

**FEBRUARY 2023**



# [HW-1]: Analysis of Peripheral Nerve Signals

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[EE-379K/385J]: NEURAL ENGINEERING

The University of Texas at Austin

## [HW-1 EE379K/385J] PNS: Peripheral Nerve Signals

### *Notes:*

- HW-1 is due on Feb 15<sup>th</sup>
- Please start early to make use of the QA sessions on Wednesdays before the deadline
- Discuss with others but submit your own work!
- Analyze your results concisely and comprehensively!
- We want to know your thoughts and suggestions!

## [HW-1 EE379K/385J] PNS: Peripheral Nerve Signals

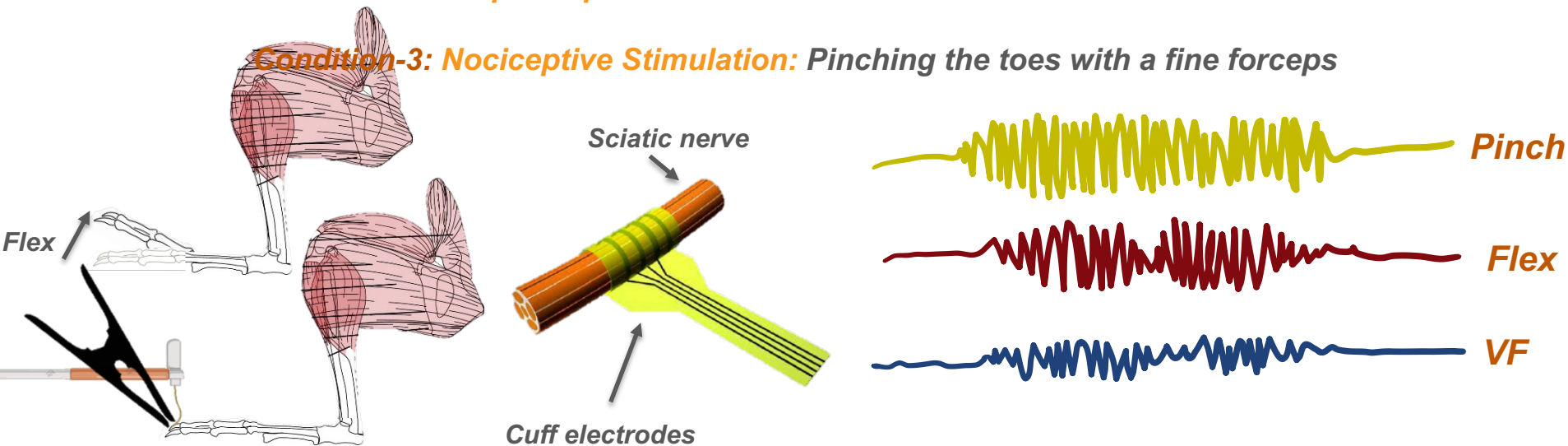
**Aim:** Identify sensory information from mixed nerves by using single-channel cuff electrodes!

**Experiment:** recording from the sciatic nerve of an anesthetized rat using cuff electrodes

**Condition-1: Mechanical Stimulation:** Von Frey (VF) filaments stimulation of plantar skin

**Condition-2: Proprioceptive Stimulation:** Passive flexion of the toes

**Condition-3: Nociceptive Stimulation:** Pinching the toes with a fine forceps



## [HW-1 EE379K/385J] PNS: Peripheral Nerve Signals

**Aim:** *Identify sensory information from mixed nerves by using single-channel cuff electrodes!*

**Data:** *data.mat file*

**fs** = 20 KHz

**VF.signal:** *time series of the nerve signal*

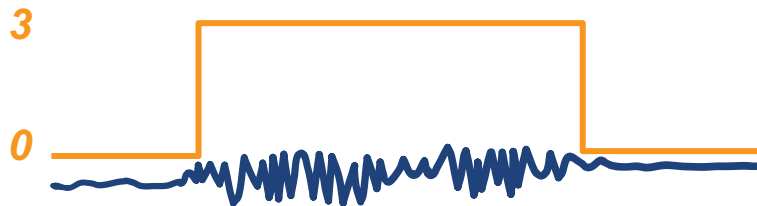
**VF.trigger:** *labels for VF Stimulus / Rest*

