

# Julia Lee Romero

Boulder, CO

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## EDUCATION

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### University of Colorado Boulder

Ph.D. Candidate in Computer Science, GPA: 4.00/4.00

Boulder, CO

2020–Current

- Advised by Prof. Qin (Christine) Lv and Prof. Morteza Karimzadeh

### University of Texas at Austin, Cockrell School of Engineering

B.S. in Biomedical Engineering with Highest Honors (top 10%), GPA: 3.73/4.00

Austin, TX

2016–2020

- Engineering Honors Program
- Certificate in Computational Sciences and Engineering

## SELECTED RESEARCH EXPERIENCE

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### University of Colorado Boulder, Ph.D. Research

Systems Lab, Computer Science and GeoHAI Lab, Geography

Boulder, CO

2020–Current

- **Graph-based spatiotemporal and multimodal deep learning for more efficient human action segmentation**

Collaborating with Intel Labs to develop graph-based deep learning methods for action segmentation on spatiotemporal and multimodal sensor data (RGB video, depth sensor, and accelerometry). Exploring transformers, spatiotemporal graphs, multimodal fusion, temporal context-awareness with text description, and continual learning. *Ongoing project.*

- **Hang-time HAR: A dataset for basketball activity recognition using wrist-worn inertial sensors**

Collaborated with researchers at the University of Siegen, Germany. Contributed to the study design for data collection from smartwatches, video cameras, and questionnaire; independently applied for and obtained IRB approval from CU Boulder, recruited subjects, conducted study and manually annotated 15 hours of wrist-worn accelerometer data from participants playing basketball; co-wrote paper. *Paper published.*

- **Investigated physical activity behaviors during COVID-19 with large-scale wearable device data**

Conceived project, independently completed the analysis and wrote a full journal manuscript. Analyzed time-series exercise logging data from smartwatches and a smart biomechanics-sensing footpod from 7,000+ runners worldwide to examine activity behaviors before and during the pandemic and in comparison to governmental pandemic policies. *Paper published.*

### Nokia Bell Labs, Pervasive Systems Group

Research Intern with Dr. Andrea Ferlini, Dr. Alessandro Montanari, and Prof. Fahim Kawsar

Cambridge, UK

Summer 2023

- **Signal processing pipeline to continuously measure clinical respiratory parameters with ear-worn PPG sensor**

Led the research project. Independently: determined the technical approach and project scope, designed a study for data collection, ordered equipment, designed a synchronization procedure, and conducted signal processing on raw photoplethysmography (PPG) sensor data in order to extract respiratory signals. First-author on a *paper in submission* to ACM Hotmobile 2024, and Nokia is filing patent applications on two of my original ideas.

### Stryd (Sports Technology Startup)

Data Science Intern, Dr. Kun Li

Boulder, CO

Summer 2022

- **Machine learning pipeline to detect and predict injury in runners using limited historical data**  
Led this project, conducted data collection, cleaning, and generating interactive visualizations with wearables fitness data. Experimented with time-series feature engineering and developed an analytics pipeline and machine learning models for injury prediction. My model and pipeline are deployed on the Stryd platform.

## GRANT WRITING

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- **Awarded: NSF IUCRC Personalized Pervasive Intelligence Center Project Funding (\$75,000/year)** 2023–Current  
**Project: Graph-based Spatiotemporal and Multimodal Deep Learning for More Efficient Human Action Segmentation**  
Role: Independently conceived the idea, drafted the proposal, and presented our research at a Center meeting where funding was awarded. Later, presented initial results, study design and aims, resulting in renewed funding for 2024.
- **Submitted/Pending: NSF, NIH** 2022–Current  
**Proposal: Addressing Data Quality Challenges with Wearable Devices for Remote Patient Monitoring**  
Role: Independently conceived and developed the project idea and set up a cross-discipline collaboration with CU Anschutz Medical School. Conducted literature review, preliminary analysis, proposed novel methods, and wrote the introduction, motivation, and related works sections.

## SCHOLARSHIPS AND AWARDS

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- NSF Industry-University Cooperative Research Center (IUCRC): Personalized Pervasive Intelligence Center Award for Most Impactful Research (*voted on by industry members, out of 30 graduate students*) 2023
- CU Boulder Population Center Travel Grant  
*To attend ACM International Conference on Pervasive and Ubiquitous Computing (UbiComp), Cancún, MX* 2023
- Dean’s Summer Research Fellowship, CU Boulder (\$6,000, 1 award out of 35 students in my PhD cohort) 2021
- Teaching Assistant Award, CU Boulder Comp Sci Department  
*Awarded for exemplary teaching in post-pandemic transition* 2021
- Top Teaching Assistant Award, CU Boulder Comp Sci Department *Awarded to 8 out of 90 TAs* 2020
- Early Career Professional Development Fellowship, CU Boulder 2020
- Finalist in Engineering Research Poster Competition, UT-Austin *Top 5 out of 100+ students* 2019
- University Honors, UT-Austin for *GPA > 3.50* 2016–2020
- Engineering Honors Scholarship, UT-Austin *\$40,000+ Merit-based scholarship* 2016–2020
- National Center for Women in Information Technology (NCWIT) Aspiration Award 2016
- Lafayette High School Renaissance Award *Top student with academic and extracurricular excellence (1 of 500)* 2016
- Missouri 100 Scholar *Awarded to top 100 high school students in Missouri* 2016

