

Maxine He

University of Illinois Urbana-Champaign
Ph.D. Candidate in Neuroscience

Address: 2204 Mechanical
Engineering Building,
1204 W Green St,
Urbana, Illinois 61801
Phone: (412) 539-5147
Email: maoyuan2@illinois.edu

EDUCATION

Ph.D. Neuroscience, University of Illinois Urbana-Champaign (UIUC) *Aug 2019 – Present, Expected Fall 2025*

- **GPA:** 3.98/4.00
- **Concentration:** Computational Neuroscience, Signal processing, Neurophysiology of stress and anxiety
- **Advisors:** Dr. Elizabeth T. Hsiao-Wecksler (Mechanical Sciences and Engineering), and Dr. Manuel E. Hernandez (Biomedical and Translational Sciences, Carle Illinois College of Medicine)

B.S. Neuroscience, Minor in Bioengineering & Chemistry, University of Pittsburgh *Aug 2015 – Aug 2019*

RESEARCH EXPERIENCE

Framework for detecting mental health changes in multimodal wearable data *Aug 2022–Present*

Funding Source: UIUC-OSF Healthcare Jump ARCHES, UIUC

- Designed and implemented experimental protocols combining wearable devices (Hexoskin smartshirt and Empatica wristband) with 64-channel electroencephalogram (EEG) to study stress and anxiety in university students under both controlled laboratory settings and real-world environments
- Collected and analyzed multimodal data, including EEG and physiological signals like heart rate variability, electrodermal activity, and respiratory rate, during validated stress-inducing conditions (e.g., Trier Social Stress Test and Stroop Color-Word Test) to elicit measurable stress responses
- Administered psychometric assessments via Research Electronic Data Capture (REDCap) system to correlate self-reported emotional states with physiological and neural data

Remote state anxiety detection and monitoring using multimodal wearable sensors *Aug 2020–Present*

Funding Source: UIUC-OSF Healthcare Jump ARCHES, UIUC

- Coordinated and monitored remote wearable data collection in medical students undergoing clerkship during two two-week observational periods, ensuring data quality and participant compliance
- Integrated self-reported measures with wearable device outputs to explore correlations between subjective and physiological stress responses
- Developed ML models to classify state anxiety levels and identify temporal trends in anxiety levels during clerkship rotations

Evaluation of how long-term Tai-chi Practice impacts resting state and functional connectivity *Dec 2021–Aug 2022*

- Utilized a 64-channel EEG cap system to collect brain activity signal under resting state
- Analyzed the temporal coupling of difference brain regions by calculating the phase lag index of EEG signal in alpha and beta wave bands

Development and validation of an upper arm training simulator for rigidity assessment

Aug 2020–Dec 2021

- Assisted in developing a robotic arm simulator that replicates rigidity symptoms, the abnormal muscle tones, often observed in patients with Parkinson's disease
- Recruited clinicians with expertise in neuromuscular diseases to evaluate the realism of the simulator in mimicking rigidity

Targeted ballet dance intervention for individuals with cerebral palsy

Aug 2019—May 2020

Principal Investigator: Dr. Citlali López-Ortiz (Kinesiology and Community Health), UIUC

- Analyzed force and acceleration data collected from a 6-week long ballet dance intervention to evaluate change in the stretch reflex response
- Prepared a manuscript that explained how stretch reflex response changed after intervention in individuals with mixed type of cerebral palsy

Evaluation of virtual reality game for motor rehabilitation in individuals with cerebral palsy

Aug 2019—May 2020

Principal Investigator: Dr. Citlali López-Ortiz (Kinesiology and Community Health), UIUC

- Modified a virtual reality game with haptic feedback to help for the rehabilitation of dystonic cerebral palsy in children
- Used low magnitude isometric force task intervention that requires participants to match force and torque at a low dimension in the virtual reality game to facilitate the recovery of motor control

Relationship between Adiponectin and Alzheimer's disease in mice model

Sep 2018 – Apr 2019

Principal Investigator: Dr. Xiaoming Hu (Neurology), University of Pittsburgh

- Co-authored a review article about microglia, macrophages and aging
- Analysed diffusion tensor imaging data to evaluate volume changes in mice hippocampus
- Contributed to assays on neuroprotective effects of Interleukin-13 on microglia

