# Pedal Lifting Mechanism

Presented by Team B11

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# Problem Statement

“ It is required to design mechanism that rases and lowers wheelchair pedals without spending an exorbitant amount of money. This project necessitates the system to be automatic, intuitive, lightweight, and compact.

# Needs Identification

- The design can raise and lower the pedals
- Minimal effort from the user
- The design is automatic
- Controls are on the right arm of the chair
- Design is unaffected by rain or snow

# Target Specifications

| Design Specifications | Relation (=, < or >) | Value | Verification Method | Design Specifications |
|---|---|---|---|---|
| **Functional Requirements** | | | | |
| Load capacity (lbs.) | > | 15 | Test | Load capacity |
| Time of assembly/modification (mins) | < | 60 | Test | Time of assembly |
| **Constraints** | | | | |
| Cost ($) | < | 100 | Estimate | Cost |
| **Non-Functional Requirements** | | | | |
| Customer satisfaction (rating 1-10) | > | 7/10 | Analyze | Customer satisfaction |

# Solution Options

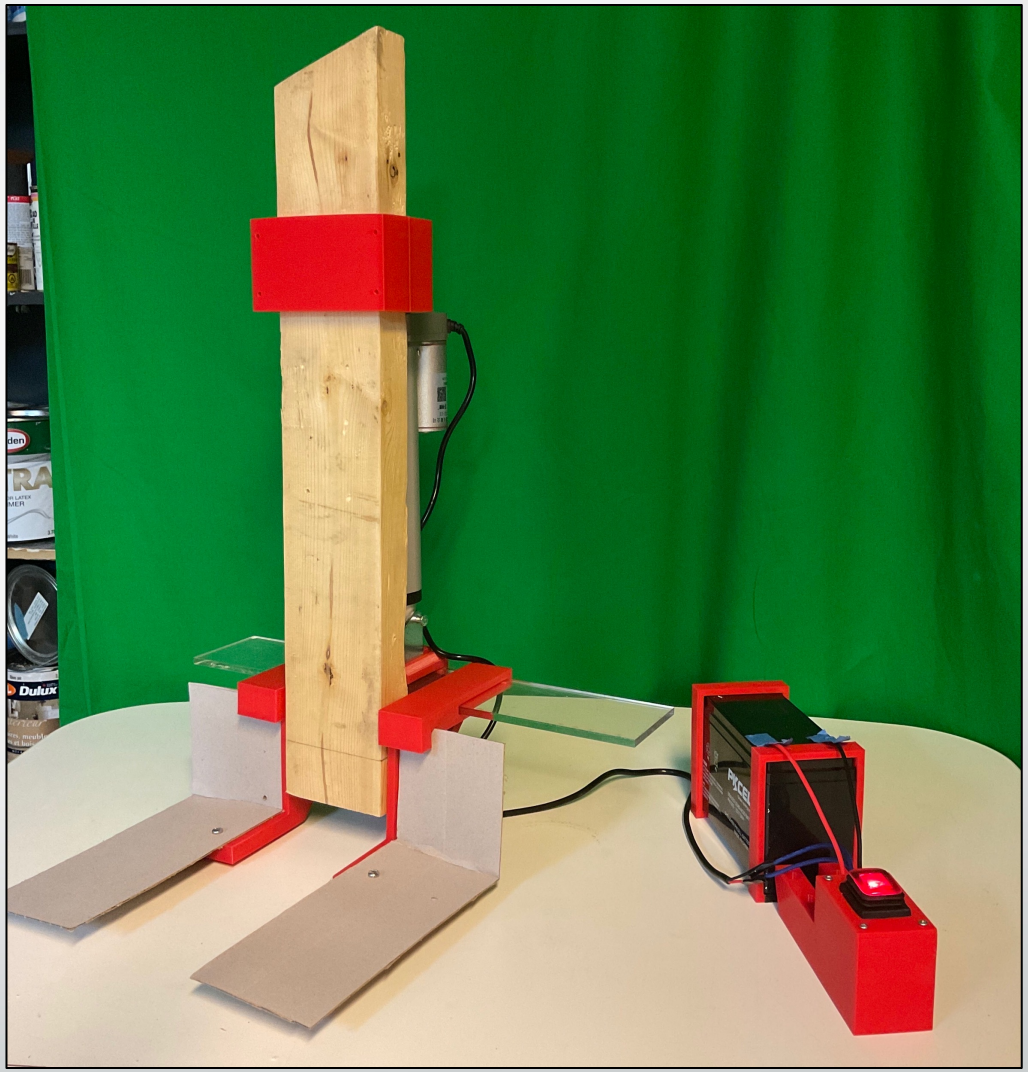
- Motors and Arduino
- Single linear actuator
- Double linear actuator

