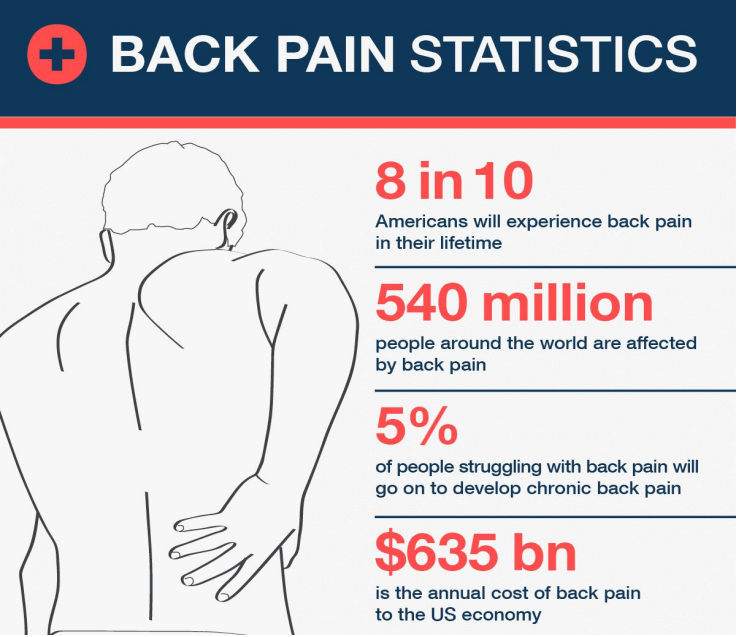
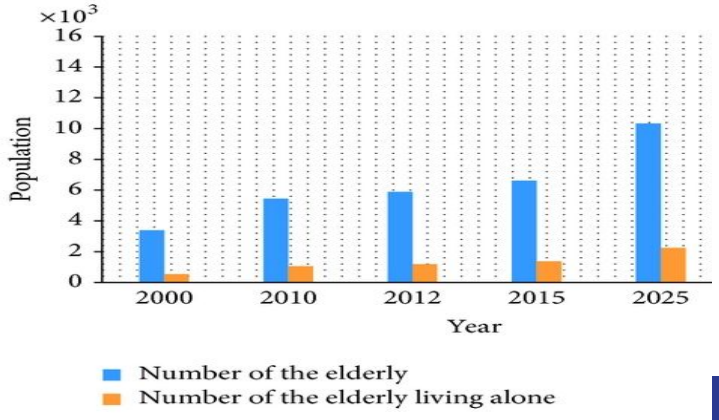
TESI Shark Tank

By Andrew, Christopher and Akirin





What's the Problem?

Nearly 70 percent of all seniors suffer from lower back pain, with 30 percent of those living unassisted.

As we age flexibility and strength is naturally lost, leading to many injuries from bending over to pick objects up.

Each year, roughly 2 million back injuries occur in America alone, many of them caused by overexertion from lifting.

How Might We Solve This Problem?

How might we design a device for the elderly so that they can safely reach things on the floor, without having to exert themselves?

Our Solution: The Cane Elevator!

