The Name Game,
Mounted Art Assistant
&
Alternative Mouse Input System

Team 6: Andrew McLean, Derek Kulakowski, Matthew Zywiak
Background

► These projects are all sponsored by the National Science Foundation (NSF)

► Client Contact:

Brooke Hallowell, PH.D., C.C.C – SLP, F-ASHA
College of Health and Human Services
Grover Center, Ohio University Athens, OH 45701
Hallowel@ohio.edu
Presentation Summary

- Project 1: Game to Improve Speed and Accuracy of Name Recall
  - Introduction – Client, Previous Products
  - Methods
  - Budget

- Project 2: Head and Arm Mounted Art Assistant
  - Introduction – Client, Previous Products
  - Methods
  - Budget

- Project 3: Alternative Mouse Input System
  - Introduction – Client, Previous Products
  - Methods
  - Budget

- Acknowledgements
- Questions
Game for Improving Name Recall and Accuracy

► Introduction – NSF has asked for a game to be created to improve the accuracy and recall time of names.

► Clients – This program will cater to elderly individuals who have trouble with remembering the names of:
  - Family
  - Friends
  - Famous Personalities

► Goal – To eliminate frustration and embarrassment of people with memory problems such as:
  - Alzheimer's
  - Senility
  - Memory loss disorders
Products on the Market

- Product developed by Nintendo for individuals in a much higher age bracket called “Brain Age”
- Designed to stimulate the brain of elderly people
- Uses Voice Recognition Software
- Developers claim that the game will slow onset of:
  - Dementia
  - Alzheimer's
- Has become very popular in Britain and Japan with millions of copies being sold
Methods

- Program will be created using Gamemaker software.
- The game will have a voice recognition component for people with limited upper extremity mobility.

Voice Recognition Software

VR Stamp toolkit
Methods (cont.)

- Game will include a Main Menu to either load pictures or begin playing game will also contain different difficulty levels
- Load Data screen will contain areas to load pictures, names, and relationships
Game Variants

5 Game Variants
► Original Game
► True-False Game
► Multiple Choice game
► Rapid Fire Game
► Relationship Game
Must fit NSF sponsored budget

Software Packages and Microphone will be only costs for the project

Production Price will need to be comparable to that of other development software

<table>
<thead>
<tr>
<th>Materials</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hands Free Microphone</td>
<td>$66 – 111</td>
</tr>
<tr>
<td>Gamemaker Software</td>
<td>$150</td>
</tr>
<tr>
<td>Nuance Voice Recognition Software</td>
<td>$200</td>
</tr>
<tr>
<td>Total</td>
<td>$416 - 461</td>
</tr>
</tbody>
</table>
Mounted Art Instrument

Introduction:

►►

Client Information: Stacey

- Cerebral Palsy – Limits head and arm mobility
- Hydrocephaly – Buildup of spinal fluids which can damage the brain

Goal

- To create a mounted art instrument, which will allow Stacey to draw
This is a redesign of a previous NSF Project. The previous project had three problems:

- Too heavy / Too cumbersome
- Could only draw circles
- Didn’t function correctly after arriving to the client

Difference in Design

- Art utensil will not be mounted to the body rather it will be mounted on the art pad itself
- Head movement will control the art utensil, giving the user full control
Methods – Art Pad Mount

- The general idea for the art mount can be seen to the right.
- Ball Screws will be used to move the horizontal and vertical components.
- High Torque Motors will be used to move the system.

- Paper will be mounted in center
- Art utensil will be housed in central component
- Vertical and Horizontal screws will provide full range of motion.
Methods – Head Control

- Mounted on the Art Pad will be a set of infrared LED’s
- Mounted on the users head will be a set of infrared Receivers

- Change in voltage across various receivers will send signal to the motors which will cause movement of the art system
Tests were performed to ensure the LED method described in the previous slide would work:

- Attached infrared LED / receiver to proto-board
- Changes in distance resulted in voltage variance in receiver

While maintaining power to the LED, the blue bulb (LED) was slowly moved further away from the detector.

