Tim Yang

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Education

- **PhD Candidate, Kinesiology, University of Illinois Urbana-Champaign (UIUC)** ≈2024
  - TITLE Computational rehabilitation for power seating and mobility
  - PI Yih-Kuen Jan, PT, PhD
- Certificate, Information Accessibility Design and Policy, UIUC 2019
- Certificate, Foundations in Teaching, UIUC 2017
- **BS, Computer Science, University of Central Oklahoma** 2012

Positions

- Sr Instructional Designer, Department of Computer Science, UIUC 2020+
- Fellow, Microsoft Lighthouse Program, UIUC 2018–2020
- Research Assistant, Rehabilitation Engineering Lab, UIUC 2012–2018
- Teaching Assistant, Department of Kinesiology, UIUC 2015–2016

Awards

- Finalist, Image of Research Competition, UIUC 2019
- **Microsoft Graduate Fellowship,** Microsoft Lighthouse Program, UIUC 2018
- 1st Place, Research Live Competition, UIUC 2018
- **Best Paper,** Student Paper Competition, Annual RESNA Conference 2015
- Honorable Mention Paper, Student Paper Competition, Annual RESNA Conference 2015
- 2nd Place, David Kuck Computational Science and Engineering Poster Competition, UIUC 2014
- Honorable Mention Paper, Student Paper Competition, Annual RESNA Conference 2014
- NIH Summer Research Scholarship, NIH INBRE Program, OUHSC 2012
- Outstanding Research Award, Department of Computer Science, UCO 2012

Research

Assistantship

- **Rehabilitation Engineering Lab, UIUC** 2012–2018
  - **Pressure ulcer risk model** PYTHON TEKSCAN
    Developed machine learning pipeline (nonnegative matrix factorization and stochastic gradient descent) to predict pressure ulcer risk from glute pressure maps in people with spinal cord injury
  - **Personalized power mobility model** MATLAB ARDUINO KINECT
    Developed probabilistic model (Markov decision process) to assess power mobility from joystick excursions and environmental context
  - **Joystick control model** MATLAB PYTHON BIOPAC
    Developed task-based driving model (vector autoregression) and joystick-

based driving model (mRMR feature selection and XGBoost classification) to identify muscle synergies for joystick control

- **Personalized seat cushion** MATLAB ARDUINO PERIMED
  Developed custom wheelchair cushion with cell pressures controlled programmatically via electropneumatic transducers; collected laser Doppler flowmetry (LDF) and interface pressure mapping data to analyze custom inflation patterns
- **Power mobility monitoring** PYTHON RASPBERRY PI
  Developed cloud-based monitor and dashboard to track power wheelchair tilt and recline usage

• Rehabilitation Biomechanics Lab, Oklahoma Health Sciences Center 2011–2012

- **Wheelchair tilt and recline** SPSS TEKSCAN
  Collected and analyzed seating interface pressure data of people with spinal cord injury; performed one-way repeated measures ANOVA to evaluate interface pressure in response to wheelchair tilt and recline
- **Wheelchair acceleration** MATLAB ACTIGRAPH
  Collected and analyzed weeks-long accelerometer data of free-living power wheelchair driving by adolescents with cerebral palsy

Scholarship

• NIH Summer Research Program, Oklahoma Health Sciences Center SU 2012

- **Soft tissue indentation model** LABVIEW PERIMED BIOPAC
  Collected blood flow data of sacral tissue in response to mechanical indentation in people with spinal cord injury
- **Cytokine indentation animal model** LABVIEW ELISA
  Performed tissue indentation protocols on Sprague-Dawley rats; extracted necrotic tissue samples; performed ELISA to test cytokine response

Teaching

Fellowship

• Microsoft Lighthouse Program, UIUC 2018–2020

- Trained College of Engineering faculty on digital accessibility
- Developed MOOC content for assistive technologies
- Audited and remediated campus technologies for accessibility

Assistantship

• Rehabilitation Biomechanics, UIUC KIN 494 2015–2016

- Led hands-on labs to clarify points of confusion from lectures
- Designed activities around practical tools: EMG, ECG, accelerometers, (center of) pressure maps, force plates

