Project Specifications

Alternative Mouse Trial and Assessment System for Adaptive Computer Control

Head and Arm Mounted Art Instrument

Game to Improve Speed and Accuracy of Name Recall

NSF Sponsored Project

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Head and Arm Mounted Art Instrument

Introduction and Overview

The arm and head mounted art instrument is a NSF sponsored project. The client Stacy is a person inhibited by cerebral palsy and has limited head and arm movement. She wishes to draw, paint and express her artistic abilities but she is unable to do so with holding the marker or paint brush. The purpose of the project is to design a mounted head and arm assistant which will help our client to pursue her artistic interests and allow her to draw or paint. The design of the project consists of two attachments to the arm and head. These ligaments will take the place of functional arms and allow the client to perform the necessary movements to draw shapes or squiggles.

Realistic Constraints

While quality and functionality is essential in any project there are some realistic constraints which are associated with building the head and arm mounted art instrument. In terms of cost, there is $750 US dollars available for use in research and construction of the device. The time for development is another realistic constraint; the two semester period in which the research and development will take place is another realistic constraint.

Even though the project will be used indoors in a relatively wear and tear free environment, it must be able to withstand everyday handling. The finalized project must be relatively light; the Client should not get overly tired while utilizing the art instrument. The art instrument must be able to sustain prolonged periods of usage and must be safe in all aspects.

Technical Specifications

Electrical Parameters

- Battery Life (6 hours min / Rechargeable)
- Power Termination (1 button)

Mechanical Parameters

- Arms must be hold their own weight (5-15lbs)
- Safety Factor (F.S of 1.5)
- Length of arms (2-4.5ft)
- Mechanical Accuracy (1-2 in)
- Weight (2-5 lbs arm weight)
- Strap flexibility (Head 25-40 in, Wrist 5-15 in)
- Durability (Liquid and Mechanical resistance)

Environmental Parameters
- Operating Temperature (60-90 F)
- Storage Temperature (50-100 F)
Game to Improve Speed and Accuracy of Name Recall

Introduction and Overview

Many people throughout the world develop memory problems late in life. This can be due to many things including Alzheimer’s, senility, or just plain old age. Often times these people can not remember the names and faces of their own children, grandchildren, or famous people such as celebrities and politicians. This usually leads to embarrassment or frustration for the individual who is afflicted. Many times the recall of names and faces can be improved simply by practicing with a set of familiar faces and names.

The purpose of this project is to design a computer program or game that will allow elderly individuals to practice with a game tailored to the individual. The game will include pictures of family, friends, and celebrities that the person might consider important to remember along with their names. The game will also include a microphone for voice recognition so that the individual will be able to just say the names when the pictures appear on the screen. As well as having speech recognition software the game will keep statistics on each person so that accuracy and speed can be recorded and measured. With this program we hope to improve the lives of many living in retirement communities. The goal is to make their lives easier and less stressful when family and friends come to visit them. Our hope is to create an easy to use interface with large pictures tailored to elderly individuals.

Realistic Constraints

There are many constraints on this particular project that will need to be taken into account in the design phase. The most obvious constraint in this project is 750 dollar budget which is non-negotiable. The computer program along with the voice recognition software will have to be developed for less than the amount signed to the project. This computer program will have to be compatible on many different desktops and laptops due to the fact that more than one person needs to be able to use it at one time. The fact that it will be installed on many different computers means that it must have a very simple and quick installation procedure. This program will have to be aesthetically pleasing as well as functional. The interface screens will have to use colors that appeal to people of an older generation and that will be easy to read as well as not being to harsh on the eyes. The program will also have to be easy to update so that new pictures and names can be constantly changed for different people. The computers that this program will be installed on may also be a limiting factor in the design. The computers must have an appropriate amount of storage space so that previous sessions can be stored and speed and accuracy computed for the sessions. The speech recognition software may also be a constraint on the project due to the fact that it must be calibrated to every new user’s speech patterns for optimal efficiency.
Technical Specifications