PUBLICATIONS

1. Alkurdi, A., **He, M.**, Cerna, J., Clore, J., Sowers, R., Hsiao-Weckslar, E.T., Hernandez, M.E. Extending Anxiety Detection from Multimodal Wearables in Controlled Conditions to Real-World Environments. *Sensors* **2025**, *25*, 1241. <https://doi.org/10.3390/s25041241>
2. Cerna, J., Gupta, P., **He, M.**, Ziegelman, L., Hu, Y., & Hernandez, M. E. (2024). Tai Chi Practice Buffers Aging Effects in Functional Brain Connectivity. *Brain Sciences*, *14*(9), 901. <https://doi.org/10.3390/brainsci14090901>
3. López-Ortiz, C., **He, M.**, Gaebler-Spira, D., & Levin, M. F. (2024). Learning ballet technique modulates the stretch reflex in students with cerebral palsy: case series. *BMC neuroscience*, *25*(1), 66. <https://doi.org/10.1186/s12868-024-00873-0>
4. Xie, D., **He, M.**, & Hu, X. (2019). Microglia/macrophage diversities in central nervous system physiology and pathology. *CNS Neuroscience & Therapeutics*, *25*(12), 1287. <https://doi.org/10.1111/cns.13257>
5. Miao, W., Jiang, L., Xu, F., Lyu, J., Jiang, X., **He, M.**, ... & Hu, X. (2021). Adiponectin ameliorates hypoperfusive cognitive deficits by boosting a neuroprotective microglial

response. *Progress in neurobiology*, 205, 102125.
<https://doi.org/10.1016/j.pneurobio.2021.102125>

CONFERENCE PROCEEDINGS

1. **He, M.**, Cerna, J., Mathew, R., Zhao, J., Zhao, J., Espina E., Clore, J.L., Sowers, R.B., Hsiao-Wecksler, E.T., Manuel E. Hernandez. 2025. Objective Anxiety Level Classification Using Unsupervised Learning and Multimodal Physiological Signals. In 2025 IEEE/ACM Conference on Connected Health: Applications, Systems and Engineering Technologies (CHASE) (CHASE '25). IEEE Press.
2. **He, M.**, Cerna, J., Alkurdi, A., Zhao, J., Gupta, P., Hsiao-Wecksler, E.T, Hernandez, M.E. Social, Physical, and Cognitive Stressor Identification using Electrocardiography-derived Features and Machine Learning from a Wearable Device. In *2024 IEEE 46th Annual International Conference of Engineering Medicine and Biology Society*. IEEE
3. **He, M.**, Mansouri, M., Pei, Y., Pedroza, I., Zallek, C. M., & Hsiao-Wecksler, E. T. (2022, April). Clinical validation testing of an upper limb robotic medical education training simulator for rigidity assessment. In *Frontiers in Biomedical Devices*(Vol. 84815, p. V001T06A008). American Society of Mechanical Engineers.
4. Gim, K. G., **He, M.**, Mansouri, M., Pei, Y., Ripperger, E., Zallek, C. M., & Hsiao-Wecksler, E. T. (2021, May). Development of a series elastic elbow neurological exam training simulator for lead-pipe rigidity. In *2021 IEEE International Conference on Robotics and Automation (ICRA)*(pp. 10340-10346). IEEE.

PEER-REVIEWED CONFERENCE PRESENTATIONS

1. **He, M.**, Cerna, J., Jamal, H., Zhao, J., Yu, S., Hsiao-Wecksler, E.T., Hernandez, M.E. "Neural-Cardiac Coupling Across Various Psychophysiological States", American Society of Biomechanics, Pittsburgh, PA, August 13–16, 2025.
2. **He, M.**, and López-Ortiz, C. (2020). "Target ballet class alters stretch reflex response while improving motor scores: a single case study", 74th American Academy for Cerebral Palsy and Developmental Medicine Annual Meeting, Live virtual meeting.
3. Hu, Y., **He, M.**, Zhao, J., Hsiao-Wecksler, E.T., Hernandez, M.E. (2022). "Effect of Tai Chi on resting state alpha power and functional connectivity in older women", The American College of Sports Medicine 2022 Annual Meeting and World Congresses, San Diego, CA, USA. May 31 - June 4, 2022.
4. **He, M.**, Hu, Y., Zhao, J., Hsiao-Wecksler, E.T., Hernandez, M.E. (2022). "Effect of tai chi and age on beta-band power and resting state functional connectivity", Society for Neuroscience 2022, San Diego, CA, USA. November 12-16, 2022.
5. **He, M.**, Cerna, J., Huang, Y., Zhang, Z., Wu, C., Hsiao-Wecksler, E.T., Hernandez, M.E. (2023). "An Examination of EEG-ECG coupling under stressful and non-stressful conditions.", Society for Psychophysiological Study Annual Meeting 2023, New Orleans, LA, USA. September 27 - October 1, 2023.