• Drug Use and Abuse, UIUC CHLH 243 FA 2015

- Graded assignments, papers, and exams
- Provided formative feedback on papers, emphasizing critical thinking and academic writing

Mentorship

• International Graduate Mentor Program, UIUC 2018–2019

- Xiangfeng He, BS PHYSIOTHERAPY
- Jiacong Li, BS PHYSICAL EDUCATION
- Yana Wang, BS KINESIOLOGY
- Zheng Zhi, BS REHABILITATION SCIENCE

- Amy Zhu, BS REHABILITATION SCIENCE
- Xiaotong Zhu, BS KINESIOLOGY

• Independent Study, Department of Kinesiology, UIUC 2018
- Claudia Kolach I-HEALTH
- Hema Patel KINESIOLOGY
- Zaki Naqvi KINESIOLOGY

• MoST Scholars Program, UIUC 2014– 2016
- Yu-Ting Jiang BIOMEDICAL ENGINEERING
- Hoi-Ching Ko BIOMEDICAL ENGINEERING
- Li-Wen Zhang BIOMEDICAL ENGINEERING
- Yu-Chen Fa BIOMEDICAL ENGINEERING
- Yu-Xuan Huang BIOMEDICAL ENGINEERING
- Ling-Yi Wang BIOMEDICAL ENGINEERING

• Independent Study, Department of Mechanical Engineering, UIUC FA 2014
- Kevin Kibler MECHANICAL ENGINEERING

• Khorana Scholars Program, UIUC SU 2014
- Ann David, BTech BIOENGINEERING

• SN Bose Scholars Program, UIUC SU 2013
- Ameya Patil ELECTRICAL ENGINEERING

Publications

Journal

7 Ren S, Chen Z, Qin X, Zhao X, **Yang TD,** Zhu W. Measurement and evaluation of bone loading in physical activity: a systematic review. *Meas Phys Educ Exerc Sci.* 2021;25(2):149–162

6 **Yang TD,** Jan YK. Predicting pressure ulcer risk from seating interface pressure using nonnegative matrix factorization. *Med Biol Eng Comput.* 2020;58:227–237

5 Lung CW, **Yang TD,** Liau BY, Cheung WC, Jain S, Jan YK. Dynamic changes in seating pressure gradients in people with spinal cord injury. *Assist Technol.* 2020;32(5):277–286

4 Liao F, **Yang TD,** Wu FL, Cao CM, Mohamed A, Jan YK. Using multiscale entropy to assess the efficacy of local cooling on reactive hyperemia in people with spinal cord injury. *Entropy.* 2019;21(1):90 (12 pages)

3 Chen Y, Wang J, Lung CW, **Yang TD,** Crane B, Jan YK. Effect of wheelchair tilt and recline on ischial and coccygeal interface pressure in people with spinal cord injury. *Am J Phys Med Rehabil.* 2015;93(12):1019–1030

2 Lung CW, **Yang TD,** Crane B, Elliott J, Dicianno BE, Jan YK. Investigation of peak pressure index parameters for people with spinal cord injury using wheelchair tilt and recline: methodology and preliminary report. *Biomed Res Int.* 2014;2014:508583 (9 pages)

1 **Yang TD,** Hutchinson S, Rice LA, Watkin KL, Jan YK. Development of a scalable wireless monitoring system for wheelchair tilt usage. *Int J Phys Med Rehabil.* 2013;1(4):129 (6 pages)

Presentations

Talk

4 1ST PLACE Yang TD. On the road to self-driving … drivers? Presented at: *Research Live Competition;* October 2018; Urbana, IL

3 BEST PAPER Yang TD, Rice LA, David A, Hutchinson S, Jan YK. Myoelectric modeling of joystick control for adaptive smart wheelchairs. Presented at: *36th Annual RESNA Conference;* June 2015; Denver, CO

2 HONORABLE MENTION PAPER Yang TD, Patil A, Jan YK. Individualized performance quantification of power wheelchair driving. Presented at: *35th Annual RESNA Conference;* June 2014; Indianapolis, IN

