The Mouse of All Trades

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Introduction

- Our device was built for our client who has a physical disability that greatly reduces her fine motor skills.
- the problem that we were facing is that we needed to develop a device that could improve her use of her computer and aid with her rehabilitation.





Metrics and Benchmarking

- After empathizing with our user, we were able to establish some key metrics and benchmarks.
- We also established very early that we wanted to center our design around rehabilitation.





Our Solution

- We settled on a single affordable design that could meet all of our user's needs.
 - Arduino controlled
 - Joystick and capacitive touch sensors
 - \circ On-Screen-Keyboard
 - Integrated control software and easy to use GUI





Our Solution (continued)

- We also determined that we would use a "plug and play" style design.
- We decided that our touch sensors would be able to have an array of possible functions







Complete Device and Spreader



Joystick and Touch Sensor Modules



Graphical User Interface

	- 🗆 X	🖶 Custom Mouse Control Center	- 🗆 X
Joystick	Settings	Joystick	Settings ○ Left Click ● Right Click
Button 1	The joystick sensitivity determines how much movement of	Button 1	 Open On-Screen Keyboard
Button 2	Less Sensitive	Button 2	 Type a Phrase Phrase:
Button 3	Cursor Speed	Button 3	Open a Program Not Assigned Change
Button 4	The cursor speed determines how quickly the mouse cursor moves across the screen with the movement of the	Button 4	• Open a Website
Button 5	joystick. Slower ————————————————————————————————————	Button 5	Website Link: Perform Keyboard Shortcut
Button 6		Button 6	Not Assigned Change

Early Design

- We initially opted to use the Sensact Arduino Leonardo shield developed by the St. Vincent Hospital
- The software originally consisted of a Windows service running in the background and a GUI to control settings



rsion 4.1	Input 1 Input 2 Input 3 Accel Gyro USB Input Mouse Speed			
t Tiggers	Solutions			
Triggers	Input 1A New Trigger Delete All			
Run Display	X Condition			
Idle	New State: 1 🚖 Action: HID Mouse 🗸 Mouse Action: Mouse Left	~		
Export Import	X Condition			
	Action New State: 1 + Action: HID Mouse V Mouse Action: Mouse Right	~		
	Input 1B New Trigger Delete All			
	X Condition			
	Action New State: 1 🕏 Action: HID Mouse 🗸 Mouse Action: Mouse Up	~		
	x Condition			

Early Design - Mockups

- We started prototyping modules together
- We designed a mockup GUI for the software that is user-friendly





Early Design - Circuitry and Printing

- We soldered different sensors and connectors together
- We also re-measured pieces and printed several case mockups





Early Design - Testing

• We continuously tested what we had along the way and kept making sure everything was working as expected





Software Progress



- We found out that Windows services cannot control the desktop
- Instead, we opted for a regular program that runs in the background, controlled by a GUI that sits in the taskbar

Arduino Code

- The Sensact code was bloated and had more functionality than needed built in
- We decided it was best to use the Sensact for its AUX inputs, but write the code from scratch







Ditching the Sensact

- The Sensact was nice because of its inputs, but it was causing a lot of instability
- We made a risky but worthwhile decision of scrapping the Sensact completely





A sticky situation...

- When we were finalizing everything a couple days before it was due, we got epoxy into the female AUX jacks and on the male AUX connectors when gluing them in the casing despite our preventative measures
- Thankfully, we were able to solve the problem, but it was a bit of a panic moment



The Finished Product





- It isn't done until it's done
- Different strengths apply to different tasks
- Time management of a long term project



Next Steps

- Present device to the client
- Gauge the usefulness of the device
- Complete remaining deliverable





- Project comes to an end with the course
- Memories last forever