

Amirtha Varshini Anbucheziyan Sindhanai

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EDUCATION

- **Georgia Institute of Technology**, Atlanta, GA Aug. 2021 - May 4th 2023
Master of Science in Computer Science (ML Concentration) **GPA: 4.0/4.0**
- **National Institute of Technology Tiruchirappalli**, India Jul. 2014 - May 2018
Bachelor of Technology in Electronics and Communication Engineering **GPA: 8.90/10**

TECHNICAL SKILLS

- **Languages:** Python, C, C++, C#, SQL, HTML, CSS, JS, PHP, Bash, TCL
- **Frameworks:** PyTorch, TensorFlow, Scikit-Learn, SciPy, Numpy, OpenCV, Linux, Streamlit, HuggingFace, W&B, MLFlow
- **Graduate Coursework :** Machine Learning with Limited Supervision, Computer Vision (CV), Deep Reinforcement Learning for Intelligent Control, Graduate Algorithms, Machine Learning, Deep Learning Specialization (Coursera)

EXPERIENCE

- **Montai Therapeutics**, Cambridge, MA - *Machine Learning Scientist* Jul 2023 - Present
 - Enhanced Chemprop (molecular property prediction model) performance through training with Nvidia's MegaMolBART embeddings as features along with RDKit provided features.
 - Currently developing transformer-based graph neural networks with PyG to enhance the overall performance of a multitask bioactivity prediction model. Also working on improving the ensembling approach along with uncertainty quantification.
 - Applied CReM approach for structural transformation, focusing on generating novel molecules as potential drug candidates and filtering out unwanted substructures using structural alerts matching. Working on multi-objective optimization against bioactivity scores and ADMET scores to improve the candidate's druglikeness.
 - Spearheaded the development of interpretability tools for in-house models that result in rationale substructures for a given prediction. Developed a novel method to generate counterfactuals by fragmenting the input molecule using SMARTS pattern matches. Implemented visual explanations to elucidate the prediction's rationale for medicinal chemistry domain experts.
- **Amazon Robotics**, Westborough, MA - *Software Development Engineer Intern* May 2022 - Aug. 2022
 - Performed live object tracking of packages in an Amazon warehouse by segmenting the unique shipping labels in the scene. Successfully improved AR-ID, an AI and CV-based automatic barcode scanner to go from single to multiple active packages
 - Developed a novel Augmented Reality(AR) app using Unity, and deployed it on Microsoft Hololens 2, to identify the current package picked or stowed, based on the collision of the tracked package's hologram with a spatially anchored hologram mesh
- **Qualcomm**, Bengaluru, India - *Embedded Software Engineer* Jul. 2018 - Aug. 2021
 - *ADAS team* -Designed Minidump feature on a QNX Real-time operating system to capture a snapshot of a system post-crash. Brought down the download time by **70%** and the size from **12GB to 300 MB**, enabling faster analysis
 - Developed a GDB-based Python and C parser to extract debug information from the collected kernel dump.

RESEARCH

- **Explainability for a Graph Neural Network performing Proactive Robot Assistance** Aug. 2022 - current
 - *Advised by Prof. Sonia Chernova* - Developing explainability for a dynamic and generative graph neural network (GNN) that performs **spatio-temporal object tracking** and models the future movement of objects in a home environment.
 - Experimented with saliency methods, attention weights, and GNNExplainer to explain the model's predictions. **Link**
 - Generated edge & temporal explanations of the predicted object movements using counterfactuals .
- **Multimodal video generation using Latent Diffusion** Aug. 2022 - Dec. 2022
 - Trained a transformer to generate future video frame embeddings on top of the Stable Diffusion encoder. Predicted embedding sequences are denoised and decoded to produce future frames conditioned on text and video input. **Link**
 - Outperformed the TGANv2 baseline by **26%** improvement in Frechet Video Distance score by using a novel combination of loss functions and video interpolation components.
- **Deep Reinforcement Learning (RL) based autonomous driving** Jan. 2022 - May 2022
 - Built TQC (Truncated Quantile Critics) algorithm with experience replay and increased rewards by **17%** for navigation in a self-driving simulator Donkeycar. Improved rewards by **42%** by training a Variational Autoencoder to compress inputs.
 - Generated a semantic segmentation mask using a pretrained autoencoder to visualize the model for interpretability. **Link**
- **Computer Vision Tools for Non-verbal Communication in Interviews** Aug. 2021 - Dec. 2021
 - *Advised by Prof James Rehg:* Devised a K-Nearest Neighbours(KNN) model to estimate head pose in videos with accuracy **83%**. Obtained features as the difference in minima and maxima of first-order pitch differences, from OpenFace Keypoints output on AMI corpus. **Link**
- **Real-Time Hand Gesture Recognition system** Jan. 2018 - May 2018
 - Fine-tuned Inception V3 Architecture on ASL dataset to detect gestures with **98%** accuracy and controlled a custom-built robotic arm. Published a paper as the **first author:** Amirtha Varshini, A.S. and et.al, "Real-time Hand Gesture Recognition for Robotic Arm and Home Automation", (**ISEEIE 2021**) **Link**