**Flex.signal:** *time series of the nerve signal*

**Flex.trigger:** *labels for Flex Stimulus / Rest*

**Pinch.signal:** *time series of the nerve signal*

**Pinch.trigger:** *labels for Pinch Stimulus / Rest*

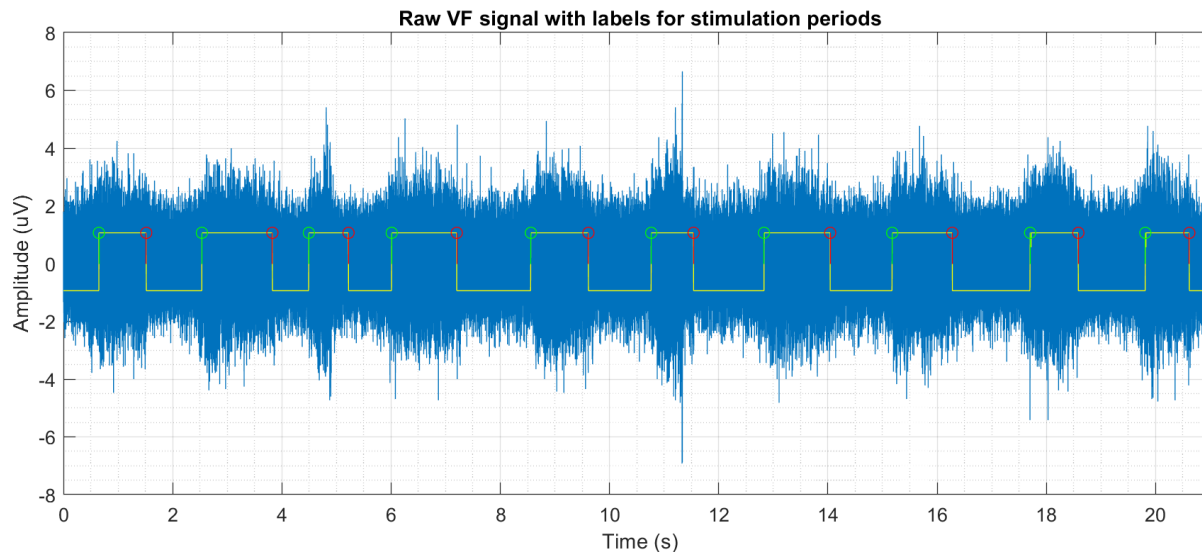


## [HW-1 EE379K/385J] PNS: Peripheral Nerve Signals

**Aim:** Identify sensory information from mixed nerves by using single-channel cuff electrodes!

**Tasks:** I) Pre-processing

Use ***c1\_dataVis.m*** to plot the signals with the triggers/labels