Electrical and Mechanical

Microphone
  Wire Length   60’’ max
  Power        +5 to -5 Volts
  Voice Range  30’’ min
  Weight       <1 pound
  Durability   Withstand 6 foot drop
  Sensitivity  -9.5dbV +/- 5db at 1.0 KHz relative to 1.0 Volt/Pa
  Maximum Sound Input 110 dB SPL (1% Distortion @ 1 KHz)

Environmental

  Location     Retirement Home
  Operating Temp 20 to 120 degrees Fahrenheit
  Storage Temp  -20 to 165 degrees Fahrenheit

Software

User Dependent
  Character Size  Minimum of size 18 font
  Contrast        Visible in indoor lighting
  Menu Levels     2 to 4 max.
  Display Size    10’’ x 8’’

Machine Dependent
  Termination/Restart Single Button
  Visibility Distance 40’’
  Interfaces to other Software Windows, DOS
  Memory Requirements 50 Megabytes with more storage for pictures
  Target Machine Computers running windows
  Voice Detection Nuance or Dragon 6.0
Alternative Mouse Trial and Assessment System for Adaptive Computer Control

Introduction and Overview

Limited hand and arm mobility is a disability that is suffered by many children and adults. Such persons are unable to use certain input devices for computer interfaces, such as a mouse. The goal is to create two alternative devices for the use of the disabled clients that is available and affordable to various clients. These devices will have a user-friendly design and have software compatible with a PC and laptop. Each interface input will have a separate scoring scheme and will be compared to the score from the other device. The two substitute apparatuses will be a foot touch-pad interface and a large track-ball device.

The footpad will consist of a touch pad similar to those found in video game operation for home video game systems. The pad will allow the user to comfortably maneuver a mouse pointer around a computer interface. The track-ball device will act much like those also found in gaming systems, permitting the user to progress the mouse pointer along the computer screen in a series of rolling motions.

Frequently alternate devices are not known to the disabled and are also unavailable due to cost. By designing a less expensive, more effective input device, more people can benefit from the final product.

Realistic Constraints

The budget for this project is $750.00, limiting the amount and type of material able to be used for construction. Also, the types of inputs chosen were restricted due to the components needed for each plan. Although there are major limitations, this allows for a high quality product at a low expense.

Environmentally speaking, the materials used must not be harmful to the user or to the environment. The materials must also be durable and able to sustain continued use by different operators. The elements of this design are fundamental, easily found, and inexpensive. Replacement of parts is also nontrivial and basic.

Ethically speaking, this product is meant to help those who are disabled, not to worsen their condition or to ridicule their ailments. Along the lines of health, as stated before, the materials used will not be physically harmful to the operator, as well as emotionally harmful through mockery of their disabilities. Also, the design itself will not contain any injurious pieces or jagged edges that may wound the client.

This device is meant to improve the skills of the hindered client and relieve the stress of computer interface operation. Socially this apparatus will progress the skills of the user in using computer interfaces, allowing them to feel as compatible as others who do not suffer from their impairments.

Technical Specifications

*Electrical:*

Power supply
PC/laptop
Display
  User-friendly
  Compatible PC/Laptop Screen
Connections
  New USB 2.0
  Easy On/Off Switch
Power
  Standard USB operation
    +/- 5 V @ <100 mA

Mechanical:
  Storage
    1.5’ cube box
  Weight
    Total apparatus <35 lbs.
  Foot Touch-Pads
    Circular @ 6”-10” diameter
    Spacing between @ 6”-8”
  Track-Ball
    Sphere @ 4” diameter
    Easy track-ball movement

Environmental:
  Operating temperature
    0° - 70° C
  Storage Temperature
    -45° - 80° C

Software:
  Driver software
  Track-ball driver
  Foot Touchpad driver
  Games (Pong, picture matching, etc…)
  Scoring and Comparison Program