## SKILLS

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- **Programming:** Python, Java, C++, C, Matlab, SQL; Familiar with Go
- **Frameworks and Tools:** PyTorch, Google Cloud Platform, Scikit-learn, SciPy for signal processing, Tensorflow/Keras, Google Cloud Platform, Django, Git; Familiarity with Spark, Kubernetes, Docker
- **Mobile Applications:** Garmin Connect IQ SDK, Garmin’s Monkey C Language, Android Studio; coding applications for my Garmin Watch
- **Related Coursework:** Deep Learning and Neural Networks, Applied Deep Learning, Machine Learning, Big Data Analytics, Data Mining, Datacenter Scale Computing, Advanced Software Development, Network Analysis, Network Systems, Statistics

## ADDITIONAL PROJECT EXPERIENCE

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**University of Colorado Boulder, Ph.D. Research** Boulder, CO  
Systems Lab, Computer Science and GeoHAI Lab, Geography 2023

– **Spatiotemporal representation learning for encoding urban neighborhoods**

Conceived and conducted this research project independently. Developed graph model for preserving spatial and temporal contextual information and learning urban representations. Leveraged large heterogeneous geospatial datasets including satellite imagery, street view imagery, Yelp reviews, and human mobility.

NSF ERC: Advancing Sustainability through Powered Infrastructure for Roadway Electrification (ASPIRE) 2021

– **Development of cloud-based pipeline to support scientific modeling of the impact of electrifying vehicles on air quality and health outcomes**

Collaborated with environmental researchers at CU Boulder. Built cloud infrastructure hosted on Google Cloud Platform for a scientific simulation pipeline, queried data from the Environmental Protection Agency, handled large data including air quality, geography, and weather conditions, ran simulations.

**Johns Hopkins Applied Physics Laboratory** Laurel, MD  
Data Science Intern, Next Generation Care Delivery Group Summer 2021, Summer 2020

– **Disability claims process data analytics for Social Security Administration**

Developed process metrics for the SSA's disability claims system. Contributed to a Django analytics dashboard and visualization functions on the backend, built a REST API, managed database, and analyzed claims process. Developed a Markov chain model to predict human mobility and recommend routes on campus during COVID-19.

**University of Texas at Austin, Undergraduate Research** Austin, TX  
Human Signals Lab, Prof. Edison Thomaz 2019–2020

– **ML on time-series Fitbit data to predict surgical outcomes**

Independently explored data, engineered features, and trained machine learning classifiers for predicting surgical outcomes using Fitbit wearable device data from hip and knee surgery patients. Handled severe data quality problems including missing data; this project sparked my interest in sensor data quality.

Biomaterials Lab, Prof. Elizabeth Cosgriff-Hernandez 2018–2019

– **Fabrication of a hydrogel dressing for tissue healing**

Worked in a wet lab on the development of a hydrogel wound dressing incorporated with active healing factors. Designed and conducted cell toxicity studies to identify the effects of antimicrobial factors on cellular processes, 3D printed devices, imaged samples and developed image processing programs. Finalist in UT-Austin Undergraduate Engineering Research Competition.

**Tufts University, NSF Research Experience for Undergraduates (REU)** Cambridge, MA  
Visual Analytics Lab, Prof. Remco Chang Summer 2017

– **Improve understanding of medical Bayesian-reasoning scenarios with visualizations**

Conducted a study to test human understanding of Bayesian-reasoning visualizations, analyzed understanding alongside different spatial ability of subjects, and examined features such as text, plots, and interactivity.

