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1. **Executive Summary**

The following proposes an Interactive Wheel of Fortune game be built for adults with some form of disabilities. The proposal presents the needs of the adults and who will be leading the game. Also presented is a detailed description of the objectives of the project. This will also include the desired functions and how the project will actually be used. The proposal will also detail the requirements that must be met in the design of the project.

Several other products made for similar purposes already in existence will be examined in detail. The project designed will be compared to the products already on the market. Possible implementation of components and functions of existing products in this project will be discussed in later sections. Existing patents of the products already on the market will be taken into consideration when designing this project. The budget for the project and the expected actual cost for the finished project will be attended to and compared to already existing products. The proposal will give a full and accurate description of the goals of the project and well as methods. It will also give a general understanding of the project’s overall purpose and how it will be used.
2. Introduction

2.1 Background

The ATCO shelter is a non-profit sheltered workshop for adults with disabilities. These people go to the shelter to spend their day meaningfully employed or engaging in interactions with other people at the workshop. Their jobs may include assembling ball-point pens or pizza boxes. When not working these people congregate in a central room where there are various activities available to keep them occupied. The staff working at the workshop like to keep the disabled adults entertained with minimal use of the television. The staff has requested that an interactive game be developed that will not be detrimental to the workers’ stimulation and sense of engagement. The game will be similar to the television show “Wheel of Fortune.” The features of the game need to accommodate the needs of the disabled adults at the shelter. The disabilities among the adults vary; however, most have cerebral palsy and mental retardation. Many of them also have motor problems that limit their mobility and dexterity. The game must have features that accommodate these disabilities so that all the adults can play.

2.2 Purpose of the project

The purpose of this project is to design an interactive Wheel of Fortune game that all of the adults at the workshop can play. It will be based on the television show with changes made to accommodate all of the disabled adults. They game needs to stimulate the adults in a way that they can enjoy.

2.3 Previous Work Done by Others

2.3.1 Products

There are a limited number of games that have been developed or modified from an existing product to fit the needs of people with disabilities. Many of these games are expensive for the average person to purchase a few of them to entertain their disabled child or adult. In 1997 senior design students at Manhattan College developed “A Decorated Wheel-Mounted Wheel of Fortune for Nursing Home Residents”. There was a
need for a new wheel game because the wheel that was previously being used did not spin correctly and often landed on “Bankrupt” and was not attached correctly thus if frequently came off of the wall. These students designed a new wheel that was made out of decorated plywood and attached the wheel to the wall using a flanged mounted steel ball bearing pillow block that had a half-inch bore. The overall cost to construct this wheel was $298.41. This wheel fit the needs of the people at the nursing home. This project did not fit any needs of people with disabilities. The wheel was large and colorful which made it visually stimulating and easy to read. However people that suffer from disabilities such as mental retardation and cerebral palsy, such as our clients, could not get much use out of the wheel. Another difference between this 1997 project and the current project is that the wheel will not be mounted on the wall. On the television game show Wheel of Fortune there are shows in which the contestants must all be disabled. This is only similar because of the fact that all of the contestants are disabled. Nothing else is changed about the rules of the game. AllinPlay is a company dedicated to adapting computer games for blind children. Right now they have adapted an interactive Wheel of Fortune game on the computer so that blind children can play it. This is a very important thing because now blind children can enjoy computer games much like “seeing” children can.

2.3.2 Patent Search Results]

Patents limit an engineer from making, using and selling an invention that is already out in market. Due to this fact, it is very important for an engineer to check for any patents prior to designing and implementing the invention. In general, a patent for a particular invention is given for a time period of 14 years after the grant date of the patent.

In order to look for any interactive wheel of fortune game patents a quick search was done using the US Patent database at www.uspto.gov/patft/index.html. The terms “wheel of fortune” were used to search the database. The results of the search were 227 filed patents. However, majority of the patents didn’t have anything to do with the game itself, but rather most of these patents were based on increasing the chance of winning. So, a refined search was done using the terms “wheel of fortune” in abstracts of the patent. Six patented games were obtained and only two used a wheel. The summary of the two results is shown below:

6,162,121- December 19, 2000- Value wheel game method and apparatus- Morro, et al

- This patent describes a game in which the wheel is placed distantly from the games main frame due to the large diameter of the wheel.

