Cameron Douglas

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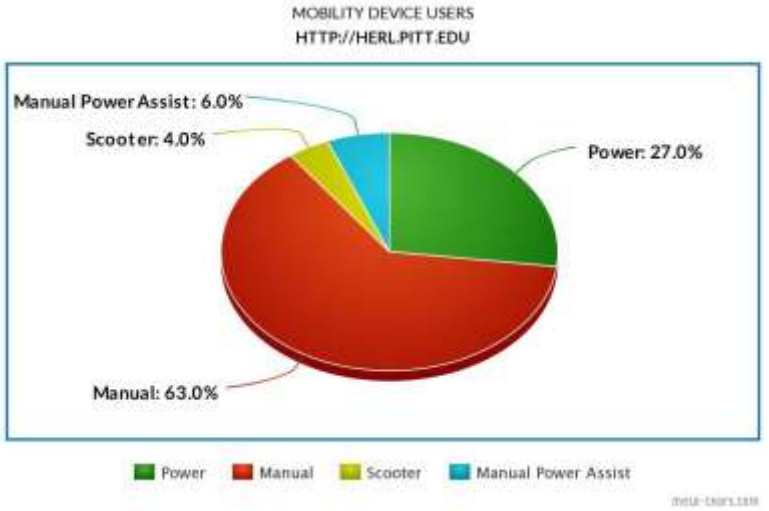
User Point of View

Background

- **40 million:** Physically disabled in the USA
- **$2.19 billion:** Automatic Door market in the US (2015) at CAGR of 7.9%
- **< 1%**: U.S housing is wheelchair accessible
- **35.2%**: People over 65 with a disability

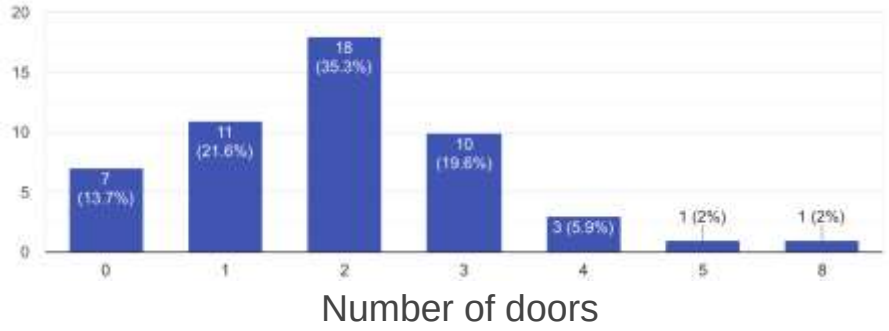


Doorway Challenges

- Weight & self-closing
- Use of hands
- Momentum & traction
- Costs of automation

Customer Surveys

- Removable (76%)
  - Moving/renting
- Price valued highest (41%)
  - Installation ease (29%)
- ~2% current access



Need Statement:

Physically disabled persons need an easy and affordable method for opening doors.

Design Evolution

Hand Tools (Manual Assistance)

- Door handle grabber
- Reach extender
- Portable/ extending doorstop
- Door jamb jammert
- Hand-held "slingshot" door launching
- Lasso-like door puller
- Key insertion & turning extender
- Suction-cup handle extension
- Straight up grappling hook
- Shower curtain/ door reach extender
- Air cannon to blow door open
- Use wheelchair wheels as pulley system

Door Modifications

- Closing handle on door
- Lighter doors
- Doors that swing both ways
- "Star Trek" sliding doors
- Saloon door stiles
- Two-level pantry-like door
- Giant torsion springs in hinges
- Audio/visual cues during motion
- Longer door handles/ knobs
- Rubber door bumpers
- Variable resistance doors
- Capacitive door knobs for auto open
- Non-newtonion fluid damper
- "Heavy Door" sticker
- "Push" or "Pull" labels required
- Retractable subway gap cover
- Magnetic door holders
- "Automatically open" doors

Wheelchair Modifications

- Lighter wheelchair
- Smaller wheelchair
- Wheelchair that can narrow
- Robotic leg kicks open door
- Foot-stand rubber bumpers
- Auto-braking wheels for leverage
- Electric bike-like motors
- Copenhagen wheel attachment
- Proximity alert sensors
- Telescoping spokes instead of wheels
- Electro-magnetic breaks
- Hydraulic breaks
- Pliable trades instead of wheels
- Shock absorbers/ active damping

