Venkata Devesh Reddy Seethi

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Area of Expertise

I specialize in advanced AI techniques, such as anomaly detection, self-supervised learning, and domain generalization, across a wide range of data modalities, including sensor data, images, videos, and natural language. With hands-on experience in developing energy-efficient deep learning solutions, I have a strong command of frameworks like TensorFlow and PyTorch, and extensive knowledge of Python and C++. My work spans from industrial applications in aerospace and material sciences to healthcare innovations like disease diagnosis, where I focus on building scalable and interpretable AI models. I am passionate about designing solutions that address real-world challenges and are carbon-efficient.

Education

Northern Illinois University Dekalb, IL
Ph.D. Computer Science *January 2021 - Present*

Northern Illinois University Dekalb, IL
M.S. Computer Science *January 2018 - December 2020*

GITAM University Location, India
B.Tech. Electronics and Communication Engineering *August 2013 - August 2017*

Experience

Argonne National Labratory Lemont, IL
Research Aide - Technical PhD *May 2024 - Present*

- Collaborated with researchers from X-Ray science teams to develop end-to-end computer vision pipelines for advanced segmentation tasks.
- Evaluated and surveyed unsupervised and self-supervised methods for automatic segmentation.
- Assessed data requirements, including quality and quantity of labeled datasets, for training robust segmentation models.
- Researched building generalizable models low-contrast tomography scans of diverse materials.

Northern Illinois University Dekalb, IL
Research Assistant (Data Lab) *May 2023 - May 2024*

- Spearheaded research ideas on advanced non-destructive testing (NDT) techniques, collaborating with industry leaders like Spirit AeroSystems.
- Brainstormed ideas with researchers from Argonne National Laboratory and built complex AI models on high-performance computing (HPC) resources at Argonne.
- Contribute to grant proposals and author papers on AI-driven improvements in NDT methodologies.
- Design and execute experiments based on NDT inspector feedback from Spirit AeroSystems to enhance solution effectiveness.
- Explored many ideas in anomaly detection, self-supervised learning, computer vision, and explainable AI.
- Conducted literature reviews for several ongoing research projects in AI for non-destructive inspection and efficient AI models.

Northern Illinois University Dekalb, IL
Teaching Assistant (CSCI 463) *Jan 2023 - May 2023*

- Hosted engaging review sessions through whole-class discussions for a class of 77 students to ensure exam readiness, reinforcing course concepts and facilitating student success.
- Offered weekly office hours and one-on-one tutoring sessions, supporting students in navigating difficult concepts and facilitating their mastery of the course material.

Intel Corporation Hillsboro, OR

AI Software Internship *June 2022 – December 2022*

- Optimized deep learning models and frameworks through precision reduction, sparsity induction, and graph/library optimization.
- Conducted system characterization to evaluate data science model performance on various CPU configurations.
- Developed power-efficient deep learning models for TensorFlow and PyTorch.
- Debugged and tested software in a fast-paced environment.
- Benchmarked and validated AI model performance against system/kernel/framework feature knobs.

Northern Illinois Univesity Dekalb, IL

Research Assistantship *October 2019 – May 2022*

- Leveraged computer vision for patient movement analysis in long-term care facilities.
- Built optimized and compressed machine learning algorithms for edge devices.
- Integrated AI into COVID-19 healthcare applications for disease diagnostics.
- Researched human activity recognition for healthcare using pervasive technologies.
- Programmed Android smartwatch app for data collection and upload to Firebase cloud.
- Served as teaching assistant for graduate courses in Neural Networks, Computer Vision, and Applied Machine Learning.

Division of Information Technology Dekalb, IL

Technology Support Analyst *August 2018 – December 2019*

- Trained and supervised student workers in delivering technical support to university staff and students.
- Created comprehensive technical documentation for troubleshooting network and software application issues.
- Successfully resolved 500+ technical issues related to graphic cards, OS imaging, hardware systems, and university-affiliated applications.

Defense Research and Developmental Organization Telangana, India

Embedded Systems Internship *May 2016 – July 2016*

- Conducted performance evaluations of embedded systems using simulation software to assess functionality and efficiency.
- Designed four voltage and current regulation systems on embedded chip, achieving 5% efficiency boost from baseline.
- Explored embedded systems integration with networks and reinforced OWASP securities in Internet of Things.
- Analyzed embedded systems in automatic component testing and hydraulics.

