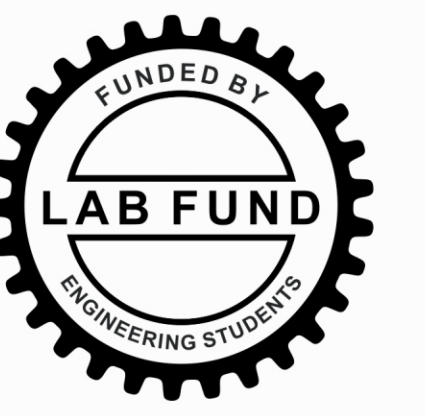# NeuroMat
A screening tool for monitoring nervous system health

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BACKGROUND

• The spinal cord contains spinal nerves that communicate with the brain to make up the central nervous system [1].
• Nerve conduction studies (NCS) can determine the health of a patient's nervous system by measuring nerve transmission velocity.
• Velostat is an electrically conductive piezoresistive material [2].
• Pressure mapping systems determine distribution of contact pressure.

PROBLEM DESCRIPTION

• There are no current recommendations for neurological health screening during physical examinations [3].
• Neurological damage and diseases impact up to one billion people worldwide [4].
• Medical errors are classified as being the third leading cause of death in the United States [5].
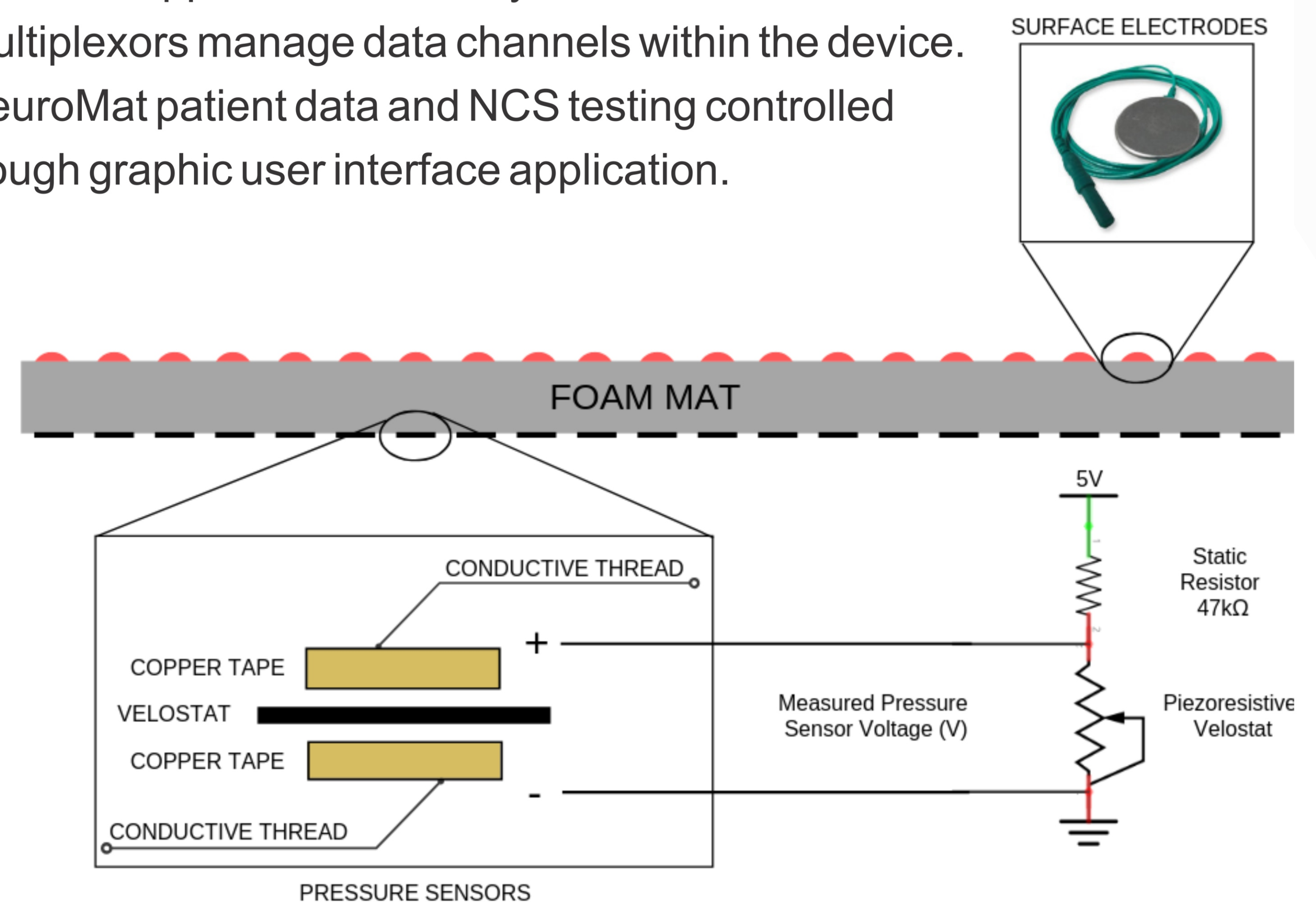
PROCESS WORKFLOW
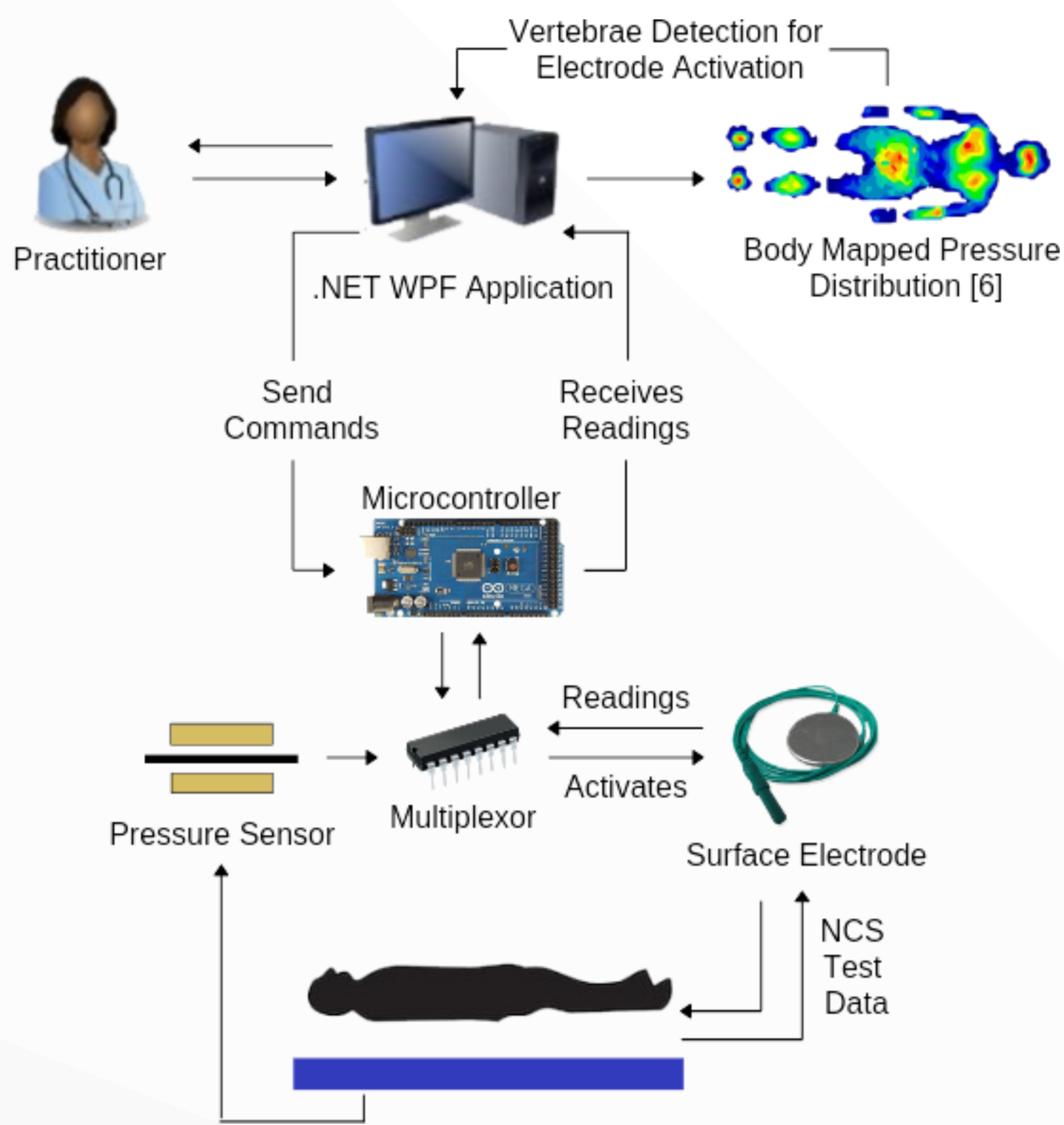
FUTURE WORK