Automated Asssitance

- Power-wheel opener
- Door-opening robot
- Geared track for door
- Kickplate button for opening
- Bluetooth/ RF capable remote
- Pressure mat for triggering
- IR sensor for triggering
- Larger/ more visible handicap buttons
- App-based opening
- Signal when in use/ non-operational
- Automated doorstops (little kick ones)
- Voice-operated door opener (Alexa?)
- Campus app w/handicap entrances label
- Periodic wheelchair spot on escalator
- Remote control/ RFID residential lock
- Moving rooms/ closet orientation

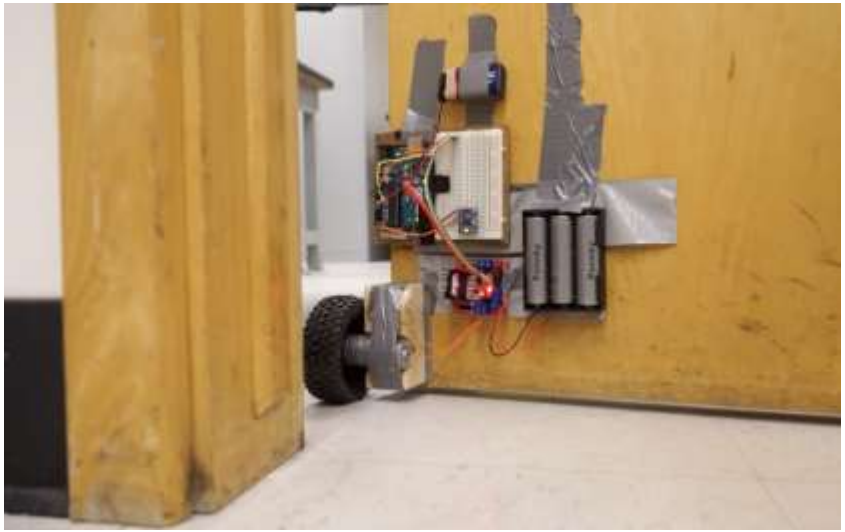
Attachment Mechanisms

- Suction cups
- Under-door sleeve
- Double-sided tape
- Screws & fasteners

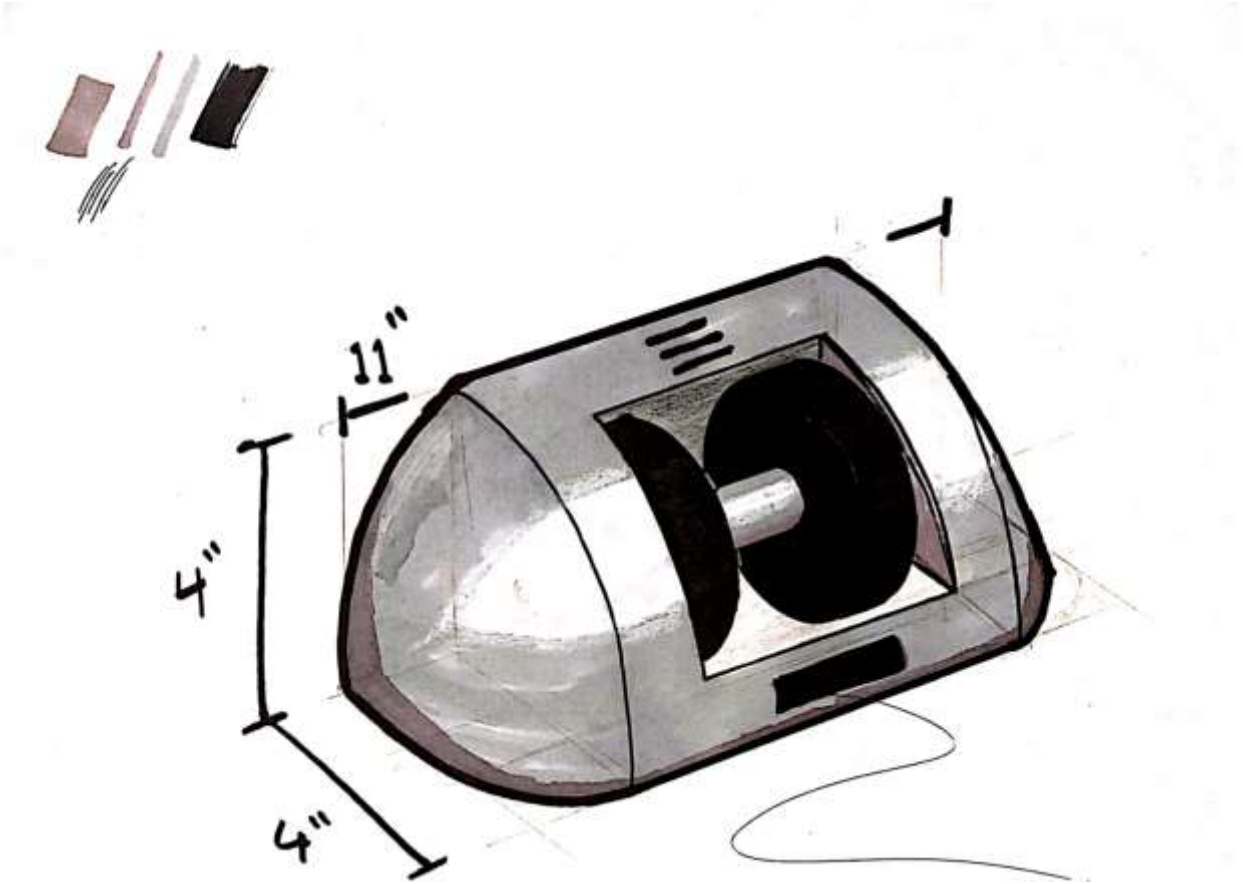
Activation Mechanisms

- Activation upon opening
- Button/remote activation
- Voice activation

Pretotyping

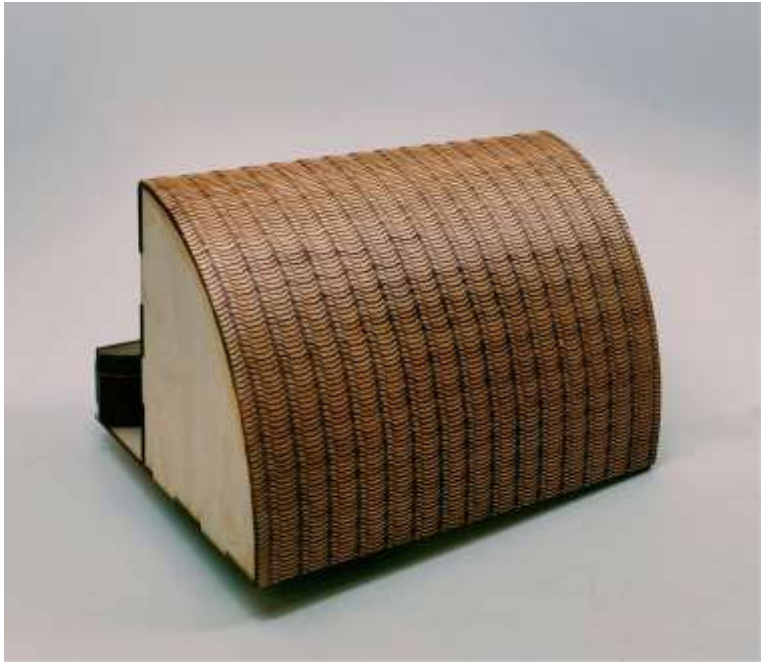


Final Design


11"
4"
4"

Final Prototype

- Sleeve w/ compressive foam
- Contained package
- Battery powered
- Opens on door movement



