

Inspired by insatiable curiosity towards science, I am passionate about driving innovation in the field of Machine Learning, Automation and Computer Vision. My areas of interest include but are not limited to:

Computer Vision

- Generative Models, Scene and Video Understanding
- Anomaly and Complex Activity Detection
- Image processing, filtering, and feature engineering
- Large Scale Content Retrieval with Human in the loop
- Remote sensing, supported by a good knowledge of Signal Processing and Photography
- 3D Computer Graphics: OpenGL, Blender and Vulkan

Machine Learning

- Interpretable ML/Explainable Ai
- Interactive Machine Learning and Search
- Matrix, subspace and Bayesian methods
- Statistical Relational Learning, Uncertainty Quantification, Estimation, and Time series forecasting
- Online Learning and Bandit Theory
- Large Language and Vision (LLM/VLM) Models

Software Development

- Experience orchestrating Software development, integration, testing, and deployment in Python
 - Experience developing real-time AI toolkits leveraging frameworks such as Pytorch, Tensorflow, Kubernetes, AWS
 - Complementary experience with low-level or hardware languages like Assembly, VHDL, Verilog, C, and C++
-

Work Experience

Association for the Advancement of Artificial Intelligence (AAAI), Workflow Chair July' 23 - February' 24
Handled Workflow responsibilities for the AAAI 2024 Conference in Vancouver, Canada

NASA Jet Propulsion Laboratory (JPL), CalTech, Graduate Research Fellow July' 22 - September' 22
Machine Learning and Instrument Autonomy (MLIA) Group

Interpretable ML for [Planetary Data System](#) under Steven Lu and Dr. Kiri Wagstaff

Oregon State University, Graduate Assistant September' 21 - Present

(Research interest: Global explanations for Complex Human Activity Data)

Kitware Inc, Research and Development Engineer January' 19 - August' 21

(Research interests: Explainable AI, Remote Sensing, Interactive machine learning and retrieval)

Software Developer on [Explainable AI Toolkit](#), under Dr. Brian Hu

Researcher on **AFRL DIY-AI**, under Dr. Brian Clipp and Daniel Davila

Software Development on **DARPA Explainable AI**, under Dr. Anthony Hoogs

Software Development Lead on **US-SOCOM Human-Machine Teaming**, under Dr. Arslan Basharat

Research Engineer on **AFRL VIGILANT**, under Dr. Rusty Blue and William Hicks

Kitware Inc, Research and Development Intern

(Research interest: Image Generation, Domain Adaptation)

Research Intern on **AFRL VIGILANT**, under Dr. Rusty Blue and Dr. Charles Law

June 18' - August' 18

Rochester Institute of Technology, Graduate Research Assistant

August' 17 - December' 18

(Research interest: Change/Anomaly detection, Remote Sensing, Image translation, Sensor modeling)

GRA at **Real-time Vision and Image Processing Lab** under Prof. Andreas Savakis and Prof. John Kerekes

Publications

- **Bhavan Vasu**, Giuseppe Raffa, Prasad Tadepalli. **Disentangling Where and When: Factored Spatio-Temporal Explanations for Video Action Recognition**, The Fortieth Annual Conference on Neural Information Processing Systems (NeurIPS), 2026.
- Saurabh Mathur*, Sahil Sidheekh*, **Bhavan Vasu***, Farbod Tavakkoli, Kristian Kersting, Sriiram Natarajan, Prasad Tadepalli. **Learning Probabilistic Logic Programs with Functional Gradient Guided Language Models**, Sixth International Joint Conference on Learning and Reasoning (IJCLR), Valencia, Spain 2026.

