

Srikar Mutnuri

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Education

University of Virginia, Charlottesville, USA

August 2024-Present

PhD, Computer Science

(GPA: Ongoing)

- *Research focus:* Graphs, network dynamics, and epidemics
- *Relevant Courses:* Computational Behavior Modelling, Natural Language Processing.

University of Southern California, Los Angeles, USA

August 2021-May 2023

Master of Science, Electrical Engineering

(GPA: 3.72/4.00)

- *Relevant Courses:* Advanced Linear Algebra, Graph Signal Processing, Causal Inference, Medical AI, ML Optimization

GITAM Deemed University, Visakhapatnam, India

June 2012-April 2016

Bachelor of Technology, Electronics and Communication Engineering

(GPA: 3.80/4.00)

Research Experience

Biocomplexity Institute, UVA

August 2024 - Present

Srivastava Group, USC

Spring 2023 - Summer 2024

Majd Al Aawar, Srikar Mutnuri, Mansoorh Montazerin, Ajitesh Srivastava. "Dynamics-based Feature Augmentation of Graph Neural Networks for Variant Emergence Prediction" ([arXiv: 2401.03390](#))

HaRVI Lab, USC

Summer 2022 - Summer 2024

Yang Chen, Srikar Mutnuri, Haylee Mota, Heather Culbertson. "Dense Magnet Array for MR Fluid-Based Fingertip Haptics Interface: Integrating Vibrotactile and Adhesion Feedback" (work-in-progress)

E2S2C Group, USC

Fall 2022 - Spring 2023

Yue Hu, Xinan Ye, Yifei Liu, Souvik Kundu, Gourav Datta, Srikar Mutnuri, Namo Asavisanu, Nora Ayanian, Konstantinos Psounis, Peter Beerel. "FireFly: A Synthetic Dataset for Ember Detection in Wildfire." 5th Workshop on Artificial Intelligence for Humanitarian Assistance and Disaster Response (ICCVW'23). ([arXiv: 2308.03164](#))

Professional Experience

University of Virginia

August 2024-Present

Graduate Research Assistant

- Working on a generalized processing pipeline for electrophysiological activity data
- Worked on research into the use of causal methods to estimate network structure

University of Southern California

August 2023-July 2024

Research Associate

- Worked on research into the use of networks, graphs, and dynamic models for epidemiology
- Built a custom MLOps pipeline to automate the train-test workflows, released a configurable template for use across multiple projects
- Researched the use of stochastic models and physics-informed neural networks in improving prediction accuracy

University of Southern California

May 2022-May 2023

Graduate Research Assistant, Course Producer

- Generated synthetic data using Unreal Engine for ML Inference, built data pipelines using PyTorch improving mAP by ~8.5% in-the-wild
- Built custom VR scenes using Unity & processed sensor data to map user interactions for haptic feedback through custom wearables
- Developed offline inference module for real-time pose detection on video streams
- Designed course materials, delivered graduate level lectures on integrating game analytics and mentored students on utilizing real-time data to improve game play (Unity WebGL), and on computer graphics (OpenGL)

TCS Interactive, Tata Consultancy Services

August 2016-August 2021

Senior Software Engineer - Immersive Technologies

- Designed and optimized ETL pipelines, frameworks, and architectures to accelerate cross-platform game & XR app performance
- Collaborated with TCS Research Labs to conceptualize and build applications for user studies

- Improved data migration speeds by building automated big-data ingestion frameworks on top of Hadoop stack
- Utilized design patterns to architect reusable application modules & templates for games and reduced delivery timelines by over 60%
- Led over 8 project proposal submissions and handled system design to integrate solutions with client infrastructure
- Managed full lifecycle of 10 cross-functional projects using Agile processes to ship high quality apps on schedule.
- Analyzed market trends and interpreted statistical data to define project road-maps, and establish R&D guidelines
- Presented technical game/XR app development capabilities and interactive demos to CXO-level clients

Kodeco (formerly raywenderlich.com)

March 2021-December 2021

Unity Tutorial Team Member - Tech Editor

- Served as the tech editor for various tutorials and a book, focusing on improving the overall quality of articles, validating and technically enhancing them
- "Unity Apprentice" book which serves as an introduction to building 3D games using Unity, published March 2022
- "Introduction to Asynchronous Programming in Unity" to show the use of async methods to parallelize in-game tasks, published December 2021
- "Improving Game Visuals with Unity's HDRP" tutorial to teach users about enhancing visuals using the HD render pipeline, published November 2021
- "Using the Terrain Tools in Unity" tutorial, for building immersive scenes using the terrain tools, published October 2021

Teaching

- **Graduate Course Producer**, CSCI 526 Advanced Mobile Devices & Games, USC Fall 2022 - Spring 2023
- **Graduate Course Producer**, CSCI 420 Computer Graphics, USC Fall 2022

Academic Projects

Learning Brain Structure through Causal Analysis of Graph Signals

Python - MNE

Graduate Research Assistant, UVA

(Biocomplexity Institute)

- Estimate effective connectivity within the brain using causal methods
- Analyse spectral properties of the resulting graph