# Decision Matric

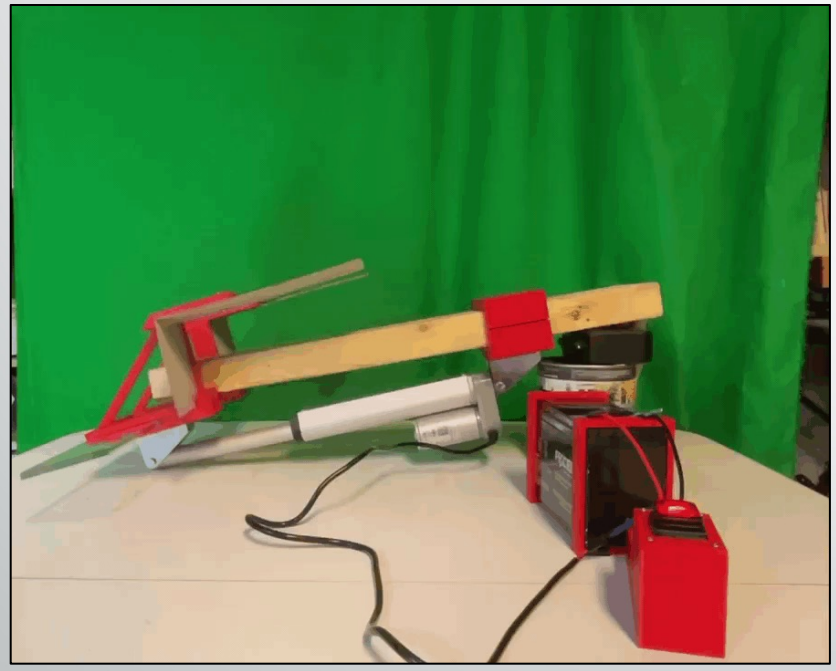
| Possible solution | Cost ($) (1-10) | Simplicity of design (1-10) | Time of assembly (1-10) | Versatility (1-10) | Total Score (1-40) |
|---|---|---|---|---|---|
| **Motors + Arduino** | 1 | 3 | 5 | 7 | 16 |
| **Single Linear Actuator** | 7.5 | 8 | 7 | 4 | 26.5 |
| **Double Linear Actuator** | 3 | 5 | 4 | 8 | 20 |

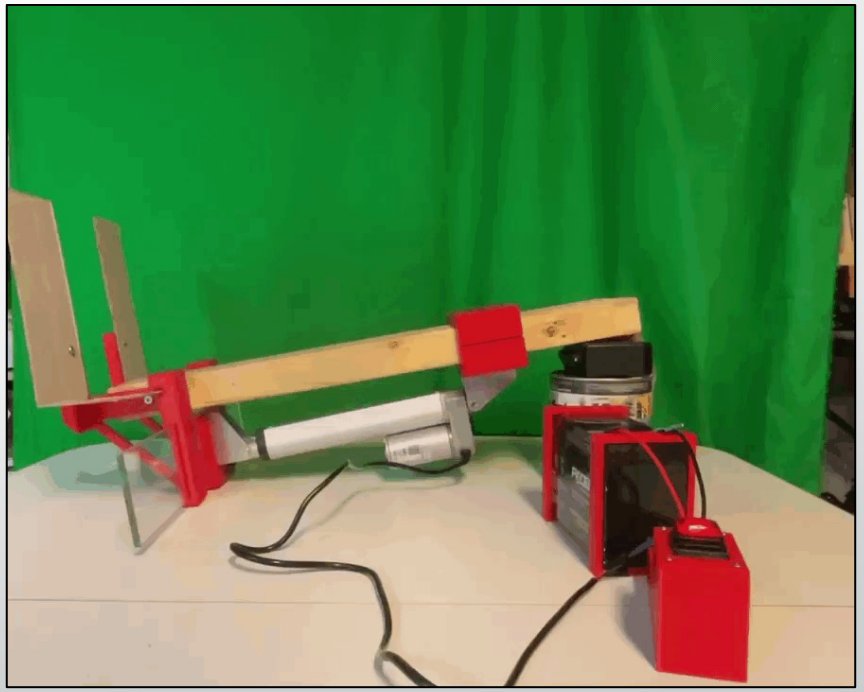
# Final Concept

- Components:
  - Linear Actuator
  - Battery
  - DPDT Switch
  - Wires
  - Screws
  - Acrylic
- 3D Printed Parts (Red)
  - Pedal Clamps
  - Switch Box
  - Battery Holders
  - Linear Actuator Mounts



# See It In Action





# Business Model and Economics

- Razor-blade model
- Subscription model

| INCOME STATEMEMT | | | |
|---|---|---|---|
| **Sales** | | | *$1,235,000* |
| **Cost of Goods Sold** | | | *$400,000* |
| *Production Materials* | $320,000 | | |
| **Gross Profit on Sales** | | | *$915,000* |
| **Operating Expenses** | | | *$364,802* |
| ***Marketing Expenses*** | | | *$1,000* |
| *Marketing Campaigns* | *$1,000* | | |
| ***General & Admin (G&A) Expenses*** | | | *$364,802* |
| *Overhead* | *$2,000* | | |
| *Salary* | *$330,000* | | |
| *Rent* | *$30,000* | | |
| *Equipment* | *$1,060* | | |
| *Depreciation* | *$742* | | |
| **Operation Income (EBIT)** | | | *$550,198* |
| **Break Even Units** | | | *377* |

# Trials and Tribulations

- No access to client's chair
- Suspension system → Pedal lifting mechanism

# Thank you for listening!

Any Questions?