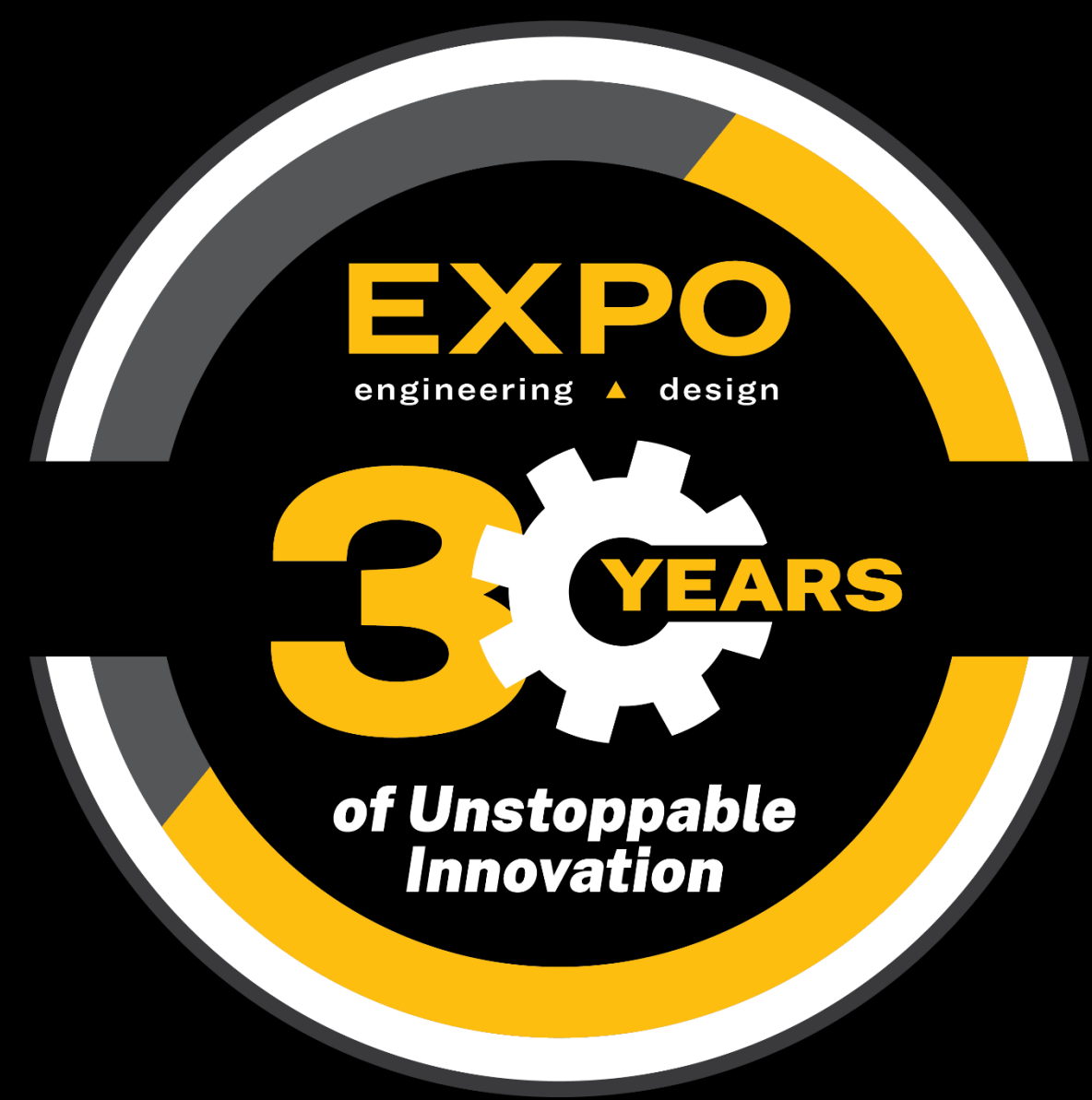




ELECTRICAL STIMULUS AND RESPONSE MEASUREMENT IN EARTHWORMS

HONNEYVILLE BOISER, LAUREN GRAVES, ALYSSA HANSTEN



OBJECTIVE:

To Develop a system to measure electric potential changes in an earthworm to visualize its nerve responses to a stimulus.

