

Assistive Device for the art Studio

Background Report

Team 27

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09/30/2016

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1 BACKGROUND

1.1 Introduction

Effective Mobility is the most important need of all people specially .We have proposed some in-home gravity balancing harness system that people with movement disabilities can build with limited resources. There are many people with weak muscles and other issues which make it hard for them to stand and do their work. We have tried our best to make it as simple and easy as possible. It is most important issue and should be given importance especially in this era in which technology has evolved to a great extent. The devices until now are really old design devices. Our goal is to make an advanced device with more functioning capabilities.

This is a senior level engineering project. The goal of this project is to design a device that helps the disable people. This device will be suitable for both people with moving disabilities and people having weak muscles which makes them unable to move their hands etc. Our main focus was to make the device safe to avoid any Misuse of equipment that can lead to serious injury. It helps approachability of the art to the disable people in an easier way. The shape of the chair makes it more stable and leaves fewer chances for any mishap. We have tried our best to make it as comfortable and feasible as possible. This device which we have built is to aid people with disabilities. W. L. Gore and Associates (a global engineering company with local offices) will be funding the projects.

1.2 Project Description

The device will be a table with art stand that hold the art paper. The table will have a button in it that can raise up the get down the paper with this button that the adult disable person can push to get it up or down by this button as shown in the sketch. Some adults cannot raise up their hands 90 degree like normal people so we did that to help them to get the art up or down. This button will be working with a hydraulic system that have a machine in the back of the art that work with the button to raise up the art or get it down to complete his/her art. This table will have a hole in the middle to make the art to go down and up as the person want. This project will be really helpful and successful because it's really important for disable people to be indulged in some activity which makes them busy. If that activity is related to their art of interest it will be very helpful. That is the reason we have selected this design.

1.3 Original System

[If your project was a re-engineering project, that is, one to redesign, improve, or add onto an existing system, use this chapter to describe, in detail, the original system, that is, the system as it existed at the time your project began.

If your project was a new-design project, that is, one to design a completely new system, include the following text, replacing “<system>” with the name of your system ...

This project involved the design of a completely new <system>. There was no original system when this project began.”

... and omit the following subsections.

In either case, **include this chapter in the Background Report and all subsequent reports.**]

2 REQUIREMENTS

team for this project. Some of these were that the project or device may not be dangerous in any way. This project was pre analyzed while we were short listing the ideas. There are few important requirements which are expected from this project. These involve safety of the design, Cost effectiveness so that people from all walks of life can buy it. Flexibility, stability, is also one of them. Our team met with sponsor mentors to find out the customer requirements too. These are also given below.

2.1 Customer Requirements (CRs)

Here we have focused on project objectives and possible redesign opportunities. This is the point where we integrated the customers' requirements in the projects. We have focus to make it cheap to satisfy customer needs. Our aim was to focus on what we are designing and to implement the ideas of the better design to our original design to make the device much easier and feasible to use. This helped us a lot in designing our design as we gave first importance to those customer needs and requirements while designing it. We have integrated customer's requirements so that this design will support the clients of the company to work on art. This will help clients to work better and in comfortable way. This will give client more options in drawing and painting. Through this more clients will be able to show creative arts.

These requirements include

- Ease of use
- effective Cost/cheap
- Light Weight
- Safety: Avoids putting person in danger
- Easy to store
- Adjustable
- Size
- Easy to clean
- flexible and comfortable: Parents/relatives can still navigate through their home
- device with short setup time: This can cause distribution of parts to be difficult and users to have difficulties assembling product
- Non Dangerous
- Standard components used
- High level of creativity
- Maximum Usability

2.2 House of Quality (HoQ)

The HoQ is basically a comparison chart that shows the comparison of the device which have chosen for is project. This process helps in decision making. The HOQ also rates how important each requirements is so that we can modify the design. The HOQ explained that the priorities which we selected include. Cost, flexibility, power consumption etc are some customer requirements which were kept in view. Other priorities include the weight of the device, short setup time and ease of assembling etc. Moreover the safety of device is also one of the priorities. These all factors help the team to design the system by keeping these all factors in mind. All the products were ranked based on the efficiency of each device.

