VIPUL LUGADE, PhD
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SUMMARY

I am a biomechanist, engineer, and data scientist with expertise in software development, managing various research groups and collaborators, mentoring students, as well as the utilization of diverse analysis techniques to solve a variety of problems related to physical systems. I have demonstrated the ability to solve difficult problems across a range of research topics with my current research primarily focused on improving health outcomes through the development of non-invasive mobile health care technology using remote sensing of human movement. Current topics of interest include body-worn sensors, motion analysis to diagnose concussions in adolescents and falls in the elderly, and the utilization of diverse large-scale datasets to optimize diagnosis and recommend intervention or rehabilitation. U.S. Citizen.

SKILLS

- o Expertise in using, troubleshooting, and validating motion capture systems, instrumented walkways, dynamometers, electromyography, force plates, instrumented treadmills, and body worn monitors or IMUs.
- o Proficiency in MATLAB, Android, Swift, Java, Python, PHP, SQL, JavaScript, CSS, HTML, Git.
- o Expertise in statistical modeling, machine learning techniques, and analysis of large multivariate data sets.
- o Adept at generating grant proposals, receiving federal funding, designing studies, performing data collections and analysis, as well as submitting results for publication in peer-reviewed journals.

EXPERIENCE

Associate Professor
Director, Motion Analysis Research Laboratory   Sept 2021 – Present
Binghamton University, *Vestal, NY*

- Lead clinical, teaching, and research efforts in evaluating the biomechanics of human movement among young and older adults in a state-of-the-art research motion analysis laboratory.
- Development of rehabilitation and individualized intervention for young adults who suffer a mild traumatic brain injury and among older adults who are at risk of falling.
- Utilization of mobile technology to provide clinical and movement analysis services to rural and under-represented populations.
- Establish large normative datasets of gait and balance control from collaborations across campus, domestic, and international communities.
- Evaluate the effect of single- and dual-task paradigms on maintaining balance and responding to cognitive tasks during activities of daily living.
- Assess the longitudinal effect of orthopedic intervention on gait and balance control among patients undergoing total joint replacement.

President, Data Scientist   Aug 2010 - Present
Control One LLC, *Atlanta, GA*

- Development of Android and iOS smartphone applications to analyze dual-task gait, postural control, and cognitive performance. Applications have been generated to diagnose and evaluate adolescents with traumatic brain injury, adults with facioscapulohumeral muscular dystrophy, and elderly fallers.
- Creator of a web platform (www.gaitanalyzer.com) which allows for the dissemination of gait, postural, and cognitive data. Platform will be used to establish a large-scale normative database, with the development of advanced data-driven models on the platform using machine learning to further optimize diagnosis and disease monitoring.

- Development of a gait database which utilizes real-time accelerometer-derived data from smartphones to investigate walking characteristics across location, gender, and age using Android, Swift, PHP, and MySQL.
- Web-based analysis of neuroimaging data for TReNDS Center and Georgia State University.
- Mobile and remote monitoring of trunk activity and seating pressure for wheelchair users with spinal cord injury in collaboration with the Mayo Clinic.
- Development of Android application to acquire, analyze and record raw sensor data.
- Analysis of large data sets using python for the Mind Research Network.
- Built automation tools to evaluate financial data in MATLAB and Python for Autumn Wind Asset Management Inc.
- Creation of a Javascript-based site to read and display motion detection patterns from a residential environment for Gamers Digital.
- Using CGAL and MATLAB, developed software to produce caustic art for NearNow, Broadway.
- Identified the location, size, and depth of bruises in mangos using pulsed phase thermography in MATLAB for the University of Hohenheim.
- Development of weightlifting video analysis software to track barbell movement.
- Designed MATLAB-based shoulder movement visualization from CT scans for Mayo Clinic.
- Creator of a blog (www.matlabgeeks.com) on MATLAB programming which generates more than 40,000 visitors per month.

Research Collaborator   Oct 2013 – Present

Mayo Clinic, *Rochester, MN* &
Chiang Mai University, *Chiang Mai, Thailand*
- Development of Android application for measuring center of mass sway during stance.
- Continued methodological means of assessing gait from accelerometer-based devices.
- Investigation of dual-task and single-task balance and cognitive training in elderly adults with balance impairment.

Graduate Teaching Fellow   Sept 2005 - July 2011

University of Oregon, *Eugene, OR*
- Lab manager and lecturer for undergraduate Biomechanics.
- Lab instructor for undergraduate Biomechanics, Musculoskeletal Anatomy, and Internal Organs.
- Instructor for undergraduate and graduate level Human Anatomy Dissection course.
- Instructor and course developer for undergraduate and graduate level course: Advanced Techniques in Movement Science.

