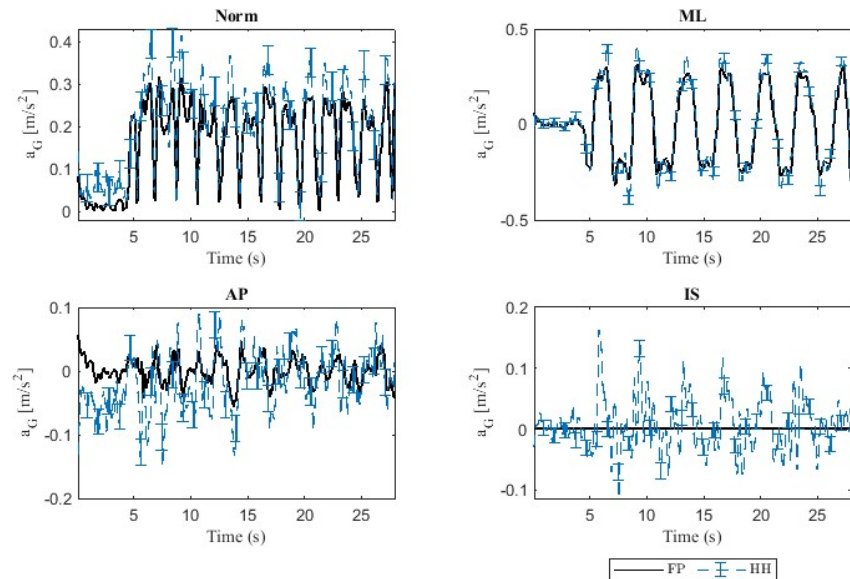


VALIDATION OF MOBILE DEVICES IN ARBITRARY LOCATIONS AGAINST FORCE PLATE STANDARD BALANCE ASSESSMENT

Presented By: Jack Ellsworth

Committee: Dr. Eric Ocegueda (Chair, ME), Dr. Britta Berg-Johansen (BMED),
Dr. Steve Klich (ME)



With balance assessment being essential to the prediction of fall risk and detection and assessment of motor disorders, increasing clinical accessibility to objective balance metrics is essential. Work has been done validating center of mass (COM) acceleration metrics against well regarded force plate center of pressure (COP) position standards for mobile device data acquisition systems, but most research is restricted to devices being close to the COM or strapped in a harness configuration. Through the use of rigid body kinematics and the inverted pendulum model, this study develops novel methodology for calculating COM acceleration using mobile devices in arbitrary positions, as well as a novel approach to validation through direct comparison of COP position predictions to force plate measurements. Validation of this methodology included comparison of smartphone and force plate results for COM accelerations and COP positions. Results showed good analysis performance for both approaches during subject intentional swaying, but results were limited in cases of little motion where good balance was observed.

A Master's Thesis Defense in Mechanical Engineering
California Polytechnic State University

Friday, August 30th, 2024, 9:30AM

Building 13, Room 124B

Zoom Meeting ID: 883 7459 6895 / <https://calpoly.zoom.us/j/88374596895>