Walking stick-like tool with an elevatable landing pad

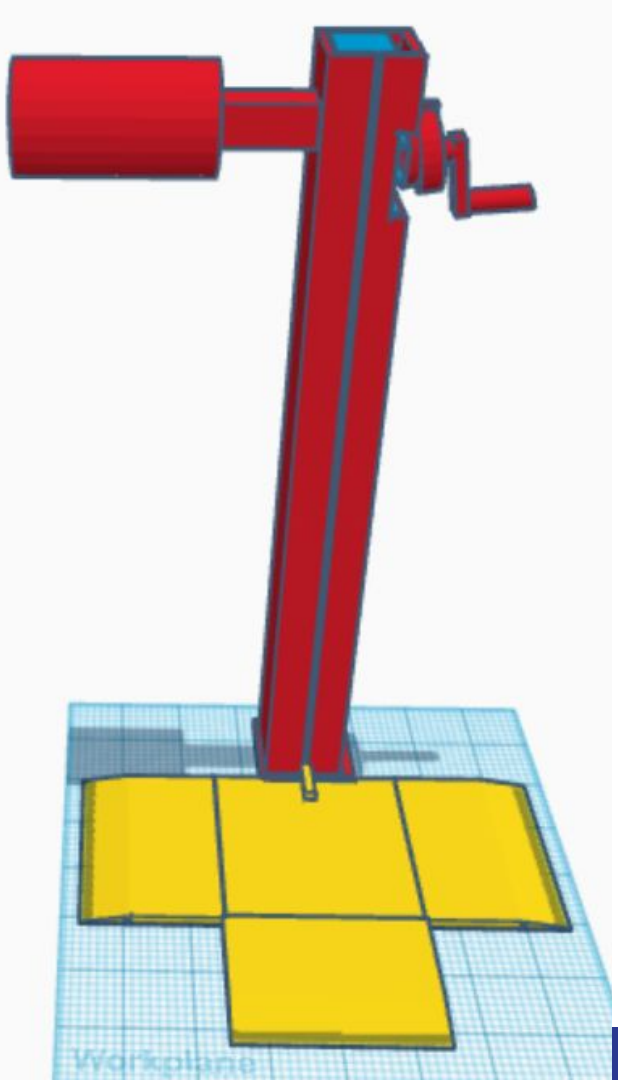
Sloped walls that start flush with the floor

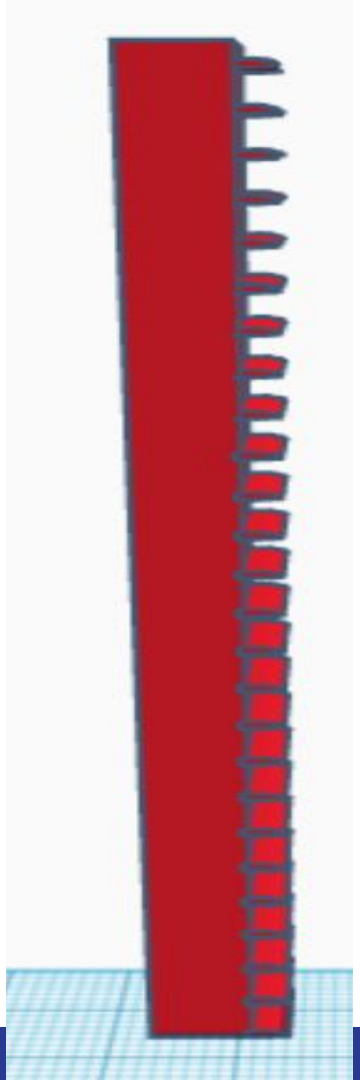
Allows objects to slide onto the platform

