Interactive Wheel of Fortune Game

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Overview

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Client

- Adults at the ATCO sheltered workshop
  - The adults have various disabilities, the most common disabilities are cerebral palsy and mental retardation.
  - These disabilities often limit the adult’s mobility and dexterity.
- Project will also be used at the Passion Works Art Studio
Project Objective

- The game will be based on the television show “Wheel of Fortune”
- A number of specific special features are incorporated to accommodate the various disabilities of the adults
- Special Features
  - Bright colored plastic used for the wheel and base of game
  - LED’s placed on the wheel to light up when activated
  - Two different methods to spinning the wheel: push button wireless remote and motion sensor
  - Audio comments to be played when a player answers the question correct
  - Two different ways to speak the questions and answers: by a staff member or through the use of a microcassette recorder
Previous Work Done by Others

- In 1997 students at Manhattan College developed “A Decorated Wheel-Mounted Wheel of Fortune for Nursing Home Residents”.
- AllinPlay have adapted an interactive Wheel of Fortune game on the computer so that blind children can play.
- The television game show “Wheel of Fortune” has certain shows in which all contestants must have some type of disability.
  - Rules are not changed for these contestants.
Current Patents

- 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 game's 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
Subunits of the Interactive Wheel of Fortune Game

- Wheel and Base of Game
- Wheel Spinner
- Methods of Spinning the Wheel
- Game Power
- Voice Recorder
- Questions and Answers Book
Wheel and Base of Game

- Both the wheel and the base of the game will be made out of pre-colored PVC.
- The wheel will be 0.635 cm in thickness and 50.8 cm in diameter.
- The base will be 1.27 cm in thickness, 60.96 cm wide and 15.24 cm deep.
- Wheel will sit on top of the base of the game.
- Base of the game will act as a storage center for all components of the game.
Wheel

- Wheel will consist of eight equal pie pieces, each containing one of three point values
- Optional “Lose a Turn” pie piece
- Visual enhancement will be through the use of LEDs that will light up when the wheel is activated and the attachment of dowels to the top of each pie piece to provide “clicking” noise as the wheel spins
Wheel and Base of Game

- The pie pieces of the wheel and the sides of the base of the game will be held together using IPS Weld-on 2007.
- A mold well will be used to insure that the wheel will stay held together.
- Mold well will be made out of the same pre-colored PVC as the wheel and base of game.
- Mold well will be 0.635 cm in thickness.
Bearing Block

- Due to having a plastic wheel spin on top of a plastic dowel there is a concern of having the plastic gall thus a bearing will be used to prevent this.
- A two bolt flange bearing block will provide load support for a rotating shaft axis.
- Supports shafts will be at a 90° angle to the mounting surface.
- Flange will be attached to the bearing rests and the dowel will go right through the hole of the flange.
Spinner

DC Motor

- DC voltage operating range (VDC) 4.5 - 12 V
- Torque @ maximum efficiency = 2000 g-cm
- Speed @ maximum efficiency = 35 RPM
Microcontroller

- **Input**
  - Motion sensor
  - Receiver for the function module

- **Output**
  - Stop motor at random time between 3 to 4 seconds
  - Turn on the LEDs
Methods of Spinning the Wheel

- **First method:** push button remote control to wirelessly activate the wheel
- Remote will have a 100 foot transmission range
- Once the button is pressed information will leave the encoder of the remote, travel through the airways and will be received by the decoder of the function module.
Methods of Spinning the Wheel

- **Second method:** motion sensor located on the base of the game
- Motion sensor will have a beam angle of 38° horizontal and 22° vertical
Audio Comments

- A SP03 speech-to-text module will be used
- Capable of 30 predefined phrases by use of a PC program
- Takes the ASCII text and transforms it into audible words
- Will congratulate a job well done by the adults playing the game
# Game Power

<table>
<thead>
<tr>
<th>Electrical component</th>
<th>Required Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>SP03</td>
<td>5 VDC</td>
</tr>
<tr>
<td>Microcontroller</td>
<td>5 VDC</td>
</tr>
<tr>
<td>DC motor</td>
<td>12 VDC</td>
</tr>
<tr>
<td>Keyfob remote</td>
<td>CR-2032 Button Lithium Battery</td>
</tr>
<tr>
<td>Function Module</td>
<td>12 VDC</td>
</tr>
<tr>
<td>Motion Sensor</td>
<td>3 VDC</td>
</tr>
<tr>
<td>Microcassette</td>
<td>3 VDC (2 * “AAA”)</td>
</tr>
</tbody>
</table>
Voice Recorder

