Final Presentation

Assistive Devices for Joey Toce
Sponsor: National Science Foundation

Design Team 8:
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BME 4910
April 23, 2010
Three assistive devices were designed to aid 6-year-old Joey, who has a muscular disorder, known as Cerebral Palsy, in order to increase his independence and increase his ability to participate in every day activities.

The three projects which were designed were the following:

1) Adapted Snow Sled
2) Adapted Hungry, Hungry Hippos game
3) Control Panel

Overview of presentation:

1) Objectives & Implementation
2) Final Product
Objectives & Implementation of Project

- **Adapted Snow Sled**
  - Plastic seat with full supportive harness was attached to the plastic sled via 1” HDPE and three stainless steel bolts, fender washers, nuts, and split lockwashers were used on each side.
  - Two PVC tubes were bolted from the back corners of the sled to the back of the seat to provide support. Four stainless steel bolts and nuts were used to accomplish this.
  - The holes in the front of the sled had to be drilled out to fit the larger diameter of the new rope. Since the rope is made of nylon the ends were burned to prevent fraying after being tied to the front of the sled.
Final Product

Joey enjoying his new sled in the snow.
Adapted Hungry, Hungry Hippos Board Game

Objectives:

- The Purpose of this project will be to take an existing H.H.H. board game and modify it so that the client will have full control of the game.
- Device must provide force required to push on levers without much effort from client

Implementation

Major Components:

- Electric Motors and swing arms
- Jelly bean style push button
- Housing Unit
- Battery Compartment

General Setup:

- Pressing the push button will active the electric motors/swing arms
- These swing arms will in turn operate the board game levers
- The device should be attachable/detachable from board game for easy storage
Objectives and Implementation of Project

Hippo Swing Arm and Motor Setup

Marble Release Swing Arm

Housing Unit without Cover Pieces
Objectives and Implementation of Project

Overview of Components

Marble Release Lever and Wiring

Main Hippo Lever and Wiring

Circuit Diagram of Setup
Objectives and Implementation of Project

Completed Housing Unit and Board Game

Housing Unit and Board Game with applied paint

Housing Unit and Board Game with Push Button
Final Product

Finished Hungry Hippos Device
Final Product (2)

Client delivery
Objectives and Implementation of Project

- **Device Control Panel**
  - **Objectives:**
    - Remotely control DVD & CD player with easy-to-use control panel
    - Touch sensitive buttons (jelly-bean style)

  **Implementation:**

  ![Initial CAD of control panel](image1.png)

  ![RF Receiver–Transmitter System](image2.png)
Objectives and Implementation of Project

Pictures of components used
Final Product

Finished control panel
Final Product (2)

Client delivery
Final Presentation

Software Game to Improve Speed & Accuracy of Name Recall
Sponsor: Ohio University

Design Team 8:
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Introduction & Overview

- A software memory recall game will be designed for people with Alzheimer’s Disease, dementia, or others who suffer from memory loss due to advanced age.

- Main cognitive deficits of clients:
  - *Short-term memory loss of names and faces of loved ones and friends; causes frustration and embarrassment*
  - Loss of basic faculties, disorientation
  - Causes of Alzheimer’s Disease/dementia: deposition of beta-amyloid plaque, which interferes with communication between brain cells, entanglement of an essential neuronal protein called tau—damaged neurons

- Why design a memory recall game?
  - Speech pathologist recommended repeated use of images to improve memory recall
  - Studies support this assessment (“Improvement of Picture Recall by Repetition in Patients with Dementia of Alzheimer Type” in the International Journal of Geriatric Psychiatry, volume 12)

- Overview of presentation:
  1) Objectives of Project
  2) Implementation of Project
  3) Final Product
Objectives of Project

- Objectives (Client’s Specifications):
  - Game must be installable on a PC– Microsoft Windows with Vista
  - Must accept digital images and names, specific for each user
  - Must supply a default package of images of celebrities and political figures, relevant to elderly people
  - Must be able to select different lists of names to be worked on in different sets
  - Must prompt the user to say a name into a microphone once the image is presented
  - Must keep score and time
  - Respond to correct or incorrect answers with auditory and visual feedback.
  - Software used for voice recognition must be supplied, along with the microphone
Implementation of Project

- **Language and tools:** C#, Microsoft Visual Studio 5.0, .NET 3.5

- **Five main components which must be included in code:**
  1. Code to create the graphical user interface—involves buttons, selection lists, text and image fields
  2. Code to create lists of personal photos from images saved on the computer, which may be ordered by the user and stored for use in the future
  3. Code to select a picture list to be used in the current game
  4. Code to interface the voice recognition libraries with the rest of the game
  5. Code to convert the software to an installable game on the users’ computer; use of a Wizard

- **Voice recognition software:** Microsoft Windows Voice Recognition Libraries
  - Dictates text into most Microsoft applications and internet; control of mouse and desktop
  - *Custom vocabulary features: add words, which user commonly uses, to pre-existing libraries. This feature, especially, may be useful in exploiting for accurate recognition of proper nouns.*

- **Microphone:** Logitech microphone
  - Excellent digital sound quality for voice recording & speech recognition
  - Noise canceling technology with manual sensitivity control, filters out background noise
Database setup
Creating a profile
Final Product (2)

Creating a person
Creating a scenario
Running a scenario
Final Product (5)

Viewing statistics by scenario

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Final Product (6)

Viewing statistics by person
Total allowable budget
$1,641.00

Purchases made
$1,053.19

Expenses for all four projects remained within budget
Team 8 would like to thank the following people for their time, support, and financial aid:

- National Science Foundation, sponsor for Toce projects
- Dr. Brooke Hallowel, sponsor for Ohio University software game
- Mr. & Mrs. Toce and Joey Toce, client
- Dr. John Enderle, BME Director
- James Paolino, Senior Design TA
- Michael Pelland, CCSU Computer Scientist
Thank you!