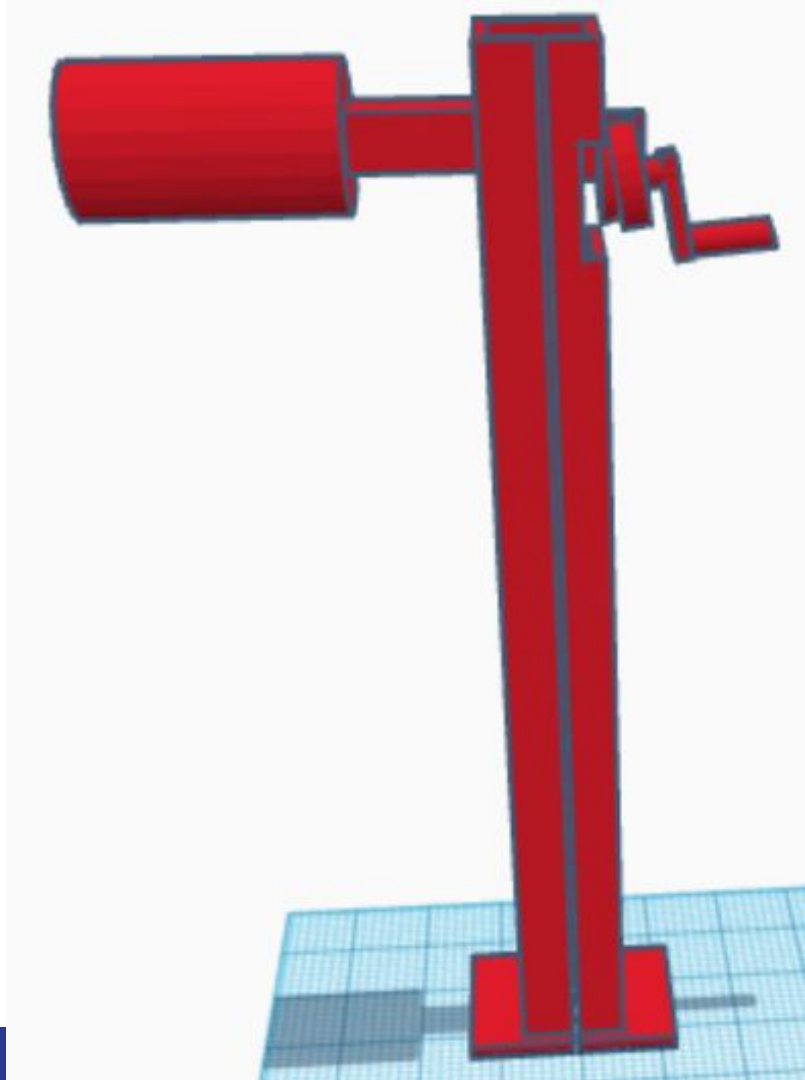
A string runs through holes in the walls, and when pulled fold up to act as walls

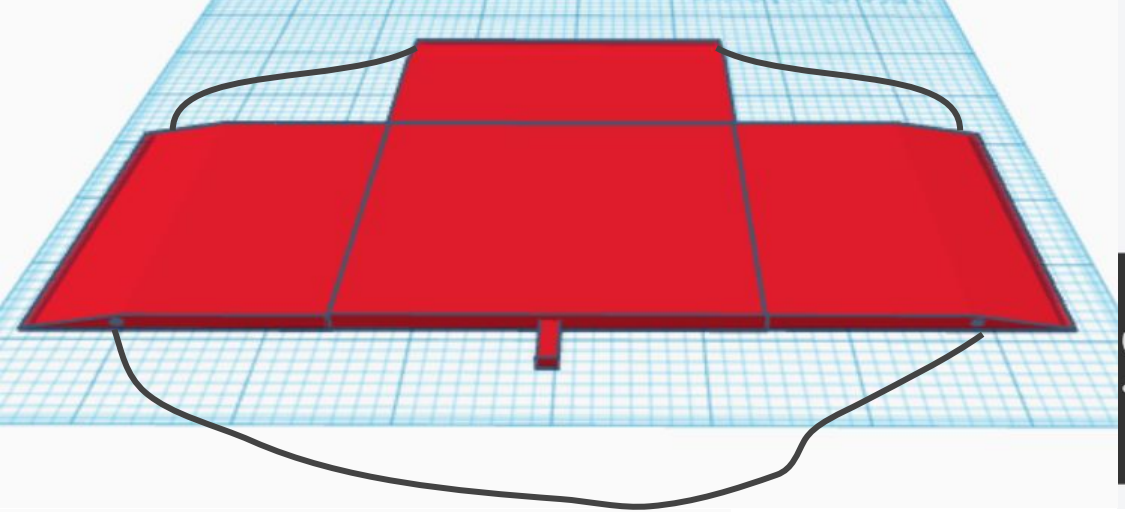
Uses an Archimedean spiral gear as the lifting mechanism