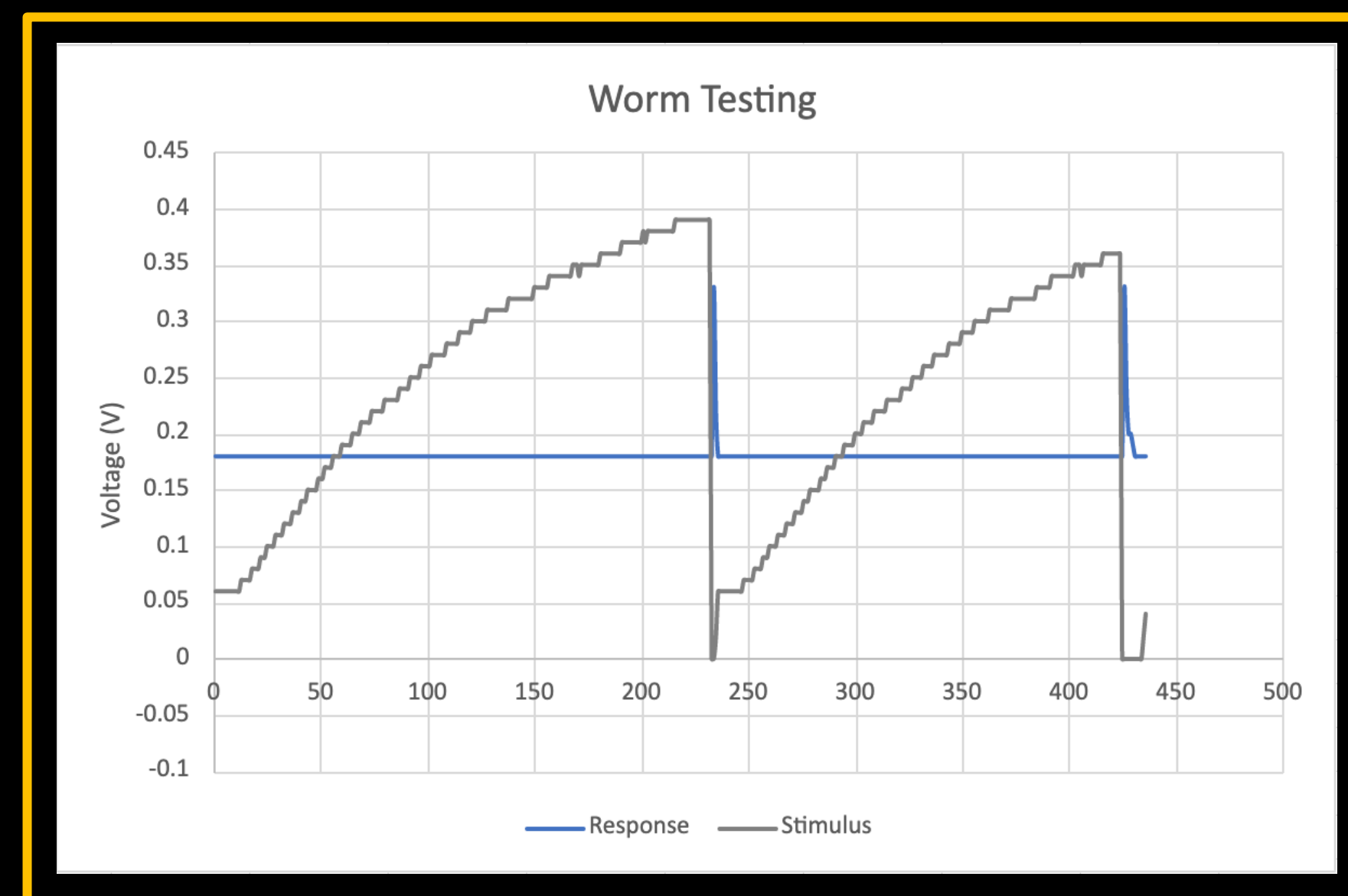
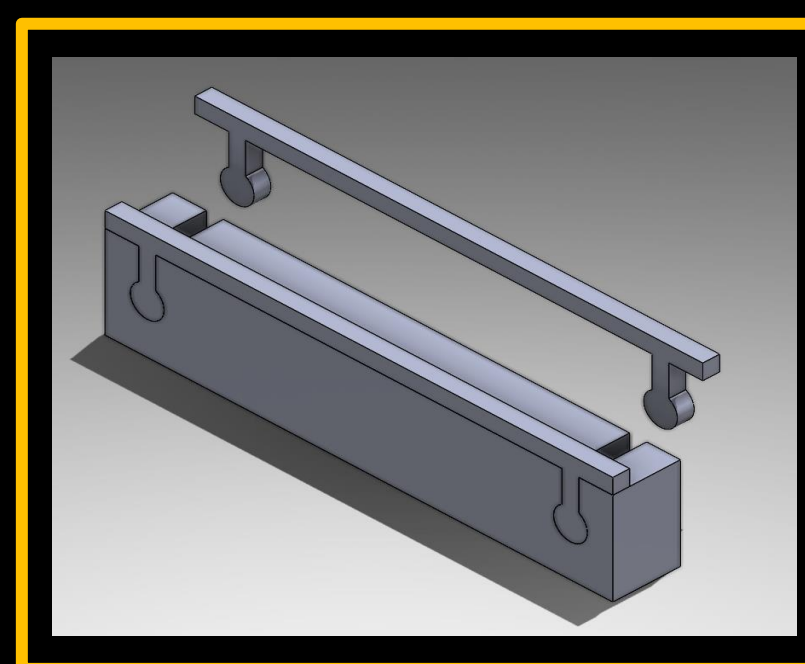
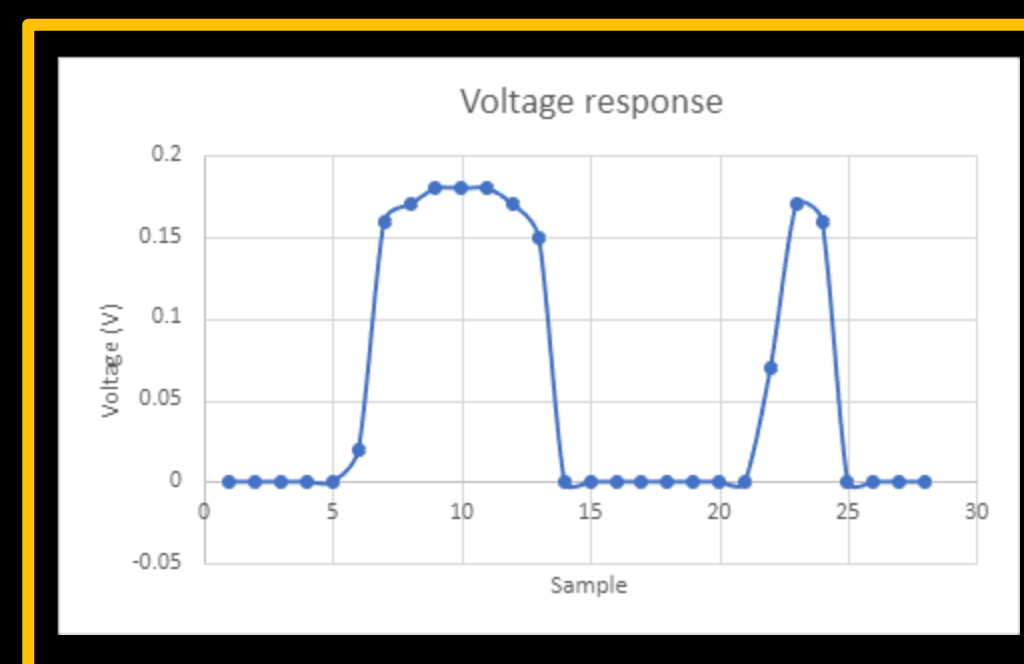