Customer Requirement	Customer weights	increased safety	increased power	increased cost	increased flexibility	increased size		1 poor		3 acceptable		5 excellent
1.Easy in use	5	9	3		3							
2.Cheap	4		9		3	9						
3.Light weight	5	3		9	3							
4.safety	3	9	3		9	3						
5)easy to store	2			9								
6)Adjustable	2	9	9			3						
7)size	3	3		3	9							
8)easy to clean	4		3	9								
9)comfortable	5	3	9			3						
10.saving time	5	9			3							
Absolute Technical Importance (ATI)		105	145	70	98	35						
Relative Technical Importance (RTI)		5	3	2	5	1						
Technical Units		N/A	WATT	\$	N/A	N/A						
Approval (print name, sign, and date):												
Team member 1: _____												
Team member 2: _____												
Team member 3: _____												
Team member 4: _____												
Team member 5: _____												

Figure 1 House of Quality Matrix

It was important to create the HOQ and bench mark these requirements so that the team had an accurate understanding of the technical requirements of the project. The HOQ gave the team a sense of what requirements to prioritize while designing this device. It shows how safety is most important requirement.

3 EXISTING DESIGNS

3.1 Design Research

There are many devices in the industry and market which are designed for disable people. These devices either help them move from one place to another or they help them to pick things by moving. We have researched many devices on Pinterest especially which have been designed for disable people. These all devices were really inspiring and creative but we were focused on naming a device which can help the disable people to do their art without any difficulty. People with limited mobility are often unable to socialize; leading to developmental challenges later in life. The design must be simple enough that people with limited resources and engineering knowledge can set it up. For this purpose we have also visited the Muscular Dystrophy Association site. Here we saw how devices are being made for disable children to make their life normal and easier.

Furthermore we interviewed many customers and made sure that what the basic requirements of customers are. These customers were too much concerned about the safety.

We have also implied the concept of pressure. The pressurized air and pressurized gun are also suggested in our memo. We have used these as the force of pushing the guns towards the target.

All the designs which we have selected are efficient and are cost effective. We have chosen the simple structures to get better results. We have the power to change the range cost and speed of the devices if needed.

3.2 System Level

There are three system levels in this device. The high system level is between art board and motor. This subsystem works up and down. Normal level connects motor with electricity that makes it work. Power is needed to make it work. Lower system level describes how will we connect it with motor and how will we manage to make the art piece move up and down.

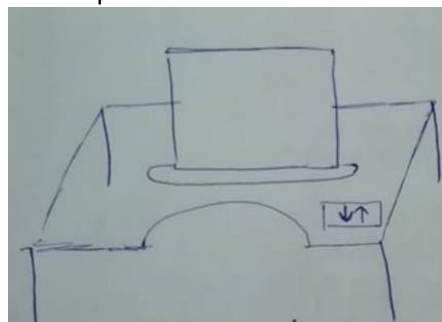


Fig 2 : Design

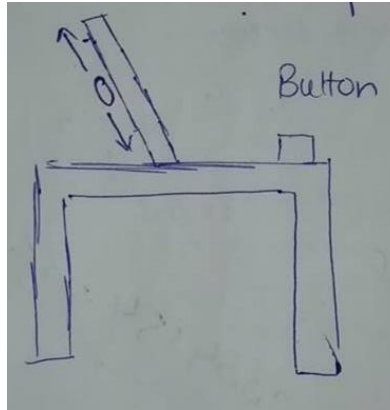


Fig 3: Design



Fig 4: Design

3.2.1 Existing Design #1: Descriptive Title

The first design of the easel that we have is to make it go up and down with the button in that table that is going to work with the hydraulic system that is going to be plugged in the wall to work in electricity. This design is already existed in our design that we did in this project.

3.2.2 Existing Design #2: Descriptive Title

The second design of the easel that we have is to make it go from right to left 360 degree. This design would be working with rotation machine in the back of the easel that is going to rotate to help the disable adults that can not raise their hands 90 degree so they can reach the art from the every side by rotating the easel.

3.2.3 Existing Design #3: Descriptive Title

The third design of the easel would be the one that you can push to make it to back and front by just a small circle in the back to make it go back so the disable can stand up and go to the other side and do the art that they want to do in the easel.

3.3 Subsystem Level

This table which is having a button with the help of which the table is moved up and down. This button is basically operated with hydraulic system. This system is following basics principles of engineering and making the life of people much easier than before. This is very creative project. We have tried our best that it meets customer needs.