

RESEARCH INTERESTS & SKILLS

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- **Programming:** Python, C/C++, Java, SQL
- **ML Frameworks:** PyTorch, TensorFlow, Scikit-learn, Hugging Face, OpenCV
- **MLOps & Deployment:** Docker, Kubernetes, AWS, GCP, FastAPI
- **Modeling Techniques:** Deep Learning, Reinforcement Learning, Graph Neural Networks, Generative Models, Transformers
- **Big Data & Optimization:** Multimodal Data Fusion, High-dimensional Data Analysis, Cloud Computing

EDUCATION

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- **Yale University** New Haven, CT  
*Ph.D. candidate, Electrical and Computer Engineering* *May 2021 - May 2025 (expected)*  
**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: 4.0* *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*

SELECTED PUBLICATIONS

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**Deep Learning & Computer Vision**

- **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* (**IF: 6.4**) <https://doi.org/10.7554/eLife.88602.1>
- **Yi, D.**, Wright, E., Padilla-Coreano, N., Saxena, S. 2023. Hierarchical Characterization of Social Behavior Motifs using Semi-Supervised Autoencoders *CVPR workshop on multi-agent behavior 2023* [MABe2023](#)

**Reinforcement Learning**

- **Yi, D.**, Saxena S. 2023. Dynamic Inverse Reinforcement Learning for Social Behavior Analysis. (**Target: NeurIPS 2025**)

**Sequential Decision-Making**

- **Yi, D.\***, Zhang, X.\*, Behdad, S., Saxena, S. 2023. Unsupervised Human Activity Recognition Learning for Disassembly Tasks. *IEEE Transactions on Industrial Informatics* (**IF: 11.7**) [10.1109/TII.2023.3264284](https://doi.org/10.1109/TII.2023.3264284)
- 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>

**Multimodal Modeling**

- **Yi, D.**, Dong, H., Higley, M., Churchland, A., Saxena, S. 2024. Shared-AE: Unsupervised Identification of Shared Subspaces in High-dimensional Neural and Behavioral Activity *ICLR 2025* (**IF: 48.87**)

**Graph Neural Networks & Bioinformatics**

- **Yi, D.\***, Zhang H.\*, Guan Y. 2021. Timesias: A machine learning pipeline for predicting outcomes from time-series clinical records, *STAR protocols* (**IF: 1.39**) <https://doi.org/10.1016/j.xpro.2021.100639>
- 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>

## EXPERIENCE

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- **Neurostats Lab, Flatiron Institute: Center for Computational Neuroscience** New York, NY  
*Machine Learning Research Intern* May 2024 - August 2024
  - **Comparing Representations from VAE Architectures:** Developed VAEs to analyze behavioral activity, optimizing **LLM-driven embeddings**. Applied shape metrics, including Procrustes shape distances and graph-based AI, to compare the representations learned by these different networks. (**Submitted to ICLR 2024 workshop**)
- **Saxena Lab, Yale University** New Haven, CT  
*Research Assistant* May 2021 - Present
  - **Dynamic Inverse Reinforcement Learning:** Developed and applied Dynamic Inverse Reinforcement Learning (DIRL) to model and analyze social behavior from high-dimensional video data. Leveraged DIRL to uncover time-varying reward functions that drive multi-subject interactions, providing interpretable insights into exploratory and goal-directed behaviors. (**Target: Neurips 2025**)
  - **Multimodal Modeling for Learning representations:** Refined and developed a model employing contrastive learning techniques to effectively ascertain and delineate the inter-modal congruence between behavioral images and corresponding neural activity patterns (**Published at ICLR 2025**).
  - **Vision Transformer-based autoencoders :** Built semi-supervised vision transformer-based autoencoder to generate interpretable behavior embedding for different social behaviors (**Published at CVPR 2022 workshop; NIH grant awarded**).
  - **CNN+BiLSTM based variational autoencoder for Human Activity Recognition (HAR):** Designed an unsupervised CNN+BiLSTM based variational autoencoder for learning representations and a state space model for activity state division (**Published at IEEE Transactions on Industrial Informatics**).
  - **Constrained subspace variational autoencoder for learning embeddings:** Designed a semi-supervised variational autoencoder with different constraints on different latent dimensions. Proposed a new algorithm on separating different subjects (**Published at eLife; NSF grant awarded**).
- **Guan Lab, University of Michigan, Ann Arbor** Ann Arbor, MI  
*Machine Learning Researcher* January 2020 - May 2021
  - **LLM-driven Drug Discovery:** Designed graph-based **transformer models** for molecule representation learning. (**Published journal article at Briefings in Bioinformatics**).
  - **Disk failure prediction using complete rank and Recurrent Neural Network:** Applied Recurrent Neural Network and SOTA ranking methods to predict disk failure (**published journal article at Nature Computational Science**).
- **Chengbo Wang Lab, University of Nottingham Ningbo** Ningbo, China  
*Software Engineer Intern* July 2018 - May 2019
  - **Application Development using Java and MySQL:** Built an Android-based sleep quality monitoring application using Java & MySQL. Developed a cloud-based data pipeline for physiological data analysis. (**Best final year project**).

## REAL-WORLD ML DEPLOYMENT EXPERIENCE

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- **End-to-End ML Deployment for Social Behavior Analysis** Yale University  
*Independent Project* 2023
  - **Developed a scalable ML pipeline:** for processing high-dimensional video and neural data using AWS S3, Lambda, and SageMaker.
  - **Deployed Dockerized ML models:** for real-time social behavior analysis in cloud-based environments.
  - **Implemented CI/CD pipelines with GitHub Actions and Kubernetes:** to automate model updates and monitoring.
- **Retrieval-Augmented Generation (RAG) for AI-driven Knowledge Retrieval** Yale University  
*Independent Project* 2024
  - **Comparing Representations from VAE Architectures:** Designed a **RAG pipeline** integrating **vector search and fine-tuned transformers** to enhance contextual understanding in neuroscience literature.

## TEACHING & COMMUNITY

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- **Reviewer:** Cell Reports, IJCNN, Neurips, ICRL, IEEE Transactions, etc
- **Teaching Assistant:** EEL4930 Neuro-AI @ University of Florida, EENG200a Introduction to Electronics @ Yale University