Work Completed

During the last report, information on the type of material that will be used in the enclosure of the muscle recorder has been found. We had chosen an acrylic, went and bought it but found out that it was thinner than what we really wanted or needed. Plexiglass is the brand name for acrylic or PMMA. I went and bought .220 (thickness) plexiglass at a hardware store. This product is an excellent choice for signage, security, or any other project requiring holes. This acrylic is a very versatile material having great impact strength yet light weight (it is less than half as heavy as glass: it is 43% as heavy as aluminum and 70% as heavy as magnesium). Sheets have from 6 to 17 times greater impact resistance than ordinary glass in thicknesses of .125" to .250". When subjected to blows beyond its resistance, acrylic sheet reduces the hazard of injury because it breaks into large relatively dull edged pieces which disperse at low velocity, due to the light weight of the material. It is easy to work with, can be sawed, drilled, glued, painted, formed, and machined like wood or soft metals. Besides as our project demands, it is resistant to corrosion and to most chemicals. Can be easily attached to other surfaces using round head wood screws, round head bolts, sheet metal screws, oval head screws or bolts used in conjunction with finishing washers, and threaded rod used with cap nuts. Flat head screws, bolts and other fasteners which require countersinking should not be used, because a countersunk hole is almost the same as a notch and a potential fracture point. Holes for fasteners should be drilled oversized to allow for thermal movement of it.

OPEN-LOOP MOTOR SPEED CONTROL WITH LABVIEW: An open loop DC motor speed control system is developed using NI DAQ and LabView software. Pulse Width Modulation (PWM) technique is employed to control motor speed. The VI is developed through LabView allowing the DAQ to read a user selected reference voltage continuously. The VI also generates a suitable triangular wave that with the help of the reference signal produces the desired PWM signal. The switching interval of the signal controlled by the reference signal determines the average power delivered to
the motor circuit. LabView allows the building of a block diagram to represent functions to be evaluated and observe results on the front panel.

The DAQ board communicates between input and the output circuit of the motor control system. The input circuit is a simple voltage divider that employs a potentiometer and two power supplies. It provides a variable reference signal within a range of plus or minus 10 volts. In the output circuit a dc motor is connected between the collector of the power transistor (TIP 41) and the power supply of 40V. The power transistor is used as a buffer between the output port of the DAQ unit and the motor under control.

The output circuit: the VI communicated the input to the output circuits. The output of the input circuit (reference signal) is connected to the input port of channel of the DAQ (ex. A1 channel 1, or A0 channel 0). The output circuit receives the signal through the output port or channel of DAQ. The VI performs the following functions:
- samples the reference signal continuously at the user supplied rate
- generates a triangular wave
- produces a signal switching at intersection of the reference signal and triangular signal
Future Work

During the next week, plans are set to have built the acrylic enclosure with the reservoir and the lever arm integrated in it. Calibration of the lever arm and the Hall Effect sensor working together is our next step to acquire actual data points. We will be trying to acquire a frog muscle from the PNB department to try to test it in our recorder in 1-2 weeks from now.

Project Review

We are trying to accelerate our progress because we might run into a lot of difficulties once the muscle recorder is built. We need to be aware of all the testing that needs to be done and the time that needs to be spent to meet our deadline.

**Week 7:** Finished Enclosure. Visit the PNB lab that will be having a dissection class for the class/see if they have extra frog muscles (OCT 16).

**Week 8:** Working lever system in junction with the pump and the stimulation device.

Hours Worked
13