## TEACHING EXPERIENCE

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- Data Mining Teaching Assistant, CU Boulder Fall 2022  
*Mentored students in class projects, managed course, held office hours.*
- Data Structures Teaching Assistant, CU Boulder Fall 2021, Spring 2022

*Taught one weekly recitation (40+ students), course management, held office hours, wrote and graded homework and exams.*

- Intro to Computer Science Teaching Assistant, CU Boulder Fall 2020  
*Taught three weekly recitations (30+ students), held office hours, wrote and graded homework and exams.*

## SERVICE AND LEADERSHIP

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- Student Volunteer at UbiComp, Cancún, Mexico 2023  
(ACM International Joint Conference on Pervasive and Ubiquitous Computing)  
*20+ hours of volunteering for pre-conference and main conference.*
- CS Department Volunteer for Underrepresented Prospective Ph.D. Students, CU Boulder 2020–Current  
*I regularly volunteer to meet with underrepresented prospective students and provide feedback on Ph.D. applications.*
- CS Department Peer Mentor, CU Boulder 2020–Current  
*Mentored 3+ CS graduate students and 3+ undergraduate students applying to graduate school.*
- NSF Engineering Research Center (ERC): Advancing Sustainability through Powered Infrastructure for Roadway Electrification (ASPIRE) Institute Student Leadership Council, CU Boulder 2021–2022  
*Volunteer on ASPIRE’s Student Outreach Committee and Student Membership Committee*
- e-NABLE Club, UT-Austin 2018–2019  
*Co-founder, Treasurer, Officer for 3D printing customized prosthetics*
- Theta Tau Professional Engineering Fraternity, UT-Austin 2017–2020  
*Inner Guard (Officer), Recruiting Chair, Tutor, Peer Mentor*

## PATENT APPLICATIONS

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1. **Julia L. Romero** and Andrea Ferlini. *Context-Aware Adaptive Control of Sound Leakage*. In preparation with Nokia Bell Labs. Expected filing date in November 2023.
2. **Julia L. Romero**, Andrea Ferlini, and Alessandro Montanari. *Biometric Authentication and Device Unlock Using Pulse Time and Interbeat Interval*. In preparation with Nokia Bell Labs. Anticipated filing date in December 2023.

## PUBLICATIONS

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1. **Julia L. Romero**, A. Ferlini, D. Spathis, T. Dang, K. Farrahi, F. Kawsar, A. Montanari, “OptiBreathe: An Earable-based PPG System for Continuous Respiration Rate, Breathing Phase, and Tidal Volume Monitoring”, *ACM Hotmobile: International Workshop on Mobile Computing Systems and Applications*, **In submission**.
2. A. Hoelzemann, **Julia L. Romero**, M. Bock, K. Van Laerhoven, and Q. Lv, “Hang-time HAR: A dataset for basketball activity recognition using wrist-worn inertial sensors”, *Sensors*, vol. 23, no. 13, 2023.
3. **Julia L. Romero** and Q. Lv, “Global impact of COVID-19 pandemic on physical activity habits of competitive runners: An analysis of wearable device data”, *International Journal of Environmental Research and Public Health*, vol. 19, no. 19, 2022.
4. B. Cadenas, J. Fita-Torró, M. Bermúdez-Cortés, I. Hernandez-Rodriguez, J. L. Fuster, M. E. Llinares, A. M. Galera, **Julia L. Romero**, S. Pérez-Montero, and C. Tornador, “L-ferritin: One gene, five diseases; from hereditary hyperferritinemia to hypoferritinemia—report of new cases”, *Pharmaceuticals*, vol. 12, no. 1, p. 17, 2019.

## PRESENTATIONS

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1. **Julia L. Romero**, Q. Lv, M. Karimzadeh, “Representation Learning on Geospatial Data for Encoding Urban Characteristics”, *American Association of Geographers*, Denver, CO, March 2023.

2. **Julia L. Romero**, Z. Lan, R. Kar, E. Cosgriff-Hernandez, “Encapsulation of Gallium Maltolate-Loaded Microspheres within Hydrogel Foam Dressing for Improved Chronic Wound Healing”, *Society for Biomaterials Conference*, Rice University, Houston, TX, May 2019.

## POSTERS

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1. **Julia L. Romero**, M. Karimzadeh, “Graph-based Spatiotemporal and Multimodal Deep Learning for More Efficient Human Action Segmentation”, *NSF Personalized Pervasive Intelligence Center Semi-Annual Meeting*, Flint, MI, October 2023.
2. **Julia L. Romero**, Q. Lv, M. Karimzadeh, “Representation Learning on Geospatial Data for Encoding Urban Characteristics”, *NSF Personalized Pervasive Intelligence Center Poster Competition*, Boulder, CO, May 2023. *Received Award for Most Impactful Research (out of 30 posters)*
3. **Julia L. Romero**, Z. Lan, R. Kar, E. Cosgriff-Hernandez, “Encapsulation of Gallium Maltolate-Loaded Microspheres within Hydrogel Foam Dressing for Improved Chronic Wound Healing”, *Undergraduate Engineering Research Competition*, University of Texas at Austin, Austin, TX, May 2019. *Top 5 Finalist of 100 students.*
4. **Julia L. Romero**, J. Chandler, A. Mosca, R. Chang, “InfoVis: Interactivity as a Tool to Improve Comprehension of Bayesian Probabilities”, *Tufts University Research Symposium*, Tufts University, Cambridge, MA, August 2017.