- **Bhavan Vasu**, Giuseppe Raffa, Prasad Tadepalli. **Local-to-Global Logical Explanations for Deep Vision Models**, Fifth International Joint Conference on Learning and Reasoning (IJCLR), Guildford, UK 2025[[URL](#)]
- **Bhavan Vasu**, Kunal Rathore, Prasad Tadepalli. **Beyond Local Explanations: A Framework for Global Concept-Based Interpretation in Image Classification**, Electronics 2025 [[URL](#)].
- **Bhavan Vasu**, Steven Lu, Emily Dunkel, Kiri L Wagstaff, Kevin Grimes, Michael McAuley, “**Interactive Mars Content-Based Search with Interpretable Machine Learning**”, Thirty-Eighth Conference on Innovative Applications of Artificial Intelligence (IAAI), Vancouver, Canada 2024[[URL](#)].
- **Bhavan Vasu**, Prasad Tadepalli, “**Global Explanations for Image Classifiers**”, Thirty-Seventh Conference on Artificial Intelligence (AAAI), Student Abstract Program, Washington, DC 2023.[[URL](#)]
- Steven Lu, Kiri Wagstaff, Emily Dunkel, **Bhavan Vasu**, Kevin Grimes, and Michael McAuley, “**Content-based Search of Large Image Archives at PDS Imaging Node**”, American Geophysical Union (AGU) 2022.
- Brian Hu, **Bhavan Vasu**, and Anthony Hoogs, “**Explainable Medical Image Retrieval**”, The IEEE Winter Conference on Applications of Computer Vision. 2022.[[URL](#)]
- Brian Hu, Paul Tunison, **Bhavan Vasu**, Nitesh Menon, Roddy Collins and Anthony Hoogs, “**XAITK: The Explainable AI toolkit**”, Applied AI Letters Journal, 2021.[[URL](#)]
- **Bhavan Vasu**, Brian Hu, Bo Dong, Roddy Collins and Anthony Hoogs, “**Explainable, Interactive Content-Based Image Retrieval**”, Applied AI Letters Journal, 2021.[[URL](#)]
- **B. Vasu** and A. Savakis, “**Resilience and Plasticity of Deep Network Interpretations for Aerial Imagery**,” IEEE Access, 2020. [[URL](#)]
- **Vasu, Bhavan**, and Chengjiang Long. “**Iterative and Adaptive Sampling with Spatial Attention for Black-Box Model Explanations.**” The IEEE Winter Conference on Applications of Computer Vision. 2020. [[URL](#)]
- **B. Vasu**, J. Barnett, R. Collins, and A. Hoogs, “**Explainability for Content-Based Image Retrieval**,” in Proceedings of the MSS National Symposium on Sensor and Data Fusion, 2019.
- W. Hicks, **B. Vasu**, B. Pikus, R. Blue, and A. Hoogs. “**Training Deep Networks for Patch-Based Search in Satellite Imagery.**” In Proceedings of the MSS National Symposium on Sensor and Data Fusion (NSSDF), 2019.
- **Vasu, Bhavan**, and Andreas E. Savakis. “**Visualizing the Resilience of Deep Convolutional Network Interpretations.**” CVPR Workshops. 2019. [[URL](#)]
- F. Rahman, **B. Vasu**, J. V. Cor, J. Kerekes and A. Savakis, “**Siamese Network With Multi-Level Features For Patch-Based Change Detection In Satellite Imagery**,” 2018 IEEE Global Conference on Signal and Information Processing (GlobalSIP), Anaheim, CA, USA, 2018. [[URL](#)]
- C. Law, R. Blue, D. Stoup, P. Tunison, A. Hoogs, **B. Vasu**, J. Van Cor, J. Kerekes, A. Savakis, T. Rovito, C. Stansifer, and S. Thomas, “**Deep Learning for Object Detection and Classification in Satellite Imagery**”, in Proceedings of the MSS National Symposium on Sensor and Data Fusion, 2018.
- Rahman, Faiz Ur, **Bhavan Vasu**, and Andreas Savakis. “**Resilience and Self-Healing of Deep Convolutional Object Detectors.**” 2018 25th IEEE International Conference on Image Processing (ICIP). IEEE, 2018. [[URL](#)]
- **B. Vasu**, F. U. Rahman and A. Savakis, “**Aerial-CAM: Salient Structures and Textures in Network Class Activation Maps of Aerial Imagery**,” 2018 IEEE 13th Image, Video, and Multidimensional Signal Processing Workshop (IVMSP), Zagorochoria, 2018. [[URL](#)]

Projects

Global Explanations for Interpretable Action Detection and Classification, Oregon State University, January 2022 - Present

Deep explanation methodologies often yield subjective explanations due to the lack of common linguistic representations to express explanations. My work attempts to bridge the gap with linguistic understanding of Human Activity Detection and Classification. Additionally it also uses the generated global explanations to identify anomalous action sequences.

Glass Dome Racing, Oregon State University, November 2023 - December 2023

Simulating realistic graphics for racing games is often challenging. I came up with an approach called the “Glass Dome” that locally projects sky texture maps inside a transitory sphere that moves along with the player while rotating on its axis to best simulate reality.