Dynamics Informed Graph Neural Networks

Python - PyTorch, PyTorch Geometric
(Srivatsava Group ([arXiv: 2401.03390](https://arxiv.org/abs/2401.03390)))

Research Associate, USC

- Researching the use of variant dynamics informed GNNs for tracking disease spread and epidemiology
- Working on enhancing the network model and running ablation studies to test various hypotheses

Haptic Wearable Interface

Unity, Quest 2, Python
(HaRVI Lab)

Student Researcher, USC

- Designing custom VR environments using Unity to map user interactions for haptic feedback through custom wearable
- Implemented UDP modules for multi-channel signal transmission to an electromagnetic array via RasPi and HiFiBerry

Synthetic Data Generation for ML Inference

Unreal Engine, C++, Python - PyTorch, pandas, SLURM
(E2S2C Lab ([arXiv: 2308.03164](https://arxiv.org/abs/2308.03164)))

Graduate Student Researcher, USC

- Built virtual environments using the Niagara system and Blueprints in Unreal to generate synthetic geospatial data
- Developed data processing pipeline for ML inference (segmentation) on the edge using PyTorch

Agent Based Network Models to Predict Influenza-Like-Illnesses

PyTorch Geometric, torchsde
(Course Project, EE638 Sp23)

Student Researcher, USC

- Implemented message passing for agent based network models to capture low level interactions in a population
- Explored the use of stochastic models to predict disease dynamics and forecast spread

Point Cloud Denoising using Graph Signal Processing

Python - PyTorch Geometric, scikit-learn
(Course Project, EE599 Sp22)

Academic Project, USC

- Performed spectral analysis to denoise 3D point clouds using Graph Fourier Transforms
- Implemented graph wavelet transforms and diffusion filters to study point cloud structures

Skills

Programming	C#, Python, C++, Java, SQL
XR Tools	Unity, Unreal Engine, ARCore, ARKit, OpenXR, WebRTC, Blender, A-Frame, three.js
ML Frameworks	PyTorch, NumPy, SciPy, pandas, scikit-learn, OpenCV
Others	git, Android Studio, Xcode, AWS, GCP, Terraform, Snowflake, Docker, Jupyter

Awards

- **Most Innovative Usecase Award**, Adobe India Hackathon 2019
- **Innovation Awards of Excellence** (multiple), Tata Consultancy Services 2016 - 2021

Conferences & Societies

Invited Talks

- **PyCon India**, Augmented Reality with Python Oct 2019
- **FOSSASIA Singapore**, Augmented Reality for Mobile Mar 2019

Attended: NeurIPS 2024 (virtual), UIST 2023 (Student Volunteer), SIGGRAPH 2023

Membership: AAAI, ACM, SIGGRAPH, SIGCHI, IEEE

Professional Work

AR Digital Twin *Unity, C#, Swift(iOS), Custom SDKs*

Technical Lead, TCS

- Architected a reusable AR template enabling users to visualize, design, and customize digital twin simulations
- Developed networking & data integration connecting digital twins to IoT devices, synchronizing object states
- Implemented core AR capabilities like spatial mapping, and indoor navigation using SLAM and custom SDKs

Custom XR Module Integration

Unity, C#, Cordova(iOS)

Technical Lead, TCS

- Engineered reusable XR modules for client's enterprise apps and low-code platform.
- Developed performant AR camera, gesture handling, 3D overlays using Unity and Cordova plugins for iOS.
- Created Unity scripts and prefabs that abstracted XR functionality for easy integration in R&D

Mobile 3D Puzzle Game

Unity, Swift, Java

Game Designer & Lead Backend Developer, TCS

(Cyber Defense Global InfoSec Award winner, 2022)

- Designed core gameplay systems and mechanics for a 3D point & click adventure game with a UI based story
- Optimized REST API networking calls, and runtime performance for smooth & responsive gameplay on mobile
- Built data binding for UI, custom workflows for SSO, and native mobile apps as wrappers for Unity-as-a-library

AR Retail Companion – Travel Assistant

Unity, C#, ARCore, Java (Android)

Full-stack Developer, TCS

(Most Innovative Use-case Award Winner, Adobe India Hackathon)

- Implemented primitive AR-based indoor navigation and mapping to guide users within an airport
- Integrated with Adobe Experience Manager to fetch real-time personalized recommendations and travel data
- Developed Unity components to visualize recommendations and travel information in context through AR overlays.

5G V2X Simulation Module

Unity, c#, Java

Full-Stack Developer, TCS

- Developed performant traffic simulation in Unity to model vehicle movements and interactions in urban environments for research
- Implemented networking APIs for integration with 5G V2X infrastructure, sensors, and external traffic control systems
- Programmed realistic vehicle AI with collision avoidance, traffic rule following, and navigation behaviors

VR Training App for Quest 2

Unity, C#, Oculus SDK

Technical Lead, TCS

- Developed immersive VR app to train HCPs on using a new eye-care product, and raise awareness of various disorders
- Implemented custom analytics and data processing modules to track user behavior within the app and suggest corrective measures
- Built and integrated custom CMS and survey components to fetch data from existing training modules