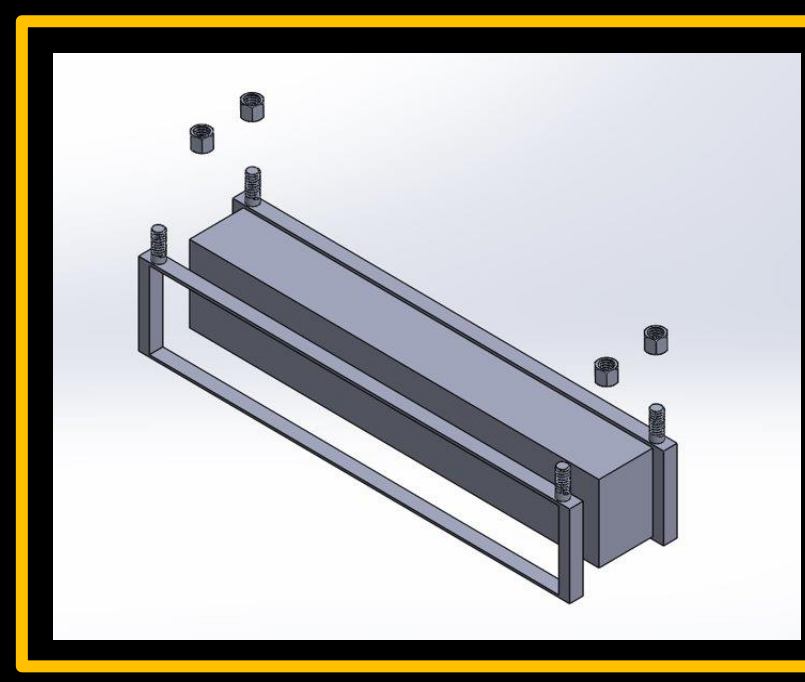
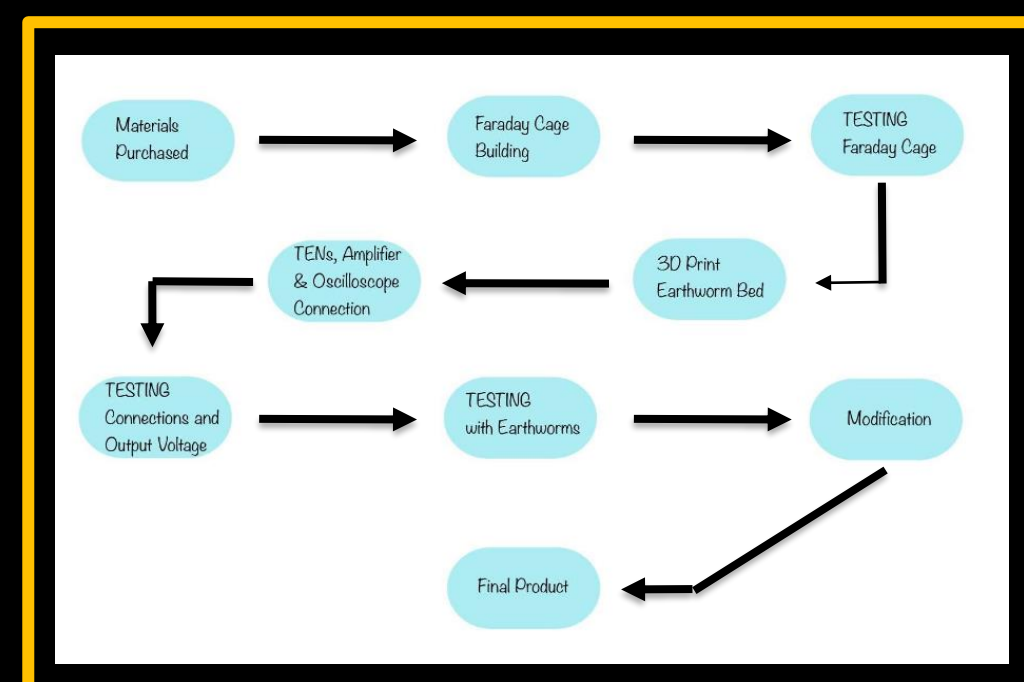
BACKGROUND:

- Nerves generate action potentials in response to a stimulus
- Action potentials are a change in voltage potential
- Earthworm nerve responses are easily measured and visualized

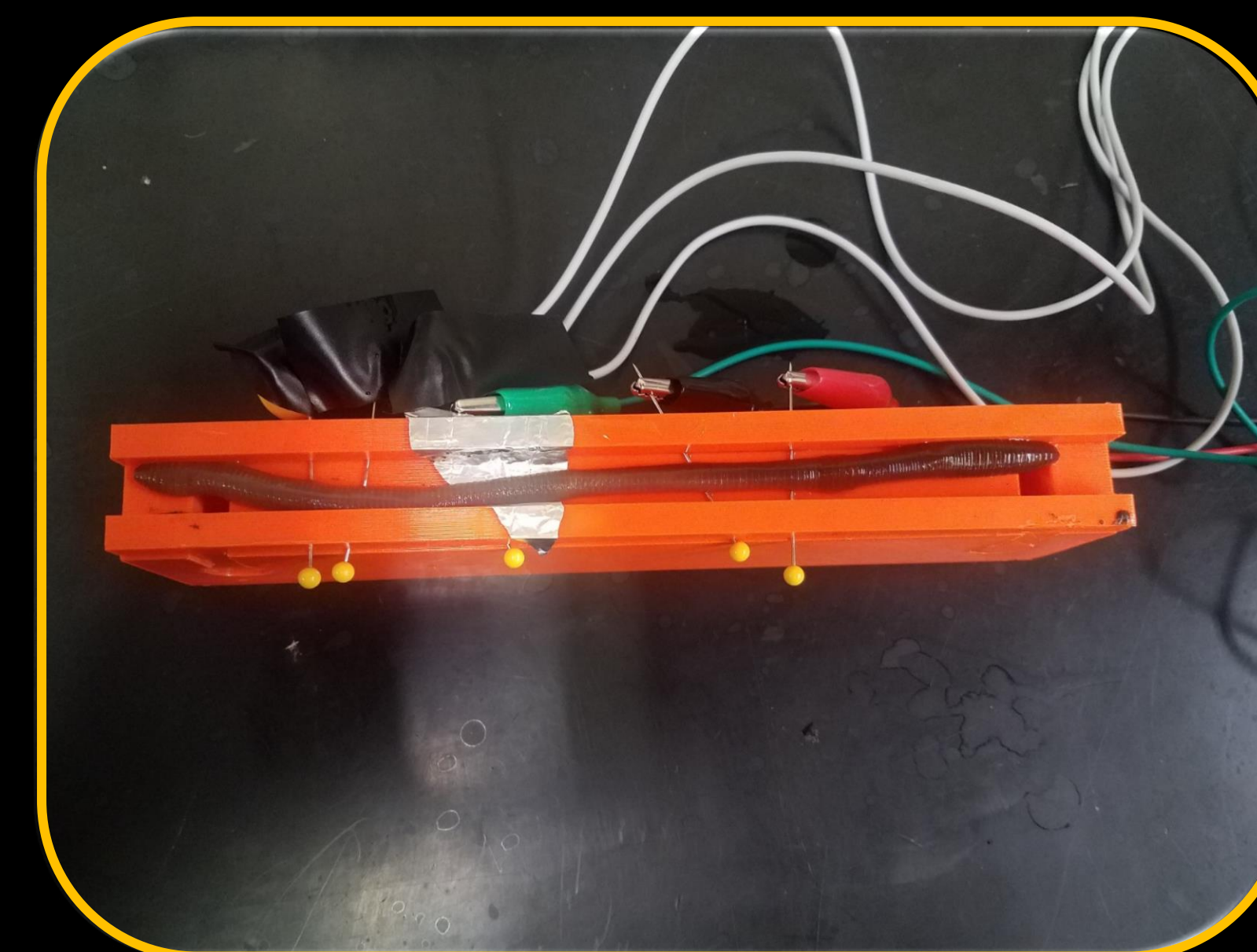
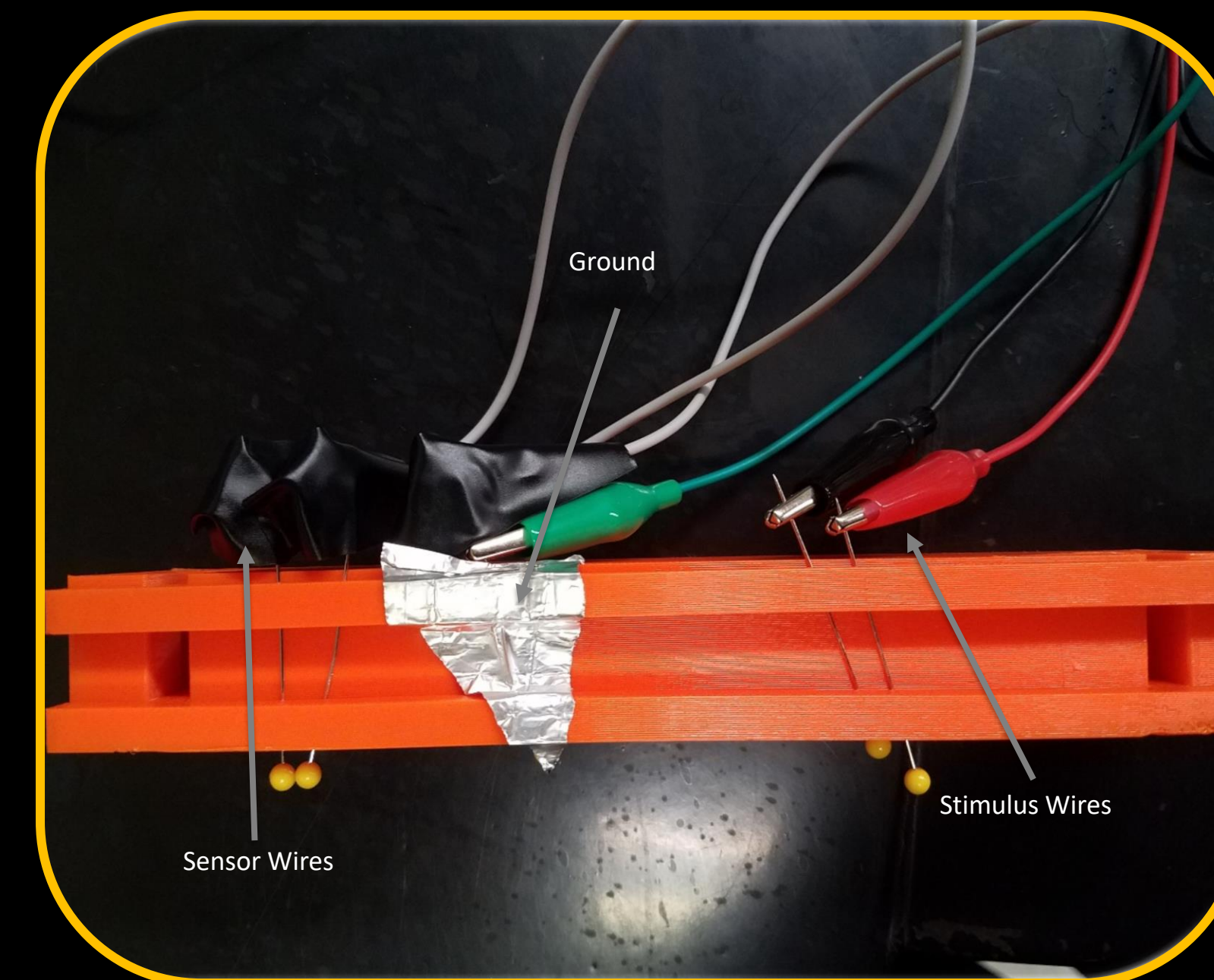
VALUE PROPOSITION:

