Assistive device to augment strength in the weak hand of a stroke patient

Team 12: "Finger Device" Team

Client: Dr. Matt Jensen

Advisor: Paul Thompson

Team Members: *Thomas Fleming (Leader)*

Mark Reagan (Communicator)

Brad Rogers (BSAC)

Tyler Vovos (BWIG)

March 27, to April 2, 2008

Last Week's Goals

- Obtain the signature necessary to obtain a card for lab access.
- Work as a team to interface the pressure sensor and microcontroller.
- Draw out a block diagram for the logic we want our controller to ultimately implement.
- Examine the data sheets for the stepper motors to get a better sense of how we will interface them with the controller.
- With deeper background knowledge of our controller, contact Dr. Yen with specific questions about the interface between the controller and the stepper motor.

Summary of Accomplishments

- Tom filled out the paperwork for obtaining a key card, and just needs a signature from Prof. Thompson to get the card made.
- Friday, March 28, we started working with the pressure sensor and the amplification necessary for the blood pressure sensor used at present.
    - The blood pressure sensor outputs ranges between 0 and 30 mV, which may have to be amplified 50-100 times for processing.
    - The output impedance of the pressure sensor was measured to be .303 kohm, for amplifier construction.
- As a team, we went through the basic servo motor project from the microcontroller kit to familiarize ourselves with the actual functions of the microcontroller.
- Mark, Tyler, and Brad have been doing more research on basic electronic circuit background (http://web-ee.com/tutorials/), particularly amplifiers and pressure sensors.

- Tom has been trying to determine how to convert the analog signal from the sensor to a digital signal usable by the microcontroller.
    - The portable Analog to Digital converters in the lab are model PMD-1208LS from measurement computing. The guide to using these can be found at http://www.measurementcomputing.com/cbicatalog/cbiproduct_new.asp?dept_id=412&pf_id=1535&mscssid=R6FHEW9TBEU88LPRQDTLL2MQMT8MCATD. However, the software installed on the lab computers at the moment is LabVIEW and not the packaged software, so the following manual will be examined for using the device with labVIEW: http://www.measurementcomputing.com/cbicatalog/cbiproduct.asp?dept%5Fid=184&pf%5Fid=1360.
    - In the meantime, labVIEW and the ELVIS board (which is not portable) will be used for test A/D conversions. The following guides describe the units' functions in this manner: http://zone.ni.com/reference/en-XX/help/371361B-01/lvwave/analog_to_digital_wf/ (labVIEW), and http://physics.wku.edu/~womble/phys301/elvisguide.pdf (NI ELVIS).
- A basic block diagram of the processing we want to do was drawn up.

This Week's Goals

- Successfully convert the analog pressure sensor signal to a usable digital one.
    - Consult Amit Nimunkar, Professor Tompkins, or Jon Sass of the "Incontinence Device" team for help if necessary.
- In the meantime, use test digital signals to work through the programming of the microcontroller.
- Look through the stepper motor data sheets and contact Dr. Yen.

Project Difficulties

- Limited meeting times for the group are a difficulty, given the group's very basic knowledge of circuitry. Weekend meeting times may have to be arranged for future work, once a key has been obtained for the laboratory.

Activities

- 3/27/08 **Team:** Interfaced pressure sensor and amplifier, practiced reading output values and resistances. Discussed the block logic of the processing which will have to occur. Performed the servo motor project from the microcontroller kit to familiarize ourselves with the connection and programming schemes. ~3 hours
- 3/27-4/2/08 **Tom:** Research analog to digital conversion with the actual equipment and software installed in the lab. ~4 hours
- 3/27-4/2/08 **Brad, Mark, Tyler:** Research basic electronics: amplifiers, pressure sensors, and analog/digital. ~4 hours
- 3/27/08 **Tom**: Write progress report. ~.5 hours

Project Schedule

Preliminary Project Schedule (Updated 3/13/08)	
Dates	Activities
Feb. 8 – 15	Brainstorm design ideas; begin gathering quantitative data to refine our PDS
Feb. 15 – 22	Choose the most feasible design idea, begin refining that design
Feb. 22 – 29	Continue refining design; create a list of parts and materials necessary for the implementation of the design and a list of manufacturers
Feb. 29 – Mar. 7	Work on presentation and paper; finalize the part numbers for materials to be purchased. (Meeting w/ Dr. Jensen 2/29 @ 2:30pm)
Mar. 7 – 14	Resolve any indecisions about materials needed and order parts
Mar. 14 – 21	Spring Break
Mar. 21 – 28	Attempt to interface the single sensor with the microcontroller. Attempt to interface the motor with the microcontroller separately.
Mar. 28 – Apr. 4	Work on control algorithm for the sensor-microcontroller-motor system.
Apr. 4 – 11	Work on analog to digital conversion of the pressure signal. Use test digital signals to work on the programming of the microcontroller.

Expenses

- **None**