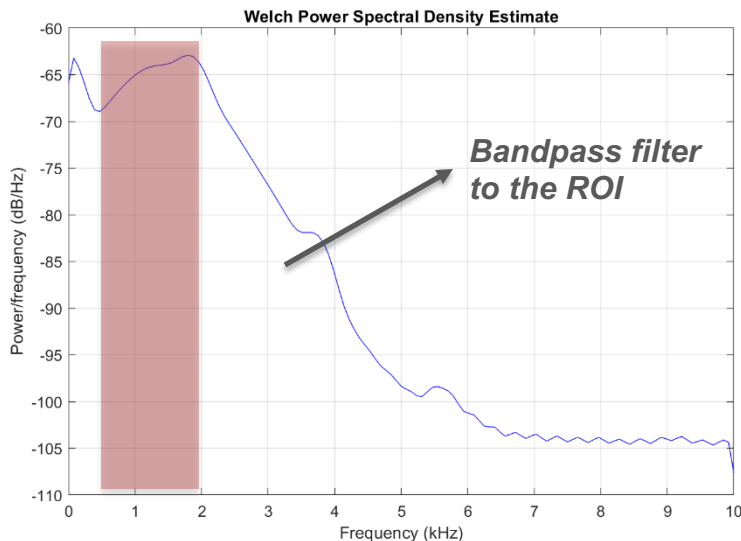


## [HW-1 EE379K/385J] PNS: Peripheral Nerve Signals

**Aim:** Identify sensory information from mixed nerves by using single-channel cuff electrodes!

**Tasks:** I) Pre-processing

Use **c1\_dataVis.m** to plot the PSD estimates of the signals



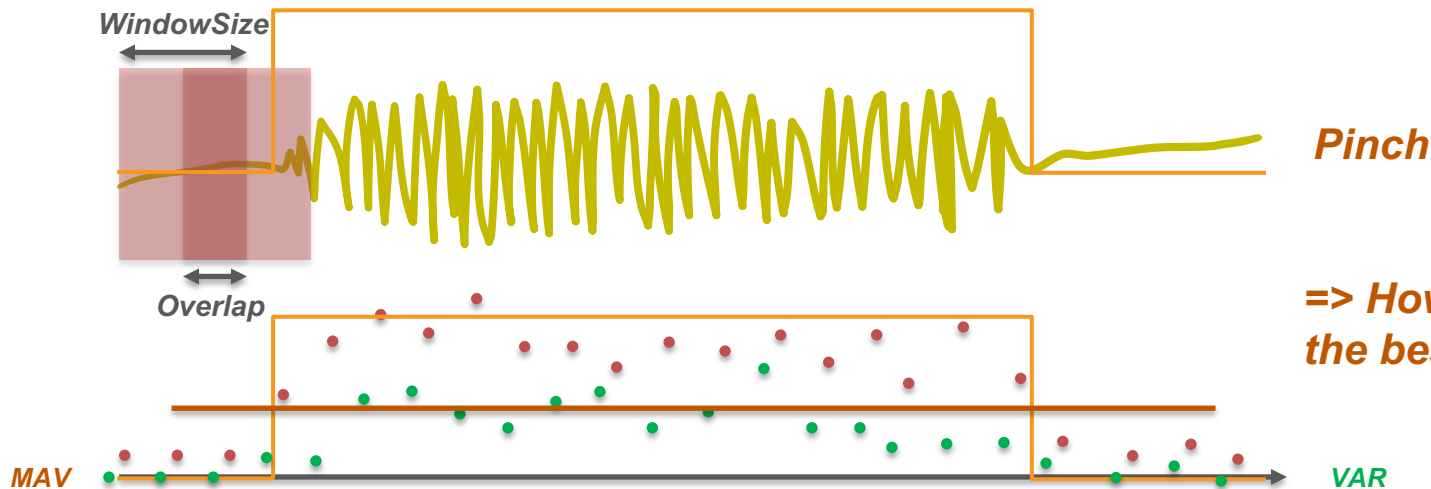
## [HW-1 EE379K/385J] PNS: Peripheral Nerve Signals