• Full scale prototype at a higher pressure sensor resolution to achieve accurate pressure mapping.
• Inclusion of active surface electrodes for NCS testing.
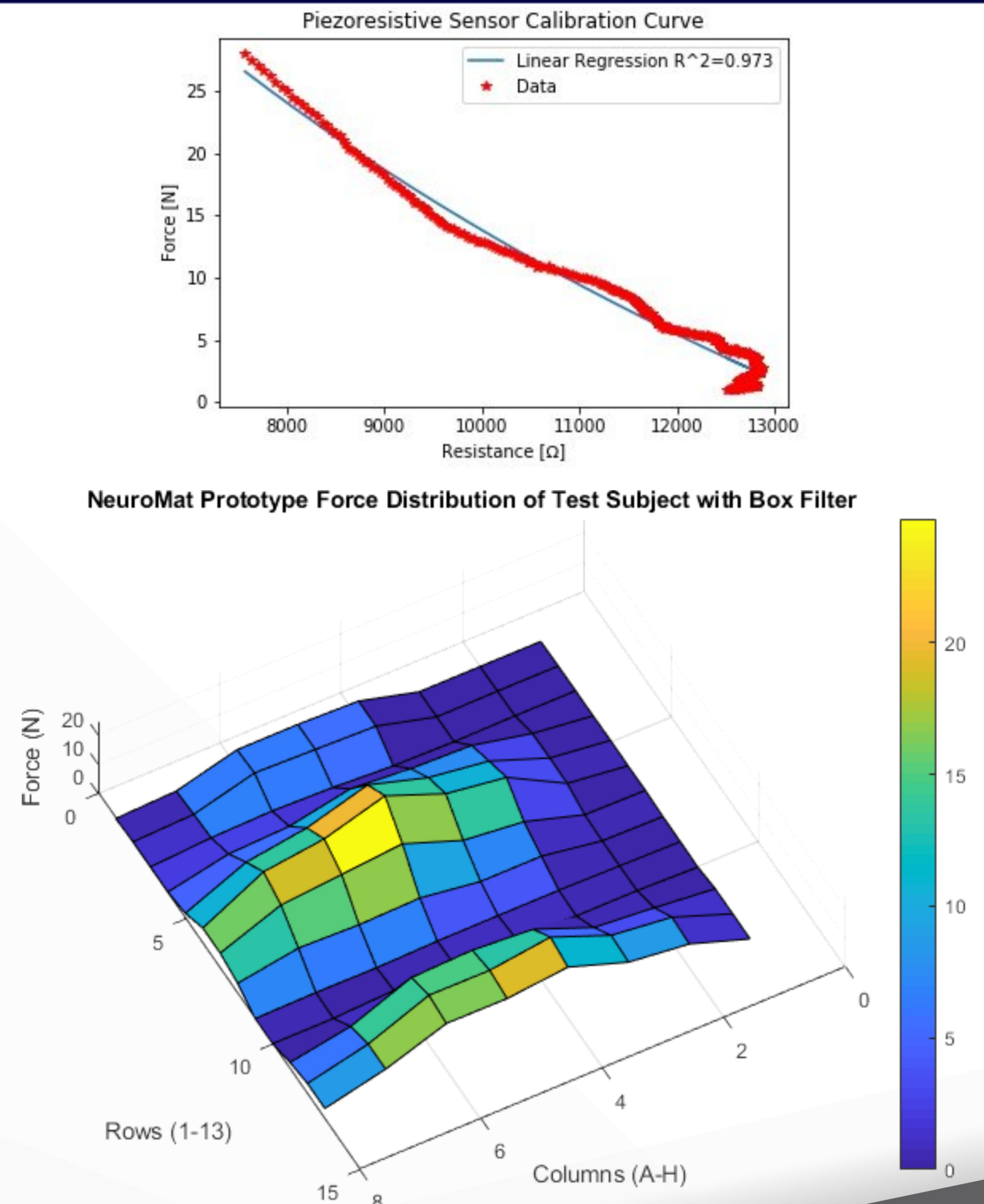• Refine manufacturing techniques.

OBJECTIVES

• Create an automated device that maps out a person's supine body surface and perform stimulating nerve monitoring tests.
• Develop a solution that can withstand daily wear and can be sanitized.

FINAL DESIGN

• Piezoresistive pressure sensors create a pressure distribution map.
• Active surface electrodes stimulate spinal nerves and perform a NCS.
• A microcontroller interfaces with pressure sensors to send data to a software application and relay data back to activate surface electrodes.
• Multiplexors manage data channels within the device.
• NeuroMat patient data and NCS testing controlled through graphic user interface application.

PROTOTYPE TEST RESULTS

Piezoresistive Sensor Calibration Curve

Linear Regression R^2=0.973

NeuroMat Prototype Force Distribution of Test Subject with Box Filter

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Biomedical

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