This patent describes an electronic game apparatus for play of a poker card game using a wheel of fortune like display. The wheel is used to display the random selection of cards.

As seen in the patent results, there is no interactive wheel of fortune game for the disabled that has been patented. Hopefully, the end results of this design will produce a game like no other and can be patented.

3. Project Description

3.1 Objective

The objective of this project is to design an Interactive Wheel of Fortune game in which adults at the ATCO sheltered workshop will be able use. Spending time productively is a large issue at the workshop. When the adults are taking breaks from their jobs it is necessary to have stimulated entertainment. Often times the staff runs out of ideas and ways to spend time with adults and regularly resort to the television. The Wheel of Fortune game will be a way for the adults to spend their time effectively and interact with others at the same time.

The adults at the workshop have a wide range of disabilities. The most common disabilities are cerebral palsy and mental retardation. They also have limited motor skills that impair their everyday functions. These disabilities make many of the functions of the features unique to the game.

The project cannot require reading due to the fact that many of the adults have difficulty reading because of their disabilities. The staff members will read out the questions and then the answers since the players cannot read. The questions cannot be difficult so therefore the answers will also be relatively elementary.

The wheel needs to be custom designed to visually stimulate the participants. Many different colors as well as lights can be integrated into the wheel. This will help to keep the adults attentive and interested in the game even when it is not their turn. Certain noises that will be played throughout will also aid in stimulating the adults. In order for the wheel to spin a button will have to be integrated into the game. Two different types of buttons must be used so that all of the adults with their many different disabilities can play the game.

Safety and portability are also major concerns when designing the game. The game will be shared with Passion Works Art Studio; a subdivision of the ATCO sheltered workshop. Thus, it must be lightweight so that one staff member can transport the game between facilities. Due to the disabilities of the adults many safety precautions must be taken. Exposed wires can create tripping hazards so therefore there can be none.
3.2 Methods

The game will consist of many different parts. These components are as follows: the wheel, base of the game (where the wheel will be placed on), the spinner that will spin the wheel, audio comments, two different methods of getting the wheel to spin, the questions and answers book, and additional lights on the wheel. Each one of these must meet the specifications given by the ATCO sheltered workshop.

The wheel will be constructed using a plastic type of material. The chosen plastic must be durable so that wear and tear from spinning the wheel will not affect the quality. Plastic is also an ideal choice because it will be a light-weight material that will make moving the game much easier. Plastic is also a smooth material so that friction will not be an issue when spinning the wheel. The smooth texture is especially important because the adults have disabilities that will limit their motor skills. The wheel will be ten to fourteen inches in diameter. There will be eight even sections on the wheel. Each of these sections will consist of a different vibrant color. There will be four different sets of points placed evenly around the wheel. There will also be a section allotted for “Loose a Turn”. See Figure One for a complete drawing of the wheel. This “Loose a Turn” option may not be suitable for all players. If a player has an extreme disability they may not understand why they lost their turn and may become upset and agitated. This will be at the discretion of the staff members running the game. If they feel “Loose a Turn” should not be used then they can simply attach a separate wheel section that will have a different point value. See Figure Two for the optional wheel attachment. If the player answers the question correct they will collect the amount of points they have landed on. The player with the most points at the end of the game will win!

![Figure 1: The Decorated Wheel](image-url)
The base of the game will be used as the support system. The base will consist of a hollow box. The box will be made out of the same type of durable and light-weight plastic material. The plastic will also be decorated with vibrant colors and large, bright words. The box enclosing the electrical components will be twenty four inches wide and at least six inches high. See Figure Three for a complete drawing of box. The questions and all game components will be able to fit inside of the box. Therefore this will be used as a storage container for the Wheel of Fortune game. Located on one of the side of the box (Figure Four) there will be the buttons to activate the wheel to spin. The buttons need to be big enough for the adults to easily find them. They should be at least one inch in diameter and square. This will be the side facing the players. The other side of the box will contain the on/off button and also buttons the staff members can press that will play phrases and sounds such as “Good Job!” or “You Got It!” (Figure Five). These buttons will also be one inch in diameter and square. These phrases are meant to excite the players on a job well done. This side of the box will face the staff members so they will be in charge of these controls. All electronics to make the box function will be in a closed off region of the box. The battery will also be inside of the box in a location that will make changing the batteries of ease.
A motor unit will be used to spin the wheel. Generally, a digital converter (DC) motor unit is required. By doing some research, a geared motor unit was found. The motor unit that will be used will be 10 revolutions per minute, which is sufficient to spin the wheel. The motor will be powered by the voltage supplied by the push button and the sensor unit.