Publications

Published

∗ **Venkata Devesh Reddy Seethi**, Ashiqur Rahman, Austin Yunker, Zachary Karl, Rajkumar Kettimuthu, Hamed Alhoori,“ Advanced Vision-Based Defect Localization in Aircraft Fuselages”, Aerospace Structures, Structural Dynamics, and Materials Conference (2025) [abstract accepted, full paper - December 2024]

∗ **Venkata Devesh Reddy Seethi**, Ashiqur Rahman, Austin Yunker, Rami Lake, Zachary Karl, Rajkumar Kettimuthu, Hamed Alhoori, “Mixture-of-Experts for Multi-Domain Defect Identification in Non-Destructive Inspection”, International Conference on Machine Learning and Applications (2024) [h-index: 55]

∗ Ibrahim Al Azher, **Venkata Devesh Reddy Seethi**, Akhil Pandey Akella, Hamed Alhoori, “LLM-based Topic Modeling and Text Summarization for Analyzing Scientific Articles limitations”, Joint Conference on Digital Libraries (2024) [h-index: 45]

∗ Zane LaCasse, Prajkta Chivte, Kari Kress, **Venkata Devesh Reddy Seethi**, Joshua Bland, Hamed Alhoori, Shrihari S. Kadkol, Elizabeth R. Gaillard. “Enhancing saliva diagnostics: the impact of Amylase depletion on MALDI-ToF MS profiles as applied to COVID-19.” *Journal of Mass Spectrometry and Advances in the Clinical Lab*, 31 (2024): 59-71. [h-index: 16]

∗ **Venkata Devesh Reddy Seethi**, Zane LaCasse, Prajkta Chivte, Joshua Bland, Shrihari S Kadkol, Elizabeth R Gaillard, Pratool Bharti, Hamed Alhoori. “An explainable-AI approach for diagnosis of COVID-19 using MALDI-ToF mass spectrometry.” *Journal of Expert Systems With Applications*, 236 (2024): 121226. [h-index: 249]

∗ Mrinmoy Roy, **Venkata Devesh Reddy Seethi**, Rami Lake, Pratool Bharti. “CovidAlert - A Wristwatch-based System to Alert Users from Face Touching.” 15th EAI International Conference on Pervasive Computing Technologies for Healthcare, (2021) pp. 489-504. [h-index: 29]

* Prajkta Chivte, Zane LaCasse, **Venkata Devesh Reddy Seethi**, Pratool Bharti, Joshua Bland, Shrihari S Kadkol, Elizabeth R Gaillard. "MALDI-ToF Protein Profiling as a Potential Rapid Diagnostic Platform for COVID-19." *Journal of Mass Spectrometry and Advances in the Clinical lab*, 21 (2021): 31-41. [h-index: 16]
* **Venkata Devesh Reddy Seethi**, Pratool Bharti. "CNN-based Speed Detection Algorithm for Walking and Running using Wrist-worn Wearable Sensors." IEEE International Workshop on Deep Learning on Edge for Smart Health and Well-being Applications, (2020) pp. 278-283.
* Ashiqur Rahman, **Venkata Devesh Reddy Seethi**, Simon Shulgan, Rui Zhang Ehsan Mohammadi, Hamed Alhoori. "Analyzing Twitter Bot Activity on Academic Articles." 11th International Conference on Social Media and Society, (2020).

Thesis

* **Venkata Devesh Reddy Seethi**, Pratool Bharti (Advisor), Reva Freedman (member), Hamed Alhoori (member). "Master Thesis in Human Activity Intensity Detection Using Wrist-Worn Wearable Sensors." Northern Illinois University, 2020.

Under Review

* Tamjid Azad, Ibrahim Al Azher, **Venkata Devesh Reddy Seethi**, Hamed Alhoori, "Can LLMs Predict the Impact of Scholarly Research?"

