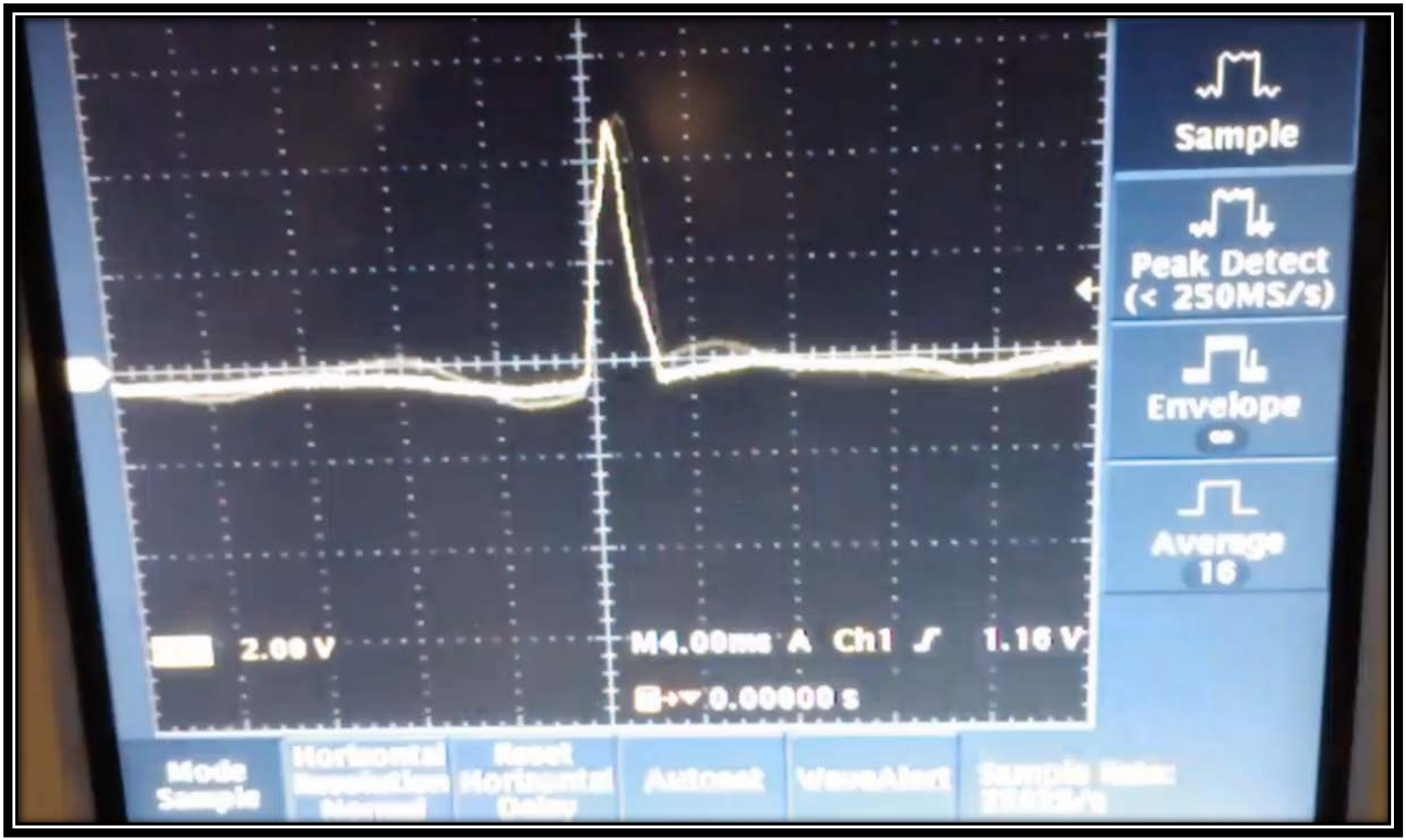
CYBORG ARM

DESIGN REVIEW 2


Sample
Peak Detect
(< 250MS/s)
Envelope
∞
Average
16
2.00 V
M4.00ms A Ch1 1.16 V
0.00000 s
Mode
Sample
Horizontal
Reset
Horizontal
Delay
Autoset
WaveAlert

ELECTRICAL-EMG CIRCUIT

EMG Circuit built and tested

- We were able to have it output useful data but it began to malfunction after attempts were made to improve it further
- We were not able to test how much it would react to, our focus before it malfunctioned was to determine if the circuit would be useable.
- Possible uses
    - Peak-move at one speed
    - Move faster depending on slope
- Further useful aspect of ranging from 0V to 9V. It will require a voltage divider before it can be used by the motor.

ELECTRICAL-PCB

PCB Arrived

- Confident it will work as it removes the problem of the large capacitor brushing into things
    - The circuit is follows is the one that was tested in the previous slide
- PCB due to come in soon.

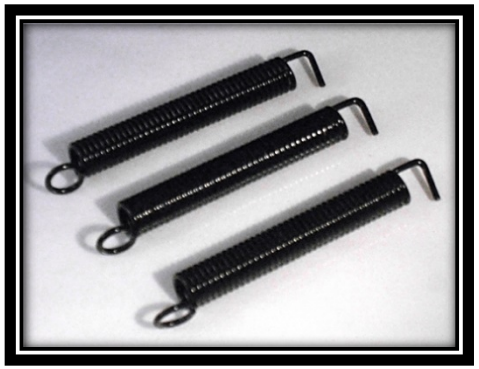
ELECTRIC-VIDEO

We took 2 videos of the reactions of the EMG. We are missing the highest quality one before it began to malfunction. The reason for this was that we were renewing the electrodes so as to have the highest quality data possible.

MECHANICAL

Series Elastic Actuator

- **Servo motor with 2.5” lever arm**
  - Keyed fit
  - Controlled with Arduino and transistors
- **Springs**
  - Springs rated for 12 to 50 lb loads
- **Fastenings**
  - Slotted plates
  - Metal cam straps ordered
- **Machining and Assembly**



SOFTWARE

Code to control motor – completed

- Key elements: Direction, Distance, and Speed

Code to receive and process EMG Data

- All the filtering is being done by the circuit
- Input from EMG
- Adjust Motor’s key elements accordingly
- Will be finalized after testing EMG

NEXT STEPS

Integration of electrical, mechanical, and software

Devise a method through which the EMG signals will drive the motor/spring. This can be done either through a hardware converter or through software involving the Arduino

- Proportional and/or integral control

Implementation of safety features so as not to damage the user

- Currently there is nothing to prevent the device from overextending and breaking the user's arm or otherwise straining it

Stretch goal: Tricep-based EMG control for 2 way motion control

- Current model is only based on bicep motion which limits us to one direction unless we come up with some very clever programming.