Systems Engineer   Sept 2002 - Aug 2005

Cryptek Inc., *San Diego, CA*
- Development of ultra thin-client systems utilizing Java smartcard, Trusted Solaris, Solaris, and Citrix.
- Test and integration of hardware based, IPSec VPN network security solutions.

Wireless Systems Intern   June 2001 - Sept 2001

Texas Instruments, Wireless Division, *San Diego, CA*
- Development of wireless base station searcher algorithms in MATLAB.

Lab Assistant   June 1998/99 - Aug 1998/99

Electron Scattering Lab, University of Nebraska, *Lincoln, NE*
- Designed test equipment and assisted in electron scattering data collections.

Lab Intern   June 1997 - Aug 1997

Optical Physics Lab, University of Oregon, *Eugene, OR*

- Generated animated images using a helium-neon laser and a programmable acousto-optic modulator.

EDUCATION

Whitaker International Scholar   Oct 2013 - Oct 2015

Chiang Mai University, Chiang Mai, Thailand

Postdoctoral Research Fellow

- Evaluated differences in gait strategies among US and Thai elderly adults.
- Investigated effects of mindfulness meditation on gait and cognitive performance during dual-task walking.

Mayo Clinic   Sept 2011 - Sept 2013

Rochester, MN

Postdoctoral Research Fellow

- Detected and validated free-living activity and posture using accelerometers.
- Defined dynamic measures of stability during gait.
- Assessed effect of marker misplacement at the knee on gait kinematics.
- Validated center of pressure using an instrumented treadmill.

University of Oregon   Dec 2007 - July 2011

Eugene, OR

Ph.D. in Biomechanics

- Gait assessment of elderly adults.
- Defined interaction of center of mass and base of support during gait.
- Use of k-means clustering, Gaussian mixture models, and artificial neural networks to discriminate healthy and balance impaired older adults.
- Dual-task evaluation of elderly adults with balance impairment.

University of Oregon   Sept 2005 - Dec 2007

Eugene, OR

M.S. in Biomechanics

- Assessed longitudinal performance of adults undergoing total hip arthroplasty.
- Evaluated balance control, gait asymmetry and gait kinematics of adults prior to and following an anterior or lateral approach total hip arthroplasty.

Harvey Mudd College   Sept 1998 - May 2002

Claremont, CA

B.S. in Engineering

RESEARCH SUPPORT

1 R43 NS108823-01A1, NINDS   Oct 2019 - Mar 2021

Principal Investigator: Vipul Lugade, Ph.D.

A Novel Smartphone-based Tool to Quantify Dual-task Gait Performance for Concussion Assessment

Whitaker International Scholar   Oct 2013 - Oct 2015

Principal Investigator: Vipul Lugade, Ph.D.

The Effect of Mindfulness Meditation on Cognitive Performance and Balance Control during Gait

5 T32 HD007447 20, NICHD   Sept 2011 - Sept 2013
Principal Investigator: Jeffrey R. Basford, M.D., Ph.D.
Role: Postdoctoral Research Fellow
Mayo Rehabilitation Research Training Grant

Betty Foster McCue Graduate Scholarship   2010
Principal Investigator: Vipul Lugade
Functional Decline and Intervention during Aging and its Effect on Fall Risk in the Elderly

Jan Broekhoff Graduate Scholarship   2009
Principal Investigator: Vipul Lugade
Balance Control during Gait in the Elderly

Student Dissertation Award, International Society of Biomechanics   2009
Principal Investigator: Vipul Lugade
Assessment of Fall Risk using Postural Control and Stability during Gait

1 R01 AG021598-01, NIH   2005-2010
Principal Investigator: Marjorie Woollacott, Ph.D.
Role: Graduate Teaching Fellow
Age Related Changes in Posture and Movement

AWARDS AND HONORS

2017	Outstanding reviewer – Journal of Biomechanics, Gait and Posture
2016	Outstanding reviewer – Archives of Physical Medicine and Rehabilitation
2013	Whitaker International Scholar, Whitaker International Program
2012	Kelly Award Nominee, Motion Analysis Laboratory, Mayo Clinic
2012	Mayo Clinic Biomechanics Research Fellows Coordinator
2011 – 2012	NIH T32 Training Grant Fellowship
2011	Commencement Speaker, Human Physiology, University of Oregon
2007	Excellence in Clinical Research. Slocum Center for Orthopedics and Sports Medicine
2002	Who's Who among Students in American Universities and Colleges
2002	Graduation with Honors from Harvey Mudd College
1998 - 2002	Dean's List, Harvey Mudd College
1998 - 2002	Robert C. Byrd Scholarship

PATENTS

Kaufman K, Morrow M, Lugade V, Fortune E. *Apparatus and method for identifying movement in a patient.* US 2015/0032033 A1. Jan 29, 2015.

