

Richard E. L. Higgins

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relh@umich.edu - relh.net - [google scholar](https://scholar.google.com/) - github.com/relh - [linkedin.com/in/relh/](https://www.linkedin.com/in/relh/)

EDUCATION

University of Michigan

- 2019 – Ph.D. in Computer Science and Engineering *Advisor: David Fouhey, Ph.D.*
2017 – 2019 M.S. in Computer Science and Engineering *Mentor: Jia Deng, Ph.D.*

University of Maryland

- 2010 – 2014 B.S. in Neurobiology and Physiology *Mentors: Elizabeth Quinlan, Ph.D.*
2010 – 2014 B.S. in Computer Science *Karen Carleton, Ph.D.*

PUBLICATIONS

- 2022 MOVES: Manipulated Objects in Video Enable Segmentation
Richard E.L. Higgins and David F. Fouhey
Submitted to Computer Vision and Pattern Recognition 2023
- 2022 EPIC-KITCHENS VISOR Benchmark: Video Segmentations and Object Relations
Ahmad Darkhalil*, Dandan Shan*, Bin Zhu*, Jian Ma*, Amlan Kar, **Richard E.L. Higgins**, Sanja Fidler, David F. Fouhey, Dima Damen
Advances in Neural Information Processing Systems 35, 2022.
- 2022 Large-Scale Spatial Cross-Calibration of Hinode/SOT-SP and SDO/HMI
David F. Fouhey, **Richard E.L. Higgins**, Spiro K. Antiochos, Graham Barnes, Marc L. DeRosa, Todd Hoeksema, KD Leka, Yang Liu, Peter W. Schuck, Tamas I. Gombosi
Hinode-15/IRIS-12 Conference, Poster 2022.
- 2022 On Identifying and Mitigating Bias in Inferred Measurements for Solar Vector Magnetic-Field Data
K.D. Leka, Eric L. Wagner, Ana Belén Griñón-Marín, Véronique Bommier, **Richard E.L. Higgins**
Solar Physics, 2022 Sep; 297(9): 1-29
- 2021 COHESIV: Contrastive Object and Hand Embeddings for Segmentation In Video
Richard E.L. Higgins*, Dandan Shan*, and David F. Fouhey
Advances in Neural Information Processing Systems 34, Poster 2021.
- 2021 SynthIA: A Synthetic Inversion Approximation for the Stokes Vector Fusing SDO and Hinode into a Virtual Observatory
Richard E.L. Higgins, David F. Fouhey, Spiro K. Antiochos, Graham Barnes, Todd Hoeksema, KD Leka, Yang Liu, Peter W. Schuck, Tamas I. Gombosi
The Astrophysical Journal Supplement Series, 2022 Mar; 259(1): 24.
Invited Speaker at the SDO Science Seminar, November 2021.
- 2021 Fast and Accurate Emulation of the SDO/HMI Stokes Inversion with Uncertainty Quantification
Richard E.L. Higgins, David F. Fouhey, Dichang Zhang, Spiro K. Antiochos, Graham Barnes, Todd Hoeksema, KD Leka, Yang Liu, Peter W. Schuck, Tamas I. Gombosi
The Astrophysical Journal, 2021 Apr; 911(2): 130
COSPAR2021, Workshop on ML for Space Sciences, Talk 2021
AGU, ML in Space Weather, Poster 2020
- 2017 Network Reconstruction Reveals that Valproic Acid Activates Neurogenic Transcriptional Programs in Adult Brain Following Traumatic Injury
Gerald A. Higgins, Patrick Georgoff, Vahagn Nikolian Ari Allyn-Feuer, Brian Pauls, **Richard E. L. Higgins**, Brian D. Athey, and Hasan E. Alam
Pharmaceutical Research, 2017 Aug; 34(8): 1658-1672

2016 Matrix Metalloproteinase-9 Regulates Neuronal Circuit Development and Excitability
Sachiko Murase, Crystal Lantz, Eunyong Kim, Nitin Gupta, **Richard E. L. Higgins**, Mark Stopfer, Dax A. Hoffman, and Elizabeth M. Quinlan
Journal of Molecular Neurobiology, 2016 Jul; 53(5): 3477–3493

