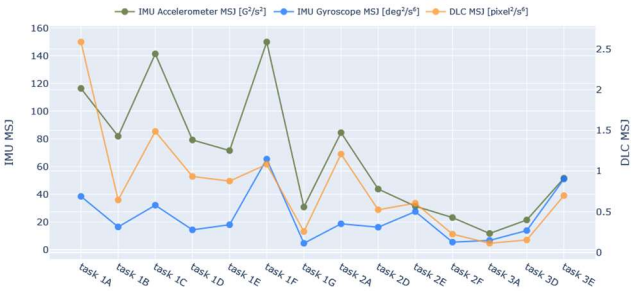
Design and Implementation of a Vision-Based Deep-Learning Protocol for Kinematic Feature Extraction with Application to Stroke Rehabilitation

Presented by: Juan Luna

Committee Members: Dr. Eric Espinoza-Wade (Chair), Dr. Stephen Klisch, Dr. Helen Yu



Stroke is a leading cause of long-term disability, affecting thousands of individuals annually and significantly impairing their mobility, independence, and quality of life. Traditional methods for assessing motor impairments are often costly and invasive, creating substantial barriers to effective rehabilitation. This thesis explores the use of DeepLabCut (DLC), a deep-learning-based pose estimation tool, to extract clinically meaningful kinematic features from video data of stroke survivors with upper-extremity (UE) impairments.

To conduct this investigation, a specialized protocol was developed to tailor DLC for analyzing movements characteristic of UE impairments in stroke survivors. This protocol was validated through comparative analysis using peak acceleration (PA), mean squared jerk (MSJ), and area under the curve (AUC) as kinematic features. These features were extracted from DLC and compared to those of the assumed ground truth data from IMU sensors worn by the participants.

A Thesis Defense in Mechanical Engineering
California Polytechnic State University, San Luis Obispo

Wednesday, June 5, 2024, at 1:00 PM
Building 13-124B

Zoom Meeting Link: https://calpoly.zoom.us/j/89136130819
Zoom Meeting ID: 891 3613 0819