MANUSCRIPTS IN REVIEW

- **He, M.***, Alkurdi, A., Hsiao-Wecksler, E.T, Hernandez, M.E. Review of machine learning approaches in anxiety detection. *IEEE Transactions on Affective Computing*. (*Equal first authorship)

AWARDS

- NSF Student Travel Award, IEEE/ACM Conference on Connected Health: Applications, Systems and Engineering Technologies, 2025

-
- Thomas and Margaret Huang Award for Graduate Research, Beckman Institute, UIUC, 2023
 - NextGen Scholar Award, IEEE 46th Annual International Conference of Engineering Medicine and Biology Society, 2024
 - Graduate College Career Exploration Fellowship, UIUC, 2024
 - The Graduate College Conference Presentation Travel Award, UIUC, 2022
 - Outstanding Teaching Assistant Award in Molecular and Cellular Biology, UIUC, 2024
 - The List of Teachers Ranked as Excellent by Their Students, UIUC, Fall 2021, Spring 2023, Fall 2023

TEACHING EXPERIENCE

Human Anatomy and Physiology II (MCB 246)

Spring 2024, Spring 2025

School of Molecular and Cellular Biology, UIUC

- Delivered a guest lecture on lymphatic systems to demonstrate teaching efficacy
- Held regular office hours to provide support and enhance students' understanding of complex physiology

Student-Athlete Tutor

Summer 2024

Division of Intercollegiate Athletics, UIUC

- Provided personalized weekly tutoring sessions in Statistics and Organic Chemistry for NCAA student-athletes
- Explained complex scientific and mathematical concepts in accessible ways to students with varying levels of subject familiarity

Human Anatomy and Physiology I & II (MCB 245/247)

Fall 2021—Fall 2023

School of Molecular and Cellular Biology, UIUC

- Delivered comprehensive content overviews that prepared students for laboratory exercises and reinforced lecture materials
- Facilitated hands-on learning experiences using anatomical models and laboratory specimens, promoting deeper understanding through guided inquiry
- Implemented active learning strategies that fostered student engagement and collaborative problem-solving in laboratory settings

Experimental Techniques in Cellular Biology (MCB 253)

Jan 2021—May 2021

School of Molecular and Cellular Biology, UIUC

- Led discussion sessions to demonstrate advanced lab techniques and experimental protocols
- Provided constructive feedback on students' experimental designs and laboratory reports to improve scientific writing skills

UNIVERSITY SERVICES

Career Exploration Fellowship at Jump Simulation Center

Aug 2024—Present

Graduate College, UIUC

- Create detailed budgets to establish a fee schedule for revenue-generating simulation and educational activities
- Apply return-on-investment analysis to evaluate the financial viability and identify revenue-generating opportunities

Clare Boothe Luce Scholar and Illinois Scholars

Aug 2023 — Present

Undergraduate Research Programs Mentor

Grainger College of Engineering, UIUC

- Regularly met with mentees to provide hands-on training in data collection and data analysis
- Provided detailed feedback to foster critical thinking and problem-solving skills

International Students and Scholar Services Student Worker

Aug 2023, Aug 2024

International Students and Scholars Services, UIUC

- Worked with Shuttle Service Team to greet and direct new international students arriving to campus
- Assisted with federally mandated immigration document check using Sunapsis database

Development of a Computational Neuroscience Course

Mar 2021 – Aug 2021

Neuroscience Program, UIUC

- Identified important topics in Computational Neuroscience that interests students with relevant background
- Collected related resources for the course topic and help creating syllabus and objectives

ADDITIONAL SKILLS

- Programming languages: Python, MATLAB
- Statistical Analysis: R studio

Summary: strong background in Neuroscience; knowledge of basic principles of machine learning algorithms with relevant coursework; experience with machine learning models and signal processing; strong project management experience with good communication skills

PROFESSIONAL REFERENCES

1. Elizabeth T. Hsiao-Wecksler, Professor, Mechanical Science and Engineering, UIUC
 - a. Email: ethw@illinois.edu
 - b. Phone: (217) 333-3415
2. Manuel E. Hernandez, Assoc. Professor, Biomedical and Translational Sciences, Carle Illinois College of Medicine
 - a. Email: mhernand@illinois.edu
 - b. Phone: (217) 244-8971
3. Jean L. Clore, Professor, Clinical Psychiatry, University of Chicago
 - a. Email: jayclore@uic.edu
 - b. Phone: (309) 495-1640