Tool Assisting Senior Citizens to Wear Socks

FINAL PROJECT

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DES131 Ergonomics | 30th November 2019

Topics

BACKGROUND

Some basic necessary activities performed daily require a fully functional body to perform them. Senior citizens suffer most here. Most of the problems that we observed related to elderly were related to the inability to use/bend certain parts of body. We observed a problem posed by elderly whom we know that wearing socks in winters is a difficult task for them as they usually wear long, warm ones that involve lot of back bending. They usually need help of a second person for this task.

STUDY

Senior citizens have limited mobility due to:

- Weak back, abdominal and thigh muscles
- Swelling in these regions
- Restricted knee and back flexibility
- Non dexterous fingers
- Balance issues

Attempting to do basic activities such as putting socks or shoes on and off require many movements and for the body to be stable and strong. Senior citizens have the risk of falling, cramping or simply being too weak and inflexible to perform such activities.

Secondary aid might not always be available, making these people are greater risk.

EXISTING PRODUCT/S

Sock Aid: Existing Product to put socks on and off

Problems:

- Many components that may cause confusion
- Tough and time consuming to assemble
- Takes a considerable amount of space
- Retrieving, placing and returning risky
- This adds to problem
- Expensive ($19.9 on Amazon)
- Limited application: only for ankle socks

STAKEHOLDERS

- Socks Supplier
- Socks Manufacturer
- Socks Distributor
- Socks Retailer
- Socks owners
- Customers & consumers
- Socks companies (Nike, adidas, etc.)

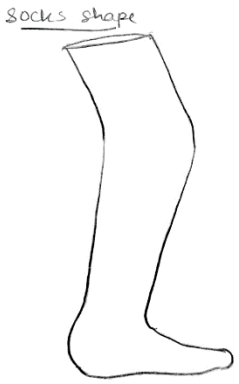
OBJECTIVE OF DESIGN SOLUTION

To be able to assist elderly in putting on socks by minimizing risk and addressing the issues caused by other products in a method that is efficient, self-sufficient and needs no secondary aid, reducing the effort that the design user needs to make at any instance innovatively.

DESIGN BRIEF

To make a lightweight, portable, simple device that requires minimum back and knee movement to put on socks without risk. Should be compact, cheap, and easy to use for the sole user without assistance.

IDEATION



Looking at the shape and size of an average human foot.

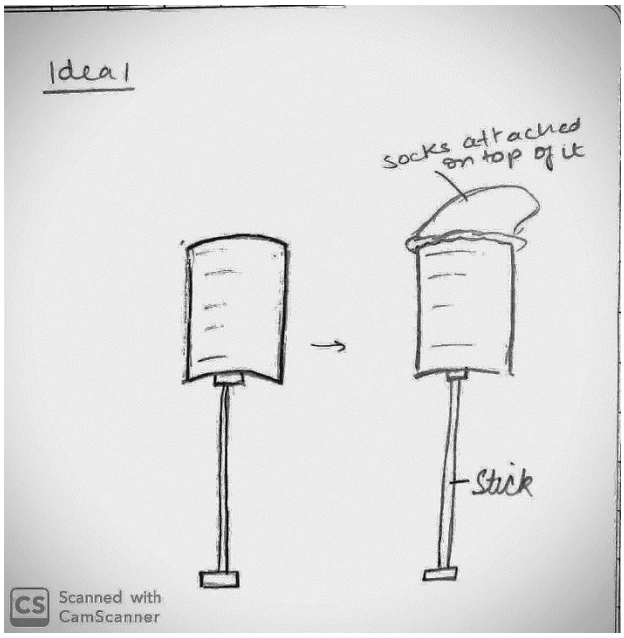
Marking features that need to be kept in mind such as the heel.

Analyzing the step by step process of putting socks on through different muscle usage.

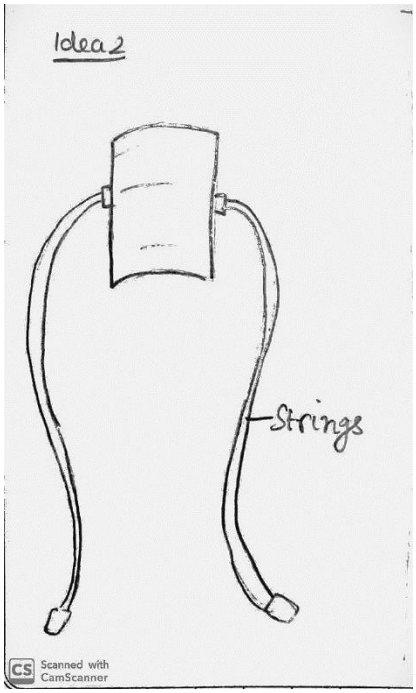
Prioritizing easier movements and making a design catering only to where assistance is required to avoid over complication and hindrance.