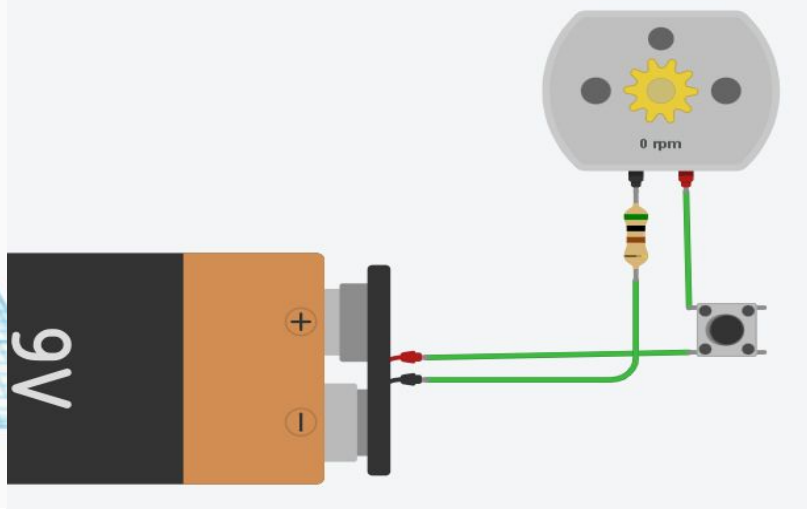
Battery powered or arm powered







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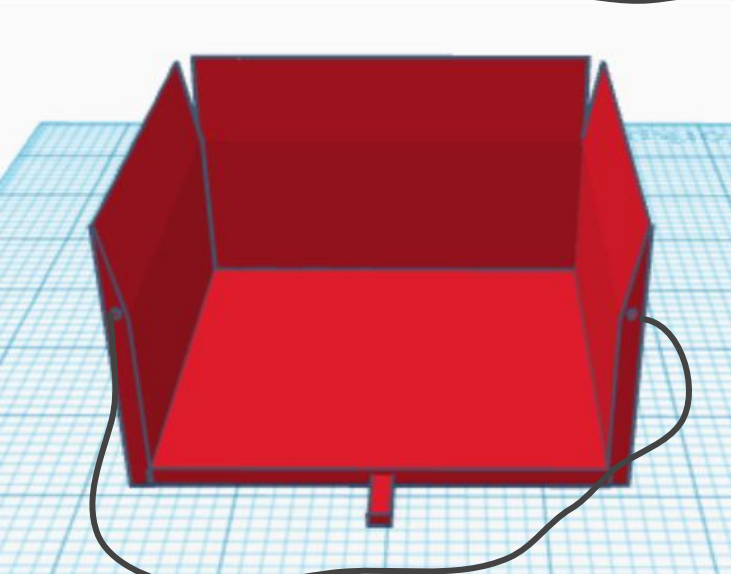

