Freely Adjustable and Accessible Keyboard and Joystick

Sponsored by the National Science Foundation

Team 6:
- Stephen Heussler and Nolan Skop
Outline

- Introduction
  - Background
  - Problem
  - Solution
  - Previous work done by others

- Project Description
  - Design
  - Materials

- Budget

- Conclusion
Client Background

- Sam from Hampton, CT
- 10 year old 5\textsuperscript{th} grade student
- Wants to fit in with other students
- Athetoid Cerebral Palsy
  - Non-verbal
  - Requires electric wheelchair
  - Typing is primary means of communication
Athetoid Quadriplegia

- Permanent damage of cerebellum or basal ganglia
- Affects all limbs
  - Involuntary Movements
  - Difficulty in Preciseness
  - Difficulty with speaking and other motor functions
Problem with Standard Keyboard

- Horizontal position
  - Affects positioning of client’s hands
- Keys too small
  - Multiple keys hit at a time
  - Damage to the keys
- Not portable
- Slows down speed and efficiency of typing
- Not Durable
Problem with Standard Mouse

- Difficult to grab
- Requires fine movements of hands and fingers
- Highly sensitive
Solution

- New Keyboard Design
  - Allow Sam to type faster and with greater ease
  - Reduce stress on hands and fingers
- Replace Mouse with Joystick
Patent Research

FrogPad™
- Sits horizontal to surface
- Small Keys
- Multiple characters per button - not user friendly
Project Design

Pressing Key(s) → Switch Triggered, Current Flows → Microprocessor

Keyboard Controller → Microprocessor Memory Buffer → Filter

Operating System

System Level Command
Command
Content
Project Design cont’d.

- New Keyboard
  - Vertical Position
  - Large Keys
  - Simplified Layout
  - High Wear Resistance
  - Portable
Project Design cont’d.

- Joystick
  - M212 Multi Axis Joystick (PQ Controls)
  - Potentiometric Displacement Joystick
    - Converts mechanical displacement to electrical output
Materials

- Keyboard
  - Plastic Parts
  - Rubber Dome Switches
  - PCB
  - Electrical Components
  - Bluetooth Connector
- Joystick
  - Aluminum
  - Glass Reinforced Nylon
### Budget

<table>
<thead>
<tr>
<th>Component</th>
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<td>Custom Built Plastic Parts</td>
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<td>PCB</td>
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Available budget is $750 provided by the National Science Foundation.
Conclusion

- Future Keyboard and Joystick
  - Faster, easier means of communication
  - Less strain on clients arms
  - Portable for classroom transport
  - High wear resistance- long lasting
  - LED backlighting
  - Custom built within budget