**Aim:** Identify sensory information from mixed nerves by using single-channel cuff electrodes!

**Tasks: II) Feature Extraction/Selection: use filtered signals**

MAV: Mean Absolute Value

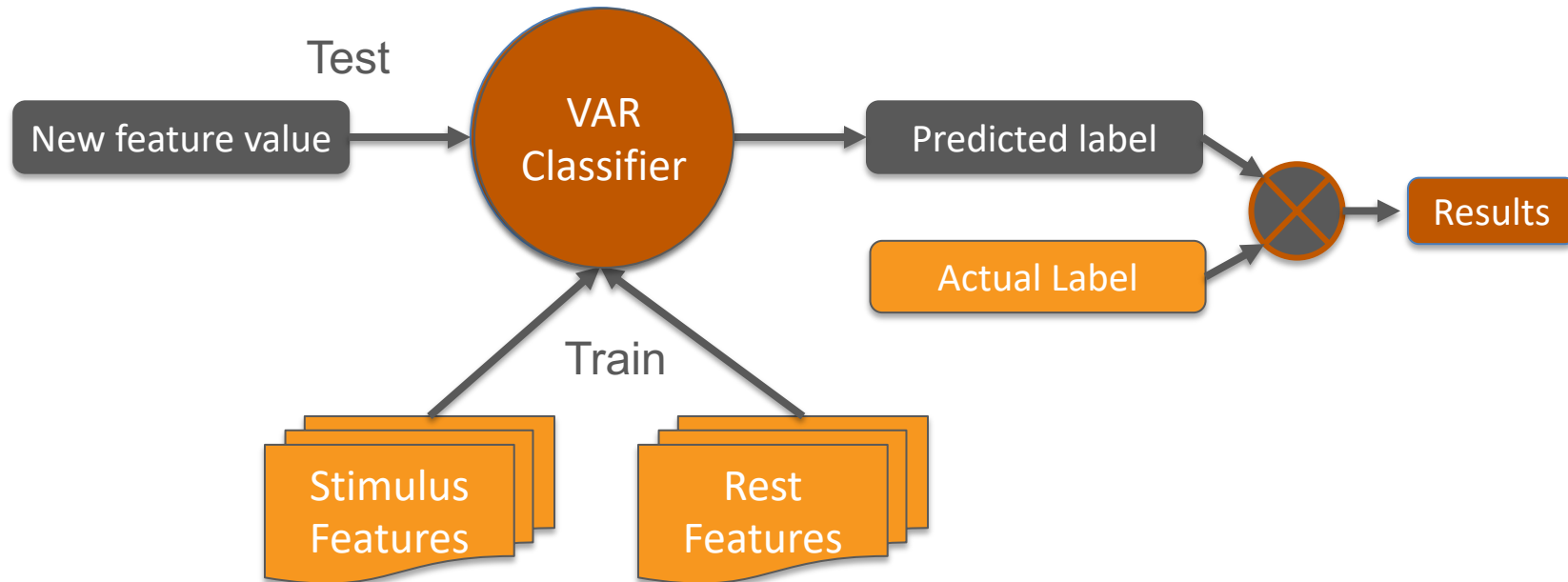
VAR: Variance



## [HW-1 EE379K/385J] PNS: Peripheral Nerve Signals

**Aim:** Identify sensory information from mixed nerves by using single-channel cuff electrodes!

**Tasks:** III) Classification



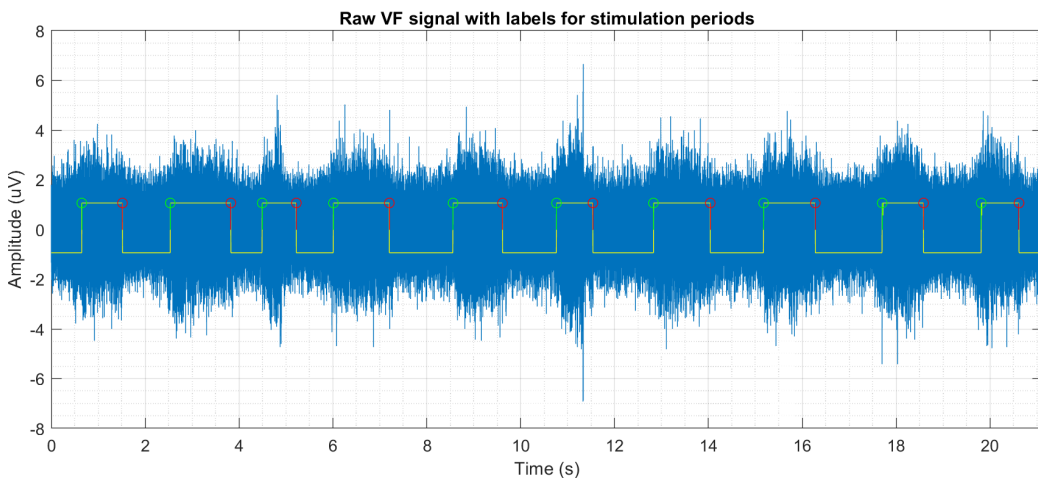


## [HW-1 EE379K/385J] PNS: Peripheral Nerve Signals

**Aim:** Evaluate the accuracy of our model for future prediction

**Tasks:** III) Classification accuracy

**Cross validation:** Nerve signals spectral components change over time



		True Class	
		Positive	Negative
Predicted Class	Positive	TP	FP
	Negative	FN	TN