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Lift

Height-adjustable work surface and storage cart for home cooks

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Introduction

Food is fundamental to human life in more ways than just sustenance. Its preparation, rituals, and consumption are steeped in tradition, culture, and family; food brings people together. Food *is* home. This is so true that if you ask anyone to describe a meaningful time spent with family, they will have a memory related to food. It is often stated that the kitchen is the heart of the home. Different levels of ability should not exclude anyone from experiencing this heart.

Cooking is at the core of this revelation. It is however a demanding task – both physically and mentally. It requires strategic planning and a significant amount of manual labour. In spite of this, cooking is a source of great joy and relaxation to many people. It can also be an excellent creative outlet. From a wheelchair, this might be less true. All the planning is greatly increased due to limited mobility. There is also no notion of, *'Oh! I forgot one thing, I'll jut run and grab it.'* Everything for the particular preparation needs to be within arms reach before cooking begins. This removes a lot of the improvisational joy of cooking and renders it a tedious chore. As people age, they also lose ability. Tasks that might once have been completed easily and painlessly can become more difficult over time. If there is a way to design a cooking experience that eliminates some of the common pain points, perhaps older individuals and people with disabilities can enjoy cooking more, and feel more at ease with food.

Project Goals

- To design something to reduce barriers and promote inclusivity in the kitchen.
- To help people of all levels of ability have an easier time cooking, and hopefully even enjoy it.

Research and Testing

This project is the culmination of a significant amount of research and testing. It began with some visits to the homes of some people with disabilities (all wheelchair users for different reasons). Our group was able to learn a lot from these visits. I knew going into the visits that I wanted to focus on kitchens and cooking. I was a bit disappointed when three of the four individuals we visited said they did not or could not cook. The one person who did cook did not have anything positive to say about it. At best, it was a tedious, exhausting chore for them.

As someone who loves food and cooking, I decided I needed to find out why cooking in a wheelchair is so difficult. I needed to know first hand so I got myself a wheelchair and began cooking in it. I found very quickly that there were significant difficulties associated with wheelchair cooking. Firstly, there was the issue of having to use my lap as a work surface. This was not the worst consequence but it afforded less ergonomic comfort than working at a counter, and I found myself fatigued after a while. Secondly, the level of preparation and planning required was greatly increased from my usual cooking. I needed to have everything within arms reach before starting a task. There were times when I cheated (by getting out of the chair) to retrieve things I had forgotten. Another thing that I struggled with was positioning myself in the space. The legs of my wheelchair stuck out making it difficult to face the stove or the sink directly. This also created reach issues with regard to stove and oven controls and high storage spaces. There was also a lot more danger related to transporting hot, heavy pots and pans because they were in my lap. All of these things contributed to making it very difficult to establish my sense of timing. Making bacon, eggs, and toast – a task I thought would be relatively easy compared to other things I attempted – proved to be the most difficult because of all the moving around and time constraints.

After this, my instinct was telling me to design attachments for wheelchair cooking. After some consultation with our main stakeholder, I decided that this approach was too niche and not universal enough. I ended up being heavily influenced by conversations with my grandmother. My grandmother used to prepare large elaborate meals for our large extended family with relative ease. She derived great enjoyment from it. As she has gotten older, she struggles to keep up with her old standards simply because it has become too physically demanding. This manifests in small ways that most of us take for granted. For example, to cook for a lot of people, the pots and pans required for large preparations have become too heavy for her to lift over time. These discussions moved me in the direction of my current design.

At this point I constructed a rough prototype. I reduced the concept to its simplest form to test its validity. The prototype was essentially a wooden platform on wheels that could be indexed at different heights. When I finished building it, I was able to gain some feedback from our user group about the prototype. This informed my final design.

Product Description and Use Cases

In its simplest description, Lift is still a platform on wheels, which can be raised and lowered, with some simple integrated storage. The board moves up and down with the help of a motor and a lead screw housed inside the aluminium extrusion. To compare it to an existing device, the mechanism works similarly to the bed of a 3D printer. It can move very precisely to accommodate for a variety of different heights and provides enough force to lift approximately 50 pounds; more than enough weight for most home kitchen tasks.

It has two primary use cases, which are sometimes combined and interchangeable depending on the user. For a wheelchair user, Lift provides a moveable, height-adjustable work surface for food preparation. The height can be adjusted to allow any sized wheelchair to be used with it. Also, the small storage allows for convenient access to select items such as a good chef's knife, frequently used

spices, small hand tools, and the like. It can also be used as a serving trolley to bring food from the cooking area to the dining area. The other primary use case is as a transfer surface. In this scenario, Lift can be lowered to its minimum height to help retrieve heavy pots and pans from low storage spaces. It can also be used to gather ingredients from the fridge and pantry to the work area. Another example in this case would be moving hot roasting pans in or out of the oven. Finally it could be used to transport a pot of boiling water over the sink to be drained. The images on the title page of this document show examples of these uses.

Design Features

Design Features

- Trapezoid shape
    - Creates a large work surface
    - Creates an open profile wheelbase that can accommodate wheelchairs
    - When butted up against counters, it leaves room for someone in a wheelchair to angle in
- C-shaped profile
    - Allows for oven door clearance
    - Allows for table surface clearance
    - Wheelchair clearance
- Aluminium extrusion
    - Houses internal components including battery and mechanical elements
    - Wooden inlays give home/furniture aesthetic
- Storage elements
    - Two fitted deep drawn stainless steel storage cups
        - Can be used for mise-en-place/storage of cut food before cooking
        - Can be used to store hand tools or other small objects
    - Rotating swivel drawer underneath main surface
        - Small stowing area
        - Does not interfere with wheelchair clearance as much as a standard pull-out drawer
        - Attaches to main support casting

- Lip and grab bar
    - helps to prevent spills
    - can be used as a point of purchase to grab onto when moving the device
- Handle and top
    - houses dc recharging port
    - up/down touch controls
    - battery indicator lights
    - large ergonomic form

Conclusion

Although a lot of research has been done to arrive at this point, Lift is still largely untested and could change and grow depending on user needs. Due to its relative simplicity, it would be fairly simple to add or remove features to accommodate certain functions. Possible directions could be an iPad recharging stand so people can read recipes on the device, other ideas might be adapting the design to be used in commercial settings to give more individuals access to the food industry. At this stage, the possibilities seem fairly unlimited.

With that being said, in its current iteration, I do believe that Lift could help remove barriers for a variety of people in the kitchen. Like I said initially, Food is part of what makes us who we are. It is celebrated in every culture. It is the fabric of community. Food's fundamental importance makes me think that this type of approach could be a big step in improving accessibility in other areas.