PROFESSIONAL SERVICE

Reviewer: Peer-reviewed articles submitted to the following journals.

Archives of Physical Medicine and Rehabilitation
Biomedical Physics and Engineering
Current Aging Science
Frontiers in Sports and Active Living
Gait and Posture
IEEE J Biomedical and Health Informatics
Journal of Biomechanics
Journal of Engineering in Medicine
Journal of Musculoskeletal Research
Medical Engineering and Physics
Physiological Measurement
PLOS One
Sensors

Editorial Board, Frontiers in Sports and Active Living
    2018 - Present

Invited Lecturer
    Jan 2018 - Special Topics – Data Processing and MATLAB
        Department of Physical Therapy, Chiang Mai University, *Chiang Mai, Thailand*
    Feb 2017, Jan 2018 - Smartphone-based Measurement Tools
        Department of Physical Therapy, Chiang Mai University, *Chiang Mai, Thailand*
    Nov 2016 - Biomechanics of Locomotion.
        Department of Physical Therapy, Chiang Mai University, *Chiang Mai, Thailand*
    Feb 2015, Jan 2016, Feb 2017 - Instrumentation and Biomechanical Assessment of Elderly Fallers
        Department of Physical Therapy, Chiang Mai University, *Chiang Mai, Thailand*

PEER-REVIEWED PUBLICATIONS

Lugade V, Kuntapun J, Prupetkaew P, Boripuntakul S, Verner E, Silsupadol P. *Three-day remote monitoring of gait using a smartphone among young adults and older adults with and without a history of falls.* J Aging Phys Act, 2021, Aug: 1-8.

Tabsuri T, Thawinchai N, Peansukmanee S, Lugade V. *Trunk and pelvis biomechanical responses in children with cerebral palsy and with typical development during horseback riding.* Gait Posture, 2021, 89:115-119.

Howell D, Seehusen C, Wingerson M, Wilson J, Lynall R, Lugade V. *Reliability and minimal detectable change for a smartphone-based motor-cognitive assessment: implications for concussion assessment.* J App Biomech, 2021, July:1-8.

Kuntapun J, Silsupadol P, Kamnardsiri T, Lugade V. *Smartphone monitoring of gait and balance during irregular surface walking and obstacle crossing.* Front Sports Act Living, 2020.

Breloff S, Bachman J, Lugade V, Stuka A. *The effect of blood glucose on quiet standing balance in young healthy individuals.* Biomed Eng, 2020, 32:2.

Howell D, Lugade V, Potter M, Walker G, Wilson J. *A multifaceted and clinically viable paradigm to quantify postural control impairments among adolescents with concussion.* Physiol Meas, 2019.

Silsupadol P, Prupetkaew P, Kamnardsir T, Lugade V. *Smartphone-based assessment of gait during straight walking, turning, and walking speed modulation in laboratory and free-living environments.* IEEE J Biomed Health Inform, 2019.

Howell D, Lugade V, Taksir M, Meehan W. *Determining the utility of a smartphone-based gait evaluation for possible use in concussion management.* Phys Sportsmed, 2019, 1-6.

Prupetkaew P, Lugade V, Kamnardsiri T, Silsupadol P. *Cognitive and visual demands, but not gross motor demands, of concurrent smartphone use affect laboratory and free-living gait among young and older adults.* Gait Posture, 2019, 68:30-36.

Silsupadol P, Teja K, Lugade V. *Reliability and validity of a smartphone-based assessment of gait parameters across walking speed and smartphone locations: body, bag, belt, hand, and pocket.* Gait Posture, 2017, 58: 516-522.

Simon A-L, Lugade V, Bernhardt K, Larson A N, Kaufman K. *Assessment of stability during gait in patients with spinal deformity - A preliminary analysis using the dynamic stability margin.* Gait Posture, 2017, 55:37-42.

Fortune E, Lugade V, Crenshaw J, Kaufman K. *Dynamic assessment of center of pressure measurements from an instrumented treadmill with controlled precision.* Med Eng Phys, 2017, 42:99-104.