1 Yang TD, Liao F, Jones MA, Jan YK. Effect of wheelchair tilt and recline on peak seating pressure in people with spinal cord injury. Presented at: *28th Annual Southern Biomedical Engineering Conference;* May 2012; University of Texas MD Anderson Cancer Center, Houston, TX

Poster

9 Yang TD, Rice LA, Jan YK. Typifying power wheelchair joystick control using EMG feature engineering and visualization. Presented at: *39th Annual RESNA Conference;* July 2018; Arlington, VA

8 Jan YK, Lung CW, Yang TD, Cheung W, Jain S. Seating pressure gradient vectors in response to wheelchair tilt and recline in people with spinal cord injury. Presented at: *93rd Annual American Congress on Rehabilitation Medicine;* November 2016; Chicago, IL

7 HONORABLE MENTION PAPER Yang TD, Kibler K, Lung CW, Jan YK. Development and evaluation of a programmable alternating pressure seat cushion. Presented at: *36th Annual RESNA Conference;* June 2015; Denver, CO

6 2ND PLACE Yang TD, Hutchinson S, Jan YK. Markov framework for power wheelchair driving. Presented at: *3rd Annual Computational Science and Engineering Meeting;* April 2014; UIUC, Urbana, IL

5 Yang TD, Hutchinson S, Rice LA, Watkin KL, Jan YK. Pressure ulcer prevention with the Raspberry Pi and Python. Presented at: *Center on Health, Aging, and Disability Symposium;* March 2013; UIUC, Champaign, IL

4 Yang TD, Liao F, Jones MA, Jan YK. Sitting-induced pressure ulcer risks may be reduced at specific tilt and recline angles. Presented at: *NIH INBRE Symposium;* July 2012; OUHSC, Oklahoma City, OK

3 Yang TD, Liao F, Jones MA, Jan YK. Effect of wheelchair tilt and recline on peak seating pressure in people with spinal cord injury. Presented at: *Allied Health Research Day;* April 2012; OUHSC, Oklahoma City, OK

2 Yang TD, Liao F, Jones MA, Jan YK. Effect of wheelchair tilt and recline on peak seating pressure in people with spinal cord injury. Presented at: *Graduate Research Education and Technology Symposium;* April 2012; OUHSC, Oklahoma City, OK

1 Yang TD, Fu J, Jones MA, Jan YK. Quantifying free-living power wheelchair usage using accelerometry. Presented at: *Oklahoma Research Day;* November 2011; Cameron University, Lawton, OK

Lecture

5 Yang TD, Bayles M, Thompson M. Accessible classroom materials. Presented at: *Graduate Academy for College Teaching, Center for Innovation in Teaching and*

Learning (CITL); August 2020; UIUC, Urbana, IL

4 Yang TD. Autonomous machines or autonomous people? Presented at: *Physical Activity Research Methods (KIN 201);* November 2018; UIUC, Urbana, IL

3 Yang TD, Angrave L. Digital accessibility for all. Presented at: *Teaching Professionals Program (TPro2), Academy for Excellence in Engineering Education (AE3);* October 2018; UIUC, Urbana, IL

2 Yang TD. Decoding pressure ulcer risk from seating interface pressure using matrix factorization. Presented at: *Rehabilitation Biomechanics Seminar;* February 2018; UIUC, Champaign, IL

1 Yang TD. Markov modeling of power wheelchair driving. Presented at: *Rehabilitation Biomechanics Seminar;* October 2013; UIUC, Champaign, IL

Service

Intramural

- CS Accessibility Liaison, Illinois Accessibility Liaison Program, UIUC — 2019+
- Judge, Research Live Competition, UIUC — FA 2019
- Language/Conversation Partner, Department of Accountancy, UIUC — SU 2018
- Grader, Illinois State Math Finals, Department of Mathematics, UIUC — 2014–2016

Extramural

- Referee, PLOS ONE — 2018+
- Referee, Annual RESNA Conference — 2015+

Professional

- Member, RESNA — 2013–2019
- Member, IEEE Engineering in Medicine and Biology Society (EMBS) — 2013–2015