Due to the fact that the adults playing the game have some disabilities that limit their motor function there will be two different types of spin activators. One of the activators will be a texturized button that the player can press. The button will have a different texture than anything else on the board. This is optimal because in case some of the players have limited vision they can feel the board to find the activator. The button will also be very large on the side of the box facing the players so that it is easy to find. The other type of activator will be a motion sensor. It was indicated by the client that some of the adults that will be playing have difficulty performing simple motor tasks. Thus it would be optimal to make activating the wheel as simple as having the player wave his or her hand over the side of the box facing them. These two types of activators can be seen in Figure Four.

The Wheel of Fortune game will also come with a number of questions and answers that the players will be asked. Keeping the player’s disabilities in mind, these questions will be very elementary. A example of a question that could be asked is “What color are red roses?”. These questions will be inside of plastic sheets that will all be contained in one binder. There will be extra plastic sheets inside of the binder to allow the staff to add new questions when they see fit.
Visual appeal was highly stressed by the client. The adults become excited and stimulated when they see bright colors and flashing lights. There will be a series of light emitting diodes (LEDs) around the wheel that will light up when the wheel is being spun.

### 4. Budget

The overall budget for the construction of the interactive wheel of fortune game is $750.00. However, due to the simplicity of the material used in order to build the game, the cost of the end product will be relatively low. The table below shows the average values of each of the major components that will be used in order to build the product.

Table 1: Average cost of the major components used in the design of the prototype

<table>
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<tr>
<th>Material</th>
<th>Average Cost</th>
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<tr>
<td>Durable Plastic</td>
<td>$.60/pound</td>
</tr>
<tr>
<td>Sensor unit</td>
<td>$15-$20</td>
</tr>
<tr>
<td>Motor unit</td>
<td>$15-$20</td>
</tr>
<tr>
<td>Keypad</td>
<td>$30-$40</td>
</tr>
<tr>
<td>Speaker (10 watt)</td>
<td>$15-$20</td>
</tr>
<tr>
<td>Series Universal Indicator Light (8)</td>
<td>$3.40 * 8 = $27.20</td>
</tr>
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Table 1 shows that the total cost of the end product will be lower than the budget for the project. However, this price doesn’t include design process and various implementations that will be needed in order to construct the desired product. Nonetheless, the price to build the product is nowhere near the profit gained by the happiness of those that are disabled.
5. Conclusion

The ATCO shelter, a non-profit sheltered workshop for adults with disabilities, has requested an interactive Wheel of Fortune game be designed. During the design the disabilities of the adults will be closely examined. Having two different methods of making the wheel spin is something very unique to this project. It must be designed this way because the adults playing the game have varying disabilities that may decrease their mobility and/or dexterity aptitude. The game will visually enhance the players by having bright and appealing colors on the wheel and box. Also the wheel will be decorated with a series of LED’s that will light up and flash when the wheel is being spun. The staff members assisting with the game also have the option to press one of the four audio comments on the side of the box when the player answers the question right. It is important that the game be light in weight so that transportation around the room and between the sheltered workshop and Passion Works is possible. Safety is a large requirement. Certain precautions are being made when the game is being designed. These precautions include no exposed wires that could create a tripping hazard and all electrical parts of the game be enclosed in the box. In addition, the cost of the interactive game will be relatively low due to the simple electronics used in the design process. Overall, the design process and the cost of the design are very low compared to the profit of implementing this project. This profit is the happiness of those that are disabled.
Team 4:
Interactive Wheel of Fortune Game

By
Yadverinder Singh
Meghan Schmidt
Kristen Gingras
Project for Passion Works Studio

Client Contact: Dr. Brooke Hallowell, Passion Works Studio, 21 S. Campbell Street
Athens, OH 45701