- Neurobiology is a difficult subject to provide hands-on labs for
- Common lab - frog sciatic nerve preparation
- Understand how action potentials are generated within nerves
- Provide a hands on, visual lab to understand action potentials
- Live time measuring earthworm response
- Potential future use in intuitive prosthetics

PRODUCT DEVELOPMENT:



FINAL DESIGN:



PROJECT VALIDATION:

Electrical Simulator

- Not to exceed 10V supplied
- Variable frequency, not over 300 Hz

Amplifier

- Signal accurately showing millivolt scale changes in signal

Faraday Cage

- Reduced noise in signal in comparison to without cage

Worm bed

- Keeps worm laid out straight
- Places worm directly on signal needles

RECOMMENDATIONS:

1. Use wires that allow for better contact with worm bed pins
2. The use of an oscilloscope for visualization is more lab compatible

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- Lead Instructor: Dr. Russell Qualls
- Graduate Mentor: Sharjeel Jokhio

KEY REQUIREMENTS:

The unit will be capable of the following:

1. Supply an adjustable voltage to the probe of the unit
2. Introduce an electric stimulus to the earthworm with the probe
3. Capture the neural signals emitted by the earthworm's muscles when the stimulus is received
4. Display the degree of the signal
5. Record the signals received graphically and numerically

Electrical Requirements:

- During the operation, the system will release a voltage between 0V to 10V
- During the operation, the system will be connected to a computer/battery
- Power source needs to be reliable and stable



2023 Capstone Project