WORK

- 2019 – **Fouhey AI Lab**, Graduate Researcher Ann Arbor, MI
- I used motion and human-object interaction to train systems that densely segment video.
 - I used weakly-supervised person labels to perform contrastive learning of hands and held objects.
 - I combined imaging instruments across satellites to improve solar magnetic field inversions.
 - I trained a UNet to predict the solar magnetic field using polarized light (IQUV's).
- 2018 – 2019 **Vision & Learning Lab**, Graduate Researcher Ann Arbor, MI
- I designed new neural networks to apply associative embeddings to scene graphs.
- 2018 – 2019 **Voxel 51**, Computer Vision Engineering Intern Ann Arbor, MI
- I integrated object detection into a video platform analyzing dashcam footage.
- 2016 – 2018 **Gigster**, Software Engineering Consultant San Francisco, CA
- I built a style-transfer service that processed millions of images/day for a social media company.
 - I built a GAN that performs face attribute transformation for a social media company.
 - I built a CNN backend to provide object recognition in a Fortune 500 company iOS app.
 - I designed many CNN computer vision systems for Fortune 500 clients across industries.
- 2016 **Athey Bioinformatics Lab**, Postgraduate Research Ann Arbor, MI
- I constructed TADs and analyzed RNA-seq data to identify differential gene expression
- 2015 – 2016 **Unscan**, Founder New York, NY
- We developed a scanned-document OCR data extraction system using custom LSTMs.
- 2015 **Redspread**, First Engineer San Francisco, CA
- I developed ML tools to automatically scale Kubernetes pods based on resource usage.
 - Part of the founding team of a Y Combinator company eventually acquired by IBM.
- 2014 **Quinlan Neuroscience Lab**, Undergraduate Research College Park, MD
- I detected seizures in mouse EEG recordings using max-margin techniques in MATLAB.
- 2011 – 2012 **Evolution of Visual Communication Lab**, Undergraduate Research College Park, MD
- I created false-color images of colorful fish to see how cone opsins effect conspicuity.

MENTEES

- 2022 – Ayda Sultan, Addis Ababa CS Undergraduate student
- 2022 – Ruoyu Wang, UM CSE Undergraduate student
- 2020 – 2021 Dichang Zhang, UM CSE Undergraduate student *Next: Stony Brook CS PhD Student*
- 2019 – 2020 Yige Liu, UM CSE Undergraduate student *Next: Stanford CS Masters Student*

TEACHING

- 2018 Winter **EECS 442: Computer Vision**, Graduate Student Instructor, University of Michigan
- 2014 Spring **BSCI 440: Mammalian Physiology**, Teaching Assistant, University of Maryland

OUTREACH & SERVICE

- 2022 – **CSE Graduate Student Organization**, Officer, University of Michigan
• I am a student liaison to the faculty hiring committee and broadly a CSEG officer.
- 2020 – 2021 **AI Lab Blog**, Co-Editor, University of Michigan
• I solicited and edited blog posts for the University of Michigan AI Lab Blog.
- 2019 + 2020 **AI4ALL**, Instructor, University of Michigan
• I taught high schoolers an introductory AI course across two-week summer camps.
- 2019 **Discover Engineering**, Volunteer, University of Michigan
• I volunteered at a summer program teaching children about Computer Science.
- 2014 – 2019 **Hackathon Mentorship**
• I mentored both at hackathons and digitally through Facebook’s mentorship program.
- 2011 – 2013 **Co-op Housing UMD**, Housing Chair, Finance Manager
• I found and arranged housing for the co-operative, as well as handled house finances.

ACHIEVEMENTS

- 2022 Best Poster, AI Symposium, University of Michigan
- 2013 Finalist, HackMIT
- 2012 Citation in Life Sciences, University of Maryland
- 2010 Presidential Scholarship (Merit), University of Maryland
- 2010 National AP Scholar - 14 AP Courses - 100th percentile of AP Tests (<1,172 in 1,845,006 students)