- Enables the use of the game when staff members are not present.
- Set questions and answers will be recorded so that the adults can still play.
- Help the adults at the workshop to feel more independent.
Questions and Answers Book

- Twenty questions and answers will be provided with the game.
- Questions will be of the elementary level.
- They will be inserted into plastic cover sheets that will all be contained in a binder.
- The binder will be able to fit inside the base of the game.
## Budget

<table>
<thead>
<tr>
<th>Product</th>
<th>Quantity</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>GH30GM Series DC Motor</td>
<td>1</td>
<td>$21.95</td>
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<tr>
<td>General Purpose Relays</td>
<td>1</td>
<td>$7.29</td>
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<tr>
<td>Alkaline Batteries</td>
<td>4</td>
<td>$11.40</td>
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<tr>
<td>Module 4 Relay Receiver</td>
<td>1</td>
<td>$59.85</td>
</tr>
<tr>
<td>Xmitter Keyfob</td>
<td>1</td>
<td>$20.60</td>
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<tr>
<td>Motion Sensor (SpotDetect)</td>
<td>1</td>
<td>$35.28</td>
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<tr>
<td>1” Avery Binder</td>
<td>1</td>
<td>$4.95</td>
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<tr>
<td>Sheet Protectors</td>
<td>1</td>
<td>$8.98</td>
</tr>
<tr>
<td>Vinyl Numbers</td>
<td>1</td>
<td>$8.74</td>
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<tr>
<td>Microcassette Recorder</td>
<td>1</td>
<td>$29.95</td>
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<tr>
<td>IPS Weld-on 2007</td>
<td>1</td>
<td>$13.00</td>
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<tr>
<td>16 Guage Hypo Applicator</td>
<td>1</td>
<td>$3.10</td>
</tr>
<tr>
<td>1” 2 Bolt Flange Bearing</td>
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<td>$8.48</td>
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<tr>
<td>SP03</td>
<td>1</td>
<td>$108.00</td>
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<tr>
<td>PVC</td>
<td>1</td>
<td>$55.00</td>
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<tr>
<td>Ultra-Mate Fasteners</td>
<td>1</td>
<td>$6.99</td>
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<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>$348.56</strong></td>
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</tbody>
</table>
# Timeline

<table>
<thead>
<tr>
<th>Task</th>
<th>Week</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial group meeting ensuring all parts are ordered and/or have arrived</td>
<td>1</td>
</tr>
<tr>
<td>Make wheel and base pattern and template</td>
<td>2</td>
</tr>
<tr>
<td>Work on program for microcontroller</td>
<td>3</td>
</tr>
<tr>
<td>Configure circuit and begin testing of motor</td>
<td>4</td>
</tr>
<tr>
<td>Cut out wheel and base of game and start attaching all pieces together, also test adherence of IPS Weld-on 2007</td>
<td>5</td>
</tr>
<tr>
<td>Start writing comments on SP03.exe and burn on microprocessor</td>
<td>6</td>
</tr>
<tr>
<td>Configure wireless modules</td>
<td>7</td>
</tr>
<tr>
<td>Configure SP03 with burned microprocessor</td>
<td>8</td>
</tr>
<tr>
<td>Test motor with wheel</td>
<td>9</td>
</tr>
<tr>
<td>Test wireless and motion sensor to ensure that there is no double activation</td>
<td>10</td>
</tr>
<tr>
<td>Test units individually and write up and assemble questions</td>
<td>11</td>
</tr>
<tr>
<td>Put together all units and ensure that all work together</td>
<td>12</td>
</tr>
</tbody>
</table>
Conclusion

- Currently there are no Wheel of Fortune games for disabled people on the market.
- Many of the games made for disabled people are very basic and are very expensive.
- This game will have numerous features that will accommodate the adults and their disabilities.
- It will provide both visual and auditory enhancement.
- The game will be able to be played both with assistance from a staff member and independently thus the adults will feel as though they do not need to rely on someone.
Acknowledgements

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- Dr. Martin Fox
Questions