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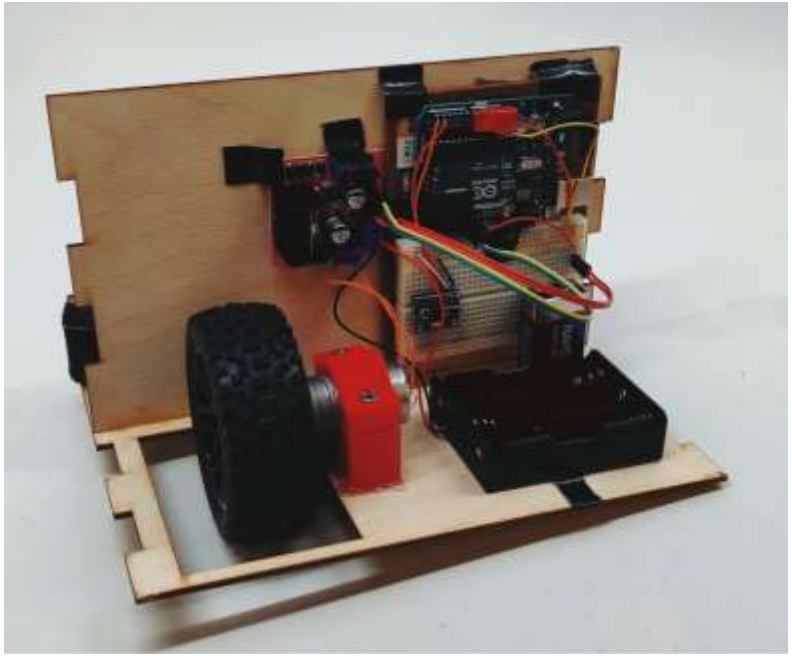
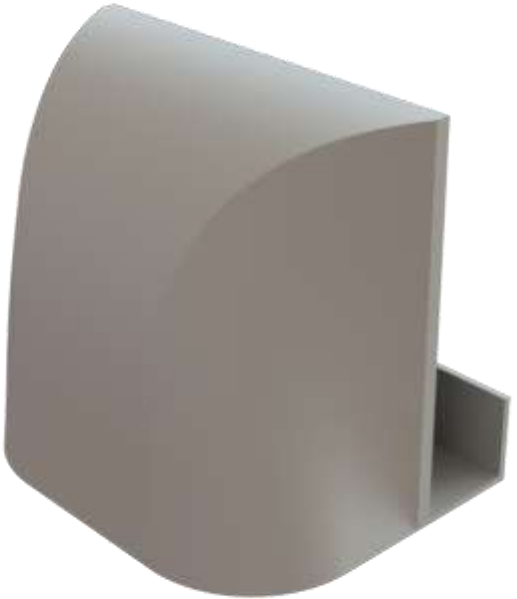


Future Iterations

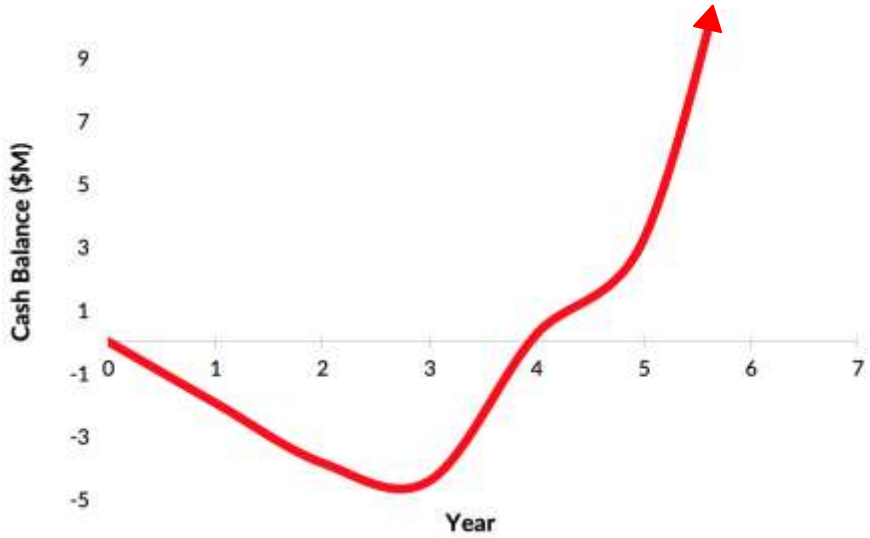
- Sleeve & screw options
- Adjustable attachment
- Fire alarm integration
- Voice Command
- Smart lock integration



Business Plan

Overview

- SBIR, NIH Grants — R&D
- VC Funding — Manufacturing
- <$50 to produce
- $150-$200 price point
- Target in-home & hospitality



“I’m currently handicapped and having automated doors is so much easier. It makes being independent a lot easier — lots of people take it for granted”

Questions?