In Progress

* **Venkata Devesh Reddy Seethi**, Cheng Han, Hamed Alhoori, "Zero-Shot Diffusion for Synthetic Anomaly Generation", Computer Vision and Pattern Recognition Conference (2025)
* **Venkata Devesh Reddy Seethi**, Zachary Karl, Rajkumar Kettimuthu, Hamed Alhoori "Effective Non-Destructive Inspection Framework With a Unified XAI Framework"
* **Venkata Devesh Reddy Seethi**, Pratool Bharti, Hongdao Meng. "Quantifying Engagement Levels in Assistive Care Facilities towards Music Using Computer Vision Techniques"
* Ashiqur Rahman, **Venkata Devesh Reddy Seethi**, Austin Yunker, Rajkumar Kettimuthu, Zachary Karl, Hamed Alhoori, "A Multidisciplinary Survey of AI-Assisted Applications For Non-Destructive Inspection"

Projects

- **A Continual Learning Framework for Inspector-In-The-Loop System for Explainable Inspection** (2023)
- **Visualization Tool for Interpreting Random Forest Rules Using D3JS and Javascript** (2021)
- **Developing a Graphics Pipeline Modeled After Pixar's Renderman for Scene Creation** (2021)
- **Using Instagram Data to Understand Public Health Perspectives with Computer Vision** (2019)
- **Exploring Bot Strategies and Scholarly Article Dissemination on Twitter** (2019)
- **Story-Based Visualization of Washington DC BikeShare Data for Climate Patterns** (2019)
- **A Scholarly Article and Academic Profile Recommendation System** (2018)
- **Developing a Smart Home Automation Prototype for Energy Efficiency with Raspberry Pi** (2017)
- **Long-Range Car Parking Sensor System with Ultrasonic Obstacle Detection** (2016)

Invited Talks And Presentations

- **Mixture-of-Experts for Multi-Domain Defect Identification in Non-Destructive Inspection**, International Conference on Machine Learning and Applications (2024)
- **Automatic Segmentation of Sand Grains in Low Contrast High Energy Tomography**, Learning On The Lawn Poster Presentation, Argonne National Laboratory (2024)
- **Data Parallelization, Model Sharding, and Distributed AI Systems**, Northern Illinois University, CSCI 637 (2024)
- **Leveraging HPC resources for Scientific AI workloads**, University of Illinois, Chicago (2023)
- **A Guide to Explaining Black Box Systems With Explainable AI**, Northern Illinois University, CSCI 636 (2023)
- **CovidAlert - A Wristwatch-based System to Alert Users from Face Touching**, 15th EAI International Conference on Pervasive Computing Technologies for Healthcare (2021)
- **CNN-based Speed Detection Algorithm for Walking and Running using Wrist-worn Wearable Sensors**, IEEE International Workshop on Deep Learning on Edge for Smart Health and Well-being Applications (2020)

Honors & Awards

- 4^th position in International Intel student ambassador AI solution hackathon (2023)
- Google Cloud Research Credit Grant (2023)
- Ranked top 3 on Intel LLM leaderboard for 3 months consecutive months (2024)

Services

Program Committee Member
* CIKM 2023, CIKM 2024

Reviewer
* Journal of Expert Systems with Applications

Activities

- **Intel Graduate Ambassador**, February 2022 – Present
- **Division of Information Technology Representative**, August 2019 – August 2019
- **United Nations Educational, Scientific and Cultural Organization Volunteer**, TECH2017 conference, December 2017 – April 2018
- **Mozilla Student Ambassador**, GITAM University, August 2016 – August 2017
- **Entecres Labs Campus Ambassador**, August 2016 – August 2017

Skills

Languages: Python, C++, Embedded C, Java, JavaScript, R
Machine Learning: Multimodal Fusion, Anomaly Detection, Explainable-AI, Computer Vision, Generative Models, Distributed Learning, Visual Analytics
ML Frameworks: TensorFlow, TensorHub, PyTorch, OpenCV, scikit-learn, Spark, SHAP, ML360, PyAudio, Transformers
Web Tools: Node.js, Flutter, Passport.js, Express, React, HTML, CSS, PHP
Databases: PostgreSQL, Heroku, MongoDB, Intel DevCloud, AWS, GCP, Firebase
Others: Android, Computer Graphics, Docker, Git, CUDA, oneAPI, NVIDIA Jetson, Raspberry Pi, Arduino, Make
Operating Systems: Linux, MacOS, Windows
IDEs: Tmux+Emacs/Vim, VS Code, Jupyter, Spyder, CLion, PyCharm, Android Studio
Electronics: Computer Architecture and Organization, Microelectronics, Embedded Systems