The voltage across the detector increased as the distance increased.
Design Overview

The flow chart below describes the general operation of the Mounted Art Instrument.
$750 USD limit sponsored by the NSF

<table>
<thead>
<tr>
<th>Items</th>
<th>Quantity</th>
<th>Retail Price</th>
<th>Total Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>PICmicro - PIC16Fxxx</td>
<td>1</td>
<td>10</td>
<td>$10</td>
</tr>
<tr>
<td>High Strength LED &amp; Receiver</td>
<td>8</td>
<td>$5</td>
<td>$40</td>
</tr>
<tr>
<td>30 RPM 24 VDC VON WEISE GEARMOTOR</td>
<td>2</td>
<td>$34.95</td>
<td>$69</td>
</tr>
<tr>
<td>24vDC battery</td>
<td>1</td>
<td>$125.25</td>
<td>$132</td>
</tr>
<tr>
<td>Fiberglass Materials 24 x 32 Sheet</td>
<td></td>
<td>$52</td>
<td>$60</td>
</tr>
<tr>
<td>Ball Screw</td>
<td>1</td>
<td>$130</td>
<td>$130</td>
</tr>
<tr>
<td>Helmet</td>
<td>1</td>
<td>$24</td>
<td>$24</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>$465</strong></td>
<td></td>
</tr>
</tbody>
</table>
Alternative Mouse Input System

► Introduction
  - NSF has asked for two alternative input devices for adaptive computer interface control

► Clients
  - This project will be designed for those who suffer upper extremity disorders
  - The devices will cater to the limitations of the clients’ hand and arm movement
Previous Products

- There are many products on the market today that resemble our design.
- They include a foot mouse, foot touch pad, track ball mouse, etc...
- Our goal is to create a cheaper, more efficient design that is affordable for the disabled.
These patents describe different foot operated mice using pedals to accommodate the clicking functions.

These patents describe an X-Y input for computer cursor control.
Methods

- Above is the design for the trackball input which will use optical technology to track the movement of the trackball.
- A microchip will process the information and send the information to the computer as cursor movement.
- To the left is an optical foot mouse that will also utilize optical technology.
- A standard optical mouse will be used as the base with a stronger housing built to fit on the user’s foot to surround it along with two separate foot pedals for clicking functions.
Both the track ball and foot mouse housing will be constructed from ¼” acrylic plexiglass.

The circuitry, microprocessor, and optical technology will be taken from two existing optical mice and integrated to fit our designs.

The buttons for the track ball will be simple off-momentary switches and the pedals will be simple pedal switches, both purchased from Automation Direct.

Each input system will be USB compatible.
Methods (continued)

- To the left is the interactive pong game.
- To the right is the hedgehog game.
- Both games will be used to measure the speed and accuracy of each input system.
- After each game is played for both inputs, a score will be calculated and posted for analysis.
- Gamemaker Software will be used to design the program and gaming interfaces.
## Budget

<table>
<thead>
<tr>
<th>Company</th>
<th>Item</th>
<th>Amount</th>
<th>Price</th>
<th>Shipping</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dell</td>
<td>2-Button Black USB Optical Mouse</td>
<td>2</td>
<td>$56.97</td>
<td>Free</td>
</tr>
<tr>
<td>Professional Plastics</td>
<td>¼” acrylic #2025 cast plexiglass sheet: 24” x 48”</td>
<td>2</td>
<td>$42.12</td>
<td>$12.99</td>
</tr>
<tr>
<td>US Plastic</td>
<td>4” diameter blue solid acrylic ball</td>
<td>1</td>
<td>$62.49</td>
<td>$4.99</td>
</tr>
<tr>
<td>Omron</td>
<td>1 inch electric square push buttons</td>
<td>3</td>
<td>$14.99</td>
<td>$3.99</td>
</tr>
<tr>
<td>1st Pads</td>
<td>24” x 36” sponge rubber mouse pad</td>
<td>1</td>
<td>$29.99</td>
<td>$7.99</td>
</tr>
<tr>
<td>Mansfield Supply</td>
<td>Velcro strap: 2” x 15’</td>
<td>1</td>
<td>$18.99</td>
<td>N/A</td>
</tr>
<tr>
<td>Mansfield Supply</td>
<td>Rubber pads</td>
<td>6</td>
<td>$3.99</td>
<td>N/A</td>
</tr>
<tr>
<td>Mansfield Supply</td>
<td>Felt pads</td>
<td>6</td>
<td>$3.99</td>
<td>N/A</td>
</tr>
<tr>
<td>Dell</td>
<td>6 ft. USB extension cable</td>
<td>2</td>
<td>$15.98</td>
<td>Free</td>
</tr>
</tbody>
</table>

| Total Shipping     |                                                 | $29.96 |
| Total Price        |                                                 | $248.51|
| Total Budget Cost  |                                                 | $278.47|
Acknowledgments

- Brooke Hallowell & the NSF
- Dr. Enderle & Uconn BME program
- Dave Price
- Dave Kaputa
Questions?