CONCEPTUALIZATION

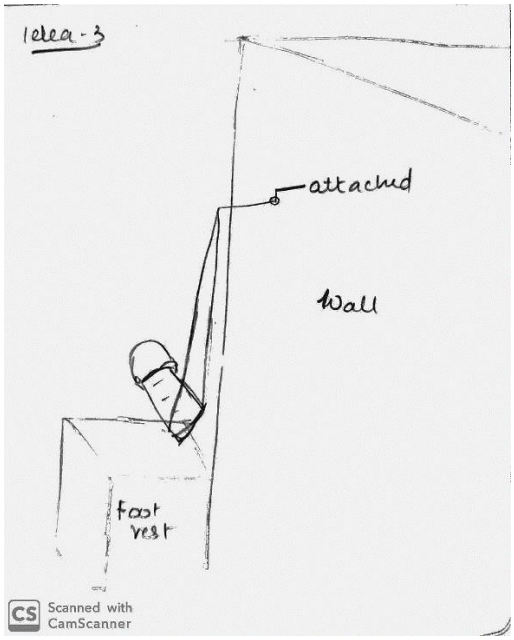
1. **Concept 1**



2. **Concept 2**

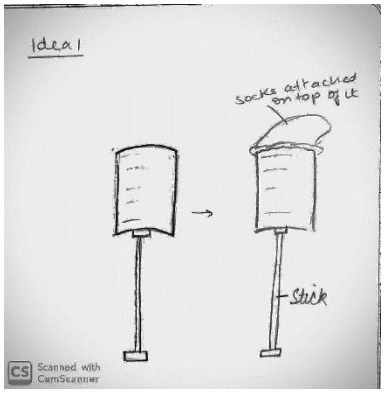


3. **Concept 3**



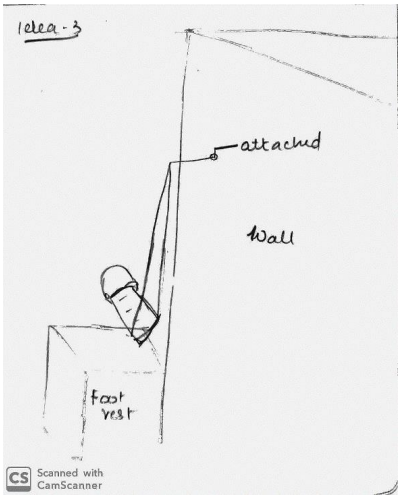
EVALUATION

Concept 1: Fail



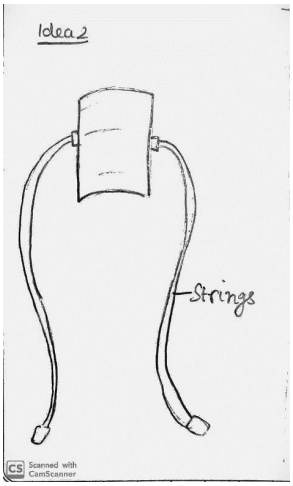
- Unsteady and therefore dangerous
- Requires a lot of knee movement which is not an option
- No mechanism to ensure that sock is pulled up all the way properly.
- Is not suitable to a wide range of foot sizes
- Does not accommodate for the bent heel
- Difficult to manage
- Potentially put much strain on the arms for balance for everyday use
- Potentially put much strain on thigh and calf muscles to lift leg

Concept 3: Fail



- Entire mechanism is not portable
- Must be assembled first and requires wall fixture
- Too many components confuse
- Strings can get tangled
- Seated support required at a particular place where the contraption is fixed on the wall
- Difficult to maneuver
- Provides no support for arm muscles that will move contraption
- Provides no support for leg muscle when leg is lifted before sock is put

Concept 2: Selected



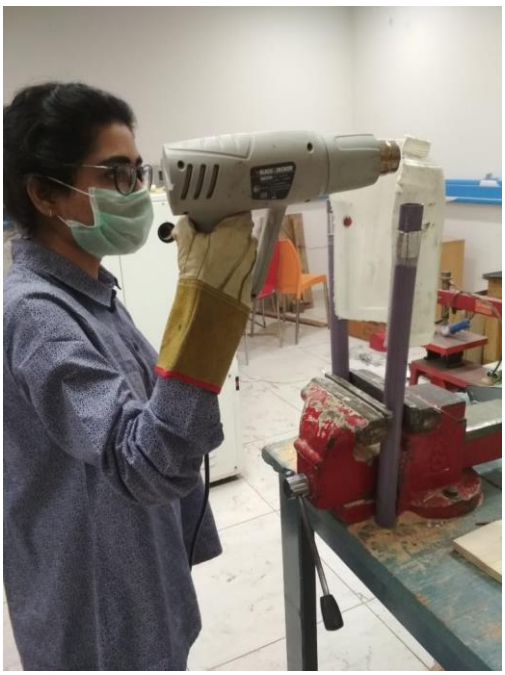
- More efficient than previous concepts
- Portable
- Less components
- Easy to use
- Does not occupy much space

