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ETech Lab

Written Report

Problem:

People who are to short or are physically disabled and are not able to reach and open a cabinet door in either a kitchen or shop.

Process:

Triggering the push sensor which then triggers the arduino to spin the servo about 180 degrees which pushes the door open. Then pushing the button a 2nd time returns the door back to closed.

Background:

We started by searching problems that people with physical abilities have in their everyday lives. We all started coming up with multiple great ideas, but some were too big for us to tackle.We then continued searching problems that professionals are trying to solve today. We eventually found a website where we found our problem of “people not being able to open cabinet doors.” People with certain disabilities such as being unable to reach above their head or unable to do a pulling motion are looking for a simple and cheap way to open their cabinets so they do not have to have someone always do it for them or even strain themselves more. We looked into this problem more and more to find if other people were trying to solve this same problem. There we found more sites that lead us on our way to our design process by showing there design examples and links to other great design options.

Design Description:

We first took our arduino and programmed our servo to spin approximately 180 degrees with the push of a push button, then when the button is pushed again it returns back starting point. Once we got these timed and programmed perfectly were able to begin creating our model. Our model we just took a six pack cardboard box and cut all the sides off of it to create our cabinet. We then took a pencil and mounted it to the servo to act as the arm that will push open the cabinet door. We took that servo and mounted it to the inside corner of the cabinet in order for it to open that door when the button is pushed on the arduino.

Design Analysis:

During our design process we looked at several different ways that an automatic door can open. A few of our starting ideas were a garage door, automatic doors at like a store and a handy cap opening door. We started to lean towards the example of a garage door, but then we got to thinking it may not be the most affordable for the people to purchase due to all the materials that would be needed. Then a 5th grade class came in and two girls made a design to open a door and it fit our problem perfectly. We took their example and modified it a little bit to fit our exact problem. Our design is simple and would not cost much to make and install for a customer. It is a small compact design so it will not take up a lot of room in any cabinet.

Weekly Journal

3/1/17

We began researching problems that physically disabled people encounter in their everyday lives. Brainstorming different ideas we could create to solve certain problems. Ideas we came up with were a robotic arm to help pull up people's pants, and a automatic cabinet opener.

3/8/17

We are stuck between our two choices of the pants puller upper and the automatic cabinet opener. We took the whole class to research the two problems and see which is more of an issue today. We went out and found professional feedback and data on the two topics which helped us get a better understanding of the issue. We chose the automatic cabinet opener to do as our project.

3/22/17

We took our topic of the cabinet opener and we looked at different ways that a door is opened either with the push of a button or motion sensored. We look at different examples such as garage doors, automatic store doors and handicap button push doors. We took all of these examples into consideration as we created a few designs and sketches. We we found that, like

a handicap push button door we could make a push button to open a cabinet door. We then drew up another final sketch in full detail of what we were going to model.

3/29/17

We started to draw the cabinet door in Solidworks so we could catch any errors in our design. We found that we needed some kind of mechanical arm that would attach to the servo and the door. We came up with a few different ideas that could work. We also started to build our Arduino board board.

4/5/17

The Arduino board was difficult to build because we couldn't figure out how to get the pushbuttons to activate the servo motor. This took us a few days to figure out and we finally figured out that one of the wire leads was broke. So, we replaced the wire and the the program started to work. It took some time to tune the program so it would open and close at the correct angle. We also decided on a design for the mechanical arm for the servo so we modeled it using small sticks. We wanted to model it before 3-D printing to make sure it will work.

4/12/17

We finished building our box that would replicate a cabinet. Then we installed the servo with the arm that we modeled up. We found that our arm would work so we started to 3-D print it. The arm only took about 20 minutes to print. Finally we replaced the mechanical arm out of sticks with the 3-D printed one and found out it worked as expected.

4/19/17

Finally, we finished up some small details on our cabinet model and started to write the paper. We also made some Solidworks videos that would demonstrate what our design would look like in full scale. We then inserted these videos in a powerpoint that we will be using in the expo.