Interpretable Machine Learning, NASA Jet Propulsion Laboratory, CalTech, June 2022 - September 2022

Tasked to investigate the possibility of a transparent image search on the [Planetary Data System](#) for imagery from the [Mars Curiosity Rover](#) and [Mars Reconnaissance Orbiter](#). I built deep models that were inherently explainable with minimal drop in performance when compared to its opaque traditional deep convolution network.

XAITK: The explainable AI toolkit, Kitware Inc, June 2021 - August 2021

I have contributed several implementations of black-box explainers for retrieval and classification to the open-source explainable AI toolkit funded by DARPA and JAIC for pushing evidence-based validation of AI models. Received [honorable mention](#) at Pytorch developer’s day 2021 for responsible AI development.

DARPA Explainable AI, Kitware Inc & UC Berkeley, April 2019 - June 2021

The project aims at bridging the gap between machine learning interpretation and human mental-model/understanding with the help of explainable and advisable Human In The Loop, ML systems to improve user-task performance. My role as software development and research lead is to explore new explainable methods and evaluate their effectiveness for mental model alignment and user task efficiency.

USSOCOM eXplainable Human-Machine Teaming, Kitware Inc, Jan 2019 - July 2019

As a research lead on the xHMT project I developed systems that facilitated explainable interactive query refinement on aerial full motion videos with active learning. This work also examined the user-task performance benefit of using explanations in image retrieval.

AFRL VIGILANT: Patch Based Search system for large scale retrieval in geospatial imagery, Kitware Inc, Jan 2019 - March 2020

Developed algorithms that achieved real time human-in-the-loop fine-grained or attribute based image retrieval on geo-spatialized satellite imagery. As one of the research leads on VIGILANT, I developed hybrid systems incorporating few-shot and active learning training strategies to perform both image classification and retrieval simultaneously. Improving performance by almost 3x compared to standard metric learning.

Masters Thesis: Visualizing Resiliency Of Deep Convolutional Network Interpretations For Aerial Imagery, Dec 2018

This work deals with visualizing and quantifying the resiliency of some popular network architectures for aerial scene classification by determining a p-map score that evaluates the class activation mapping of aerial imagery when subjected to various degrees of failures. Finally, it tries to map the ability of the networks to self-heal and recover its performance by retraining its healthy portions after partial damage.

AFRL VIGILANT: Simulated Generative Adversarial Network(SimGAN) for DIRSIG generated aerial imagery, Kitware Inc, June 2018

My work improved the accuracy of neural networks trained on synthetic data from 59% to 85%. The network was trained on DIRSIG (The Digital Imaging and Remote Sensing Image Generation) for tasks such as classification and segmentation. This work was implemented on Keras with a tensorflow backend.

AFRL VIGILANT: Change detection in aerial imagery using Siamese Neural Network and Feature selection, RIT, January 2018

Successfully proposed a Siamese neural network that can detect changes in bi-temporal aerial images with an accuracy of 96.7%. The network was trained and tested on DIRSIG simulated data to match the spectral properties of images from RapidEye for structured change detection. This was implemented on tensorflow.

Design and implementation of weighted priority arbiter using finite state machine (FSM), Global Academy of technology, April 2015

Designed and implemented a weighted priority arbiter for solving resource contention between intellectual properties (IPs) such as processor cores, memories, on-chip switches/networks. managed to reduce delay by a 9% during resource allocation.

Education

Oregon State University, Oregon, USA

Sept' 21 - Present

Doctor of Philosophy, Electrical Electronics and Computer Science, GPA 3.74/ 4.0

Rochester Institute of Technology, Rochester, USA

Jan' 16 - Dec' 18

Master of Science in Computer Engineering, GPA 3.40/ 4.0

Global Academy of Technology, Bangalore, India

Sept' 11 - April' 15

Bachelor of Engineering in Electronics and Communication Engineering, GPA 3.0/4.0

Extracurricular/Volunteering activities

- Awarded 1st place for both 2023 and 2024 for best poster at AI Week at Oregon State University
- Workflow Chair, [Association for the Advancement of Artificial Intelligence \(AAAI\)](#) 2024
- Awarded "Most Impactful Research" at the [NSF-Pervasive Personalized Intelligence](#) Fall 2022 Meeting, Portland, OR
- Vice President, EECS Graduate Student Association, Oregon State University, 2