Wongcharoen S, Sungkarat S, Munkhetvit P, Lugade V, Silsupadol P. *Home-based interventions improve trained, but not novel, dual-task balance performance in older adults: A randomized controlled trial.* Gait Posture, 2017, 52:147-152.

Wongcharoen S, Munkhetvit P, Sungkarat S, Lugade V, Silsupadol P. *The effect of walking task contexts on dual-task walking performance among older adults.* Thai J Phys Ther, 2017: 103-113.

Jensen E, Lugade V, Crenshaw J, Kaufman K. *A principal component analysis approach to correcting the knee flexion axis during gait.* J Biomech, 2016. 49(9): 1698-1704.

Fortune E, Lugade V, Amin S, Kaufman K. *Step detection using multi- versus single tri-axial accelerometer-based systems.* Phys Meas, 2015, 36(12):2519.

Lugade V, Chen T, Erickson C, Fujimoto M, San Juan J, Karduna A, Chou L-S. *Comparison of an Electromagnetic and Optical System during Dynamic Motion.* Biomedical Engineering, 2015, 25(5): 1550041.

Lugade V, Kaufman K. *Center of pressure trajectory during gait: a comparison of four foot positions - Short Communication.* Gait Posture, 2014. 40(4): 719-722.

Fortune E, Lugade V, Kaufman K. *Posture and Movement Classification: The Comparison of Tri-Axial Accelerometer Numbers and Anatomical Placement.* J Biomech Eng-T ASME, 2014. 136(5): 051003.

Lugade V, Farley A, Lin V, Chou L-S. *An Artificial Neural Network Estimation of Gait Balance Control in the Elderly using Clinical Evaluations.* PLOS One, 2014. 9(5).

Morrow M, Hurd W, Fortune E, Lugade V, Kaufman K. *Accelerations of the Waist and Lower Extremities Over a Range of Gait Velocities to Aid in Activity Monitor Selection for Field-Based Studies.* J Appl Biomech, 2014, 30(4): 581-585.

Lugade V, Kaufman K. *Dynamic stability margin using a marker based system and Tekscan: A comparison of four foot positions during gait – Short Communication.* Gait Posture, 2014. 40: 252-254.

Fortune E, Lugade V, Morrow M, Kaufman K. *Validity of using tri-axial accelerometers to measure human movement - Part II: Step Count Validation during Walking and Jogging.* Med Eng Phys, 2014. 36:659-669.

Lugade V, Fortune E, Morrow M, Kaufman K. *Validity of using tri-axial accelerometers to measure human movement - Part I: Posture and Movement Detection.* Med Eng Phys, 2014. 36:169-176.

Lugade V, Lin V, Chou L-S. *Center of mass motion and base of support interaction during gait.* Gait Posture, 2011. 33(3): 406-411.

Lugade V, Wu A, Jewett B, Collis D, Chou L-S. *Gait Asymmetry following an Anterior and Anterolateral Approach to Total Hip Arthroplasty.* Clin Biomech, 2010. 25(7): 675-680.

Klausmeier V, Lugade V, Collis D, Jewett B, Chou L-S. *Is There Faster Recovery with an Anterior or Anterolateral THA? A Pilot Stody.* Clin Orthop Relat Res, 2010. 468(2):533-541.

Silsupadol P, Lugade V, Shumway-Cook A, van Donkelaar P, Chou L-S, Mayr U, Woolacott M. *Training-related Changes in Dual-task Walking Performance of Elderly Persons with Balance Impairment: A Double-blind, Randomized Controlled Trial.* Gait Posture, 2009. 29(4):634-639.

Silsupadol P, Shumway-Cook A, Lugade V, van Donkelaar P, Chou L-S, Mayr U, Woolacott M. *Effects of Single- vs. Dual-task training on Balance Performance in Older Adults: A Double-blind, Randomized Controlled Trial.* Arch Phys Med Rehab, 2009. 90(3):381-387.

Lugade V, Klausmeier V, Jewett B, Collis D, Chou L-S. *Short-term Recovery of Balance Control after Total Hip Arthroplasty.* Clin Orthop Relat Res, 2008. 466(12):3051-3058.

Siu K, Lugade V, Chou L-S,van Donkelaar P, Woollacott M. *Dual-task Interference During Obstacle Clearance in Healthy and Balance-impaired Older Adults.* Aging Clin Exp Res, 2008. 20(4): p. 349-354.

Complete list of published work in MyBibliography:
https://www.ncbi.nlm.nih.gov/myncbi/1jWzc55d8lkAj/bibliography/public/