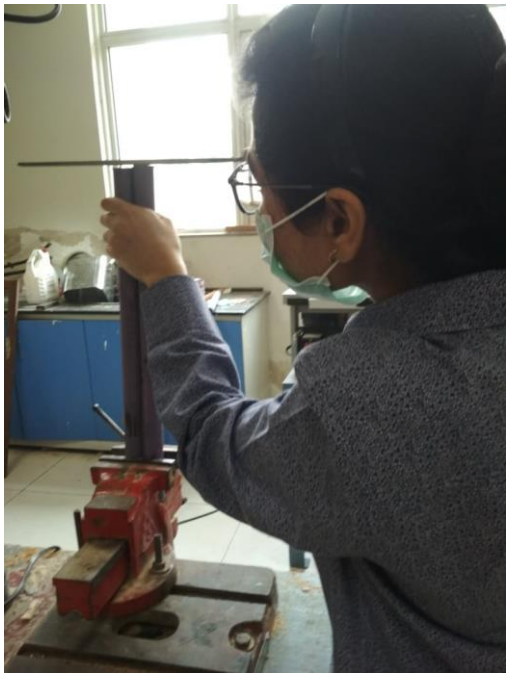
<u>Problems faced while manufacturing:</u>

- Material needs to curve around the foot for the foot to be able to easily slide in
- Strings do not assist in positioning the device before using it
- To pierce the cut tube from outwards to inwards scratch the foot when using

MANUFACTURING

1. Footrest made from cut out of a Fevicol box. Attached filed rods made of a plastic viper rod cut in half. Screwed and clamped to the side of the bisected hollow footrest cylinder, covered the screws with M-seal. Carved wooden handles to attach to the rods. Attempted to narrow the toe end of the footrest with the hot air gun but no considerable effect.





2. Modification of the base required. Switches the footrest to be made from a cross section of a PVC pipe. Sketched grooves where cutting, drilling, filing was required. Cut the primary grooves on either side of the heel end of the pipe till the approximate middle. Drilled the holes where the rods were to be attached. Filed the edges and smoothed the entire footrest.

3. Secondary groove cut and filed at the toe end of the footrest and filed to smooth edges. Other end of rods drilled to supply rectangular wire handles for ease of gripping. Rods attached to the footrest with screws inside to out, outer part covered with a nylon screw cap.

TESTING

Issues brought up that were depicted in the Manufacturing section:

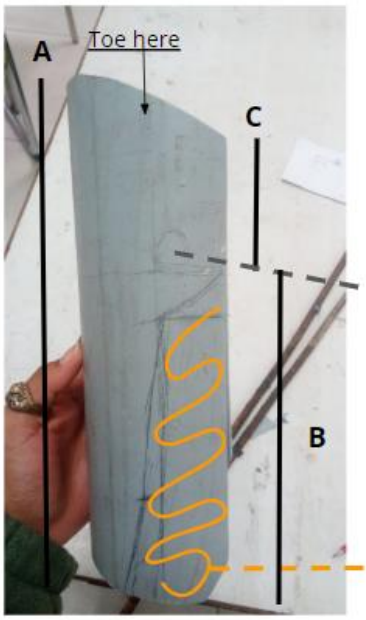
- Footrest not firm enough to secure sock. Switched from shaped plastic to a carved hollow pipe
- Strings switched with solid rods to aid in reaching the foot without bending
- Hooks to secure rods go inside out rather than from outside to in to avoid scratching or injuring foot
- Switched from pins to hooks on the outside of the footrest to ensure sock does not slip off halfway
- Secondary groove cut into the rear end to improve flexibility of the product

DETAILING

Includes changes made that are depicted in the Manufacturing section and issues that were brought up in the Testing section that were rectified.

Dimensions:

- Length of entire bottom of the footrest: 25 cm
- Length of groove made from back end to toe direction to help the sock to stay on despite the push against it when the foot is inserted: 13 cm
- Length of front section at the toe end that directs foot and supports rods: 6 cm
- Length of rear groove: 9 cm



Wider part to hold open sock. Groove allows sock mouth to bunch up and stay on device

Hole to insert rods

Cut out part to form groove

Rods screwed in place inside out to minimize injury. Covered with nylon cap on the outside

Groove cut into the front end improves flexibility of the otherwise rigid cylindrical shape. Assists in ensuring that product can curve under the sock and hold it open to some extent which helps in ensuring that sock is successfully pulled on

FINAL PRODUCT

FUTURE SCOPE AND POSSIBLE NEW APPLICATIONS

Helpful to people with leg injuries and disabilities.

- Usage of ABS plastic makes footrest more flexible, would not require the secondary groove. An add-on piece that can help remove socks securely as well
- More chiselled toe end can act as a shoehorn to assist wearing shoes as well
- Shoe-horn groove that holds shoes in place to remove them
- Contractible rods and collapsible footrest to allow portability

THANK YOU