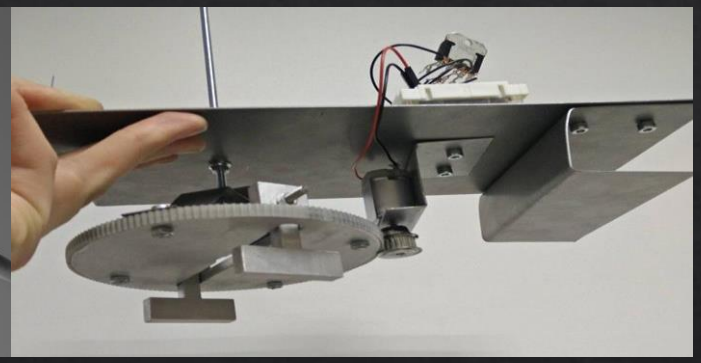

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SEE OUR VIDEO : https://youtu.be/EB9LN_RSNmE