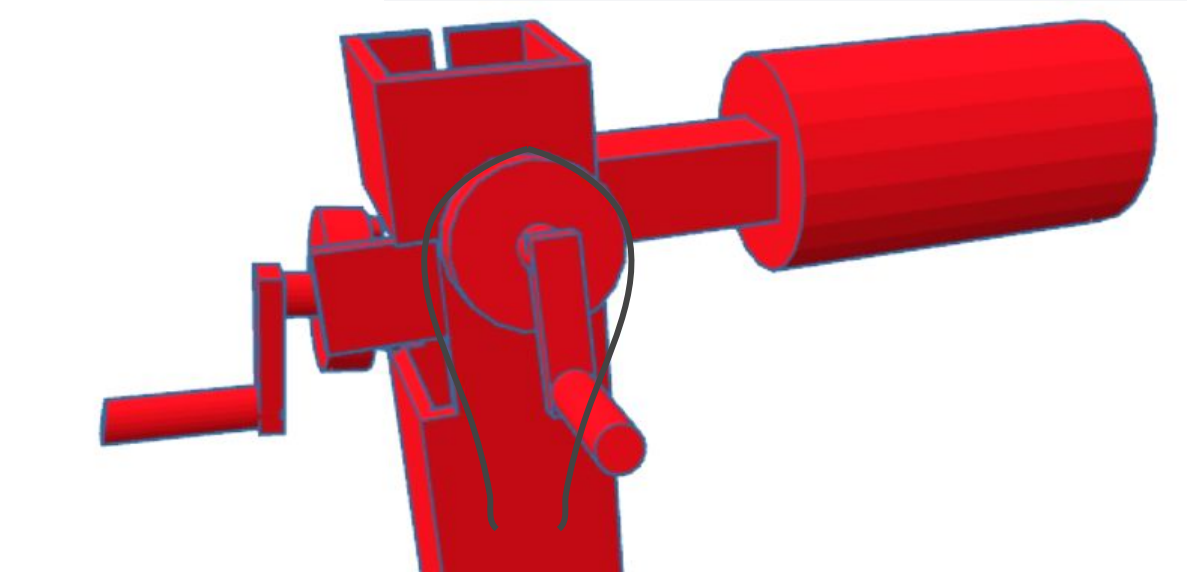

Why Our Solution is Better

Our products stands out in that it

- Is completely stable and even supports your weight
- No strength needed to operate, unlike many products
- Not a hassle to carry around
- Stored easily
- Able to handle even delicate or irregular shaped objects
- Does not require any bending to lift objects
- Much more space

Other Info

-Dimensions: The Cane would be about a meter long, and the middle part of the landing pad would be a square foot in area

-Materials: Aluminum for the outer case, all other components made out of plastic except for rubber on the handles and at the bottom of the cane.

-Cost Estimate: Aluminum: ~10$; Plastic ~ 15$; >1$ for rubber; 2$ for 9 vol; t~5$ for other circuitry (2 dc motors, wiring, and resistors)

-Cost comparison- very comparable, price ranged from 8-90$, vast majority was about

25 which is similar to our price estimate

-How long does it last: The biggest point of failure would be the plastic connecting the gear rack and the loading pad, otherwise the Cane Elevator would last about as long as any other cane.

-Max Load: T=F/A (Tensile strength =force divided by cross sectional area); solving for mass we get m=(T*A)/g

3d printer plastic tensile strength= 4350; A= 1 ft^2 (.093 meters ^2)

m=(435*.093)/9.8= ~40kg (does not factor in torque)

-Weight- comparable to the average weight of a walking stick- besides outer shell, other

components are made using light weight plastic or rubber

What improvements?

Ratchet gear so that if someone lets go of the crank the landing pad doesn't go crashing down

Possible to attach 2 of them together to create a ‘walker elevator’; much more stable and would have a higher load capacity and not have any bending

Have some way to make sure you tension the landing pad before you can start lifting, or have both be controlled by 1 gear- first tension and then it starts lifting

Better materials

Make sure skin can’t get caught between the gear and the case

Right and left handed and better grip design

Adjustable height

Foldable landing pad to reduce footprint while in storage

Connect the gear rack to the landing platform in more than just 1 place

Instead of gear and handle for tension, maybe have a switch

THANK YOU!

FAQ

How much weight can be supported compared to normal cane?- Untested, but we hypothesize that it would be comparable, as most canes are already hollow and made of similar materials to our Cane Elevator.

Does it get weaker if the landing pad is extended?- It would be easier for bending and deformation to occur, but it would be unlikely. Weight support would likely remain unchanged.

How easy is loading?- Relatively easy, but might benefit from getting a broom to help coax things onto the platform.

What happens if someone keeps turning an of the gears?- The Gear stack (although not shown in protype) has a slight lip and would not be able to exit the outer case. In the final design the string gear would only be able to span 180 degrees, so there would be no possibility of snapping.

How to reset landing pad?- Once the landing pad is at a comfortable elevation,

by simply pushing the walls down would cause the pad to be reset.