

RESEARCH INTERESTS & SKILLS

- **Deep Learning& Computer vision& Computational neuroscience:** Research and application of deep learning and computer vision techniques in understanding animal behaviors.
- **Technical Skills:** Python, C/C++, Keras, Pytorch, Computer vision, Large Language Model, Generative model, Graph Neural Network, Optimization, data modeling and evaluation.
- **Soft Skills:** Communication and presentation, writing and figure design, collaboration.

EDUCATION

- **Yale University** New Haven, CT
Ph.D. candidate, Electrical Engineering (previously at University of Florida) *May 2021 - Present*
Thesis topic: Behavioral modeling from high-dimensional video data for multi-subject and social behavior
Advisory committee: Shreya Saxena
- **University of Michigan** Ann Arbor, MI
Master in Biomedical Engineering; Concentration: Computational neuroscience; GPA: 3.83 *Aug 2019 - Dec 2020*
- **University of Nottingham** Ningbo, China
BEng Hons in Electrical and Electronic Engineering; First Class; GPA: 4.00 *Sep 2015 - May 2019*

PUBLICATIONS

Selected Journal Articles

- **Yi, D.**, Zhang, X., Behdad, S., Saxena, S. 2023. Unsupervised Human Activity Recognition Learning for Disassembly Tasks. *IEEE Transactions on Industrial Informatics (Early Access)*. [10.1109/TII.2023.3264284](https://doi.org/10.1109/TII.2023.3264284)
- **Yi, D.**, Musall S., Churchland A., Padilla-Coreano N., Saxena S. 2023. Disentangled multi-subject and social behavioral representations through a constrained subspace variational autoencoder (CS-VAE), *eLife*. <https://doi.org/10.7554/eLife.88602.1>
- **Yi, D.**, Zhang H., Guan Y. 2021. Timesias: A machine learning pipeline for predicting outcomes from time-series clinical records, *STAR protocols* <https://doi.org/10.1016/j.xpro.2021.100639>
- Berryman D., Barrett J., Liu C., Maugee C., Waldbaum J., **Yi D.**, Xing H., Yokoi F., Saxena S., Li Y. 2023 Motor deficit and lack of overt dystonia in Dlx conditional Dyt1 knockout mice, *Behavioral Brain Research* [10.1016/j.bbr.2022.114221](https://doi.org/10.1016/j.bbr.2022.114221)
- Guan Y., Wang X., Chen X., **Yi D.**, Chen L., Jiang X. 2021. Assessment of the timeliness and robustness for predicting adult sepsis, *iScience* <https://doi.org/10.1016/j.isci.2021.102106>
- An X., Chen X., **Yi D.**, Li H., Guan Y., 2022. Representation of molecules for drug response prediction, *Briefings in Bioinformatics* <https://doi.org/10.1093/bib/bbab393>
- Guan Y., Li H., **Yi D.**, Zhang D., Yin X., Li K., Zhang P 2021. A survival model generalized to regression learning algorithms, *Nature Computational Science* <https://doi.org/10.1038/s43588-021-00083-2>

Conference Proceedings

- **Yi, D.**, Saxena, S. 2023. Neural Correlations across Mice during Spontaneous and Task-Related Behaviors *11th International IEEE EMBS Conference on Neural Engineering* [10.1109/NER52421.2023.10123873](https://doi.org/10.1109/NER52421.2023.10123873)
- **Yi, D.**, Saxena, S. 2022. "Modeling the behavior of multiple subjects using a Cauchy-Schwarz regularized Partitioned Subspace Variational AutoEncoder (CS-PS-VAE) *44th Annual International Conference of the IEEE Engineering in Medicine & Biology Society (EMBC)*. [10.1109/EMBC48229.2022.9871466](https://doi.org/10.1109/EMBC48229.2022.9871466)

EXPERIENCE

- **Saxena Lab, Yale University** New Haven, CT
May 2021 - Present
Research Assistant
 - **Understand animals social interaction using Graph Neural Network:** Developed a GCN-based variational autoencoder to predict which body parts of the animals are likely to have interactions during the specific social tasks.
 - **Social behavior representation learning using vision transformer:** Created a semi-supervised vision transformer-based autoencoder to generate interpretable behavior embedding for different social behaviors.
 - **Human Activity Recognition using CNN+BiLSTM based variational autoencoder:** Created an unsupervised CNN+BiLSTM based variational autoencoder for learning representations and a state space model for activity state division.
 - **Multi-subject behavior Embedding using constrained subspace variational autoencoder:** Created a semi-supervised variational autoencoder with different constraints on different latent dimensions, proposed a new algorithm on separating different subjects.
 - **Learning the link between the behavior and the corresponding neural activities using Recurrent Neural Network:** Processed neural activity data using Low Pass Filter and Principal component analysis. Applied Canonical-Correlation Analysis to align the neural activities. Created a Recurrent Neural Network-based autoencoder to decode the behavior from the corresponding neural activities.
- **Guan Lab, University of Michigan, Ann Arbor** Ann Arbor, MI
January 2020 - May 2021
Research Assistant
 - **Learning Representation for molecules using basic machine learning methods and Graph Neural Network.:** Reviewed the papers for molecules learning representations.
 - **Protein secondary structure prediction using U-Net:** Applied 1D U-Net algorithm for protein secondary structure prediction from its primary structure.
 - **Disk failure prediction using complete rank and Recurrent Neural Network:** Applied Recurrent Neural Network and SOTA ranking methods to predict disk failure.
- **Chengbo Wang Lab, University of Nottingham Ningbo** Ningbo, China
July 2018 - May 2019
Undergraduate Research Assistant
 - **Sleep Quality Monitoring Application Development using Java and MySQL:** Developed an Android application and a wearable device to monitor human's physiological data. Analysis of the sleep quality on the cloud using MySQL.

INVITED TALKS

- Workshop on Multi-Agent Behavior, **CVPR (2023)**. Hierarchical Characterization of Social Behavior Motifs using Semi-Supervised Autoencoders *Multi-Agent Behavior*
<https://sites.google.com/view/mabe23/accepted-papers?authuser=0>
- Workshop **neuromatch-5.0 (2022)**. Disentangled multi-subject and social behavioral representations through a constrained subspace variational autoencoder (CS-VAE)
Neuromatch.<https://www.world-wide.org/neuromatch-5.0/disentangled-multi-subject-social-behavioral-f5f5c76d/>

SERVICES

- **Reviewer:** Cell Reports, Conference on Neural Information Processing Systems (Neurips) Workshop, International Conference on Learning Representations (ICRL) Workshop

AWARDS

- Excellent Student Cadre, University of Nottingham 2018
- Undergraduate student summer research grant, University of Nottingham 2018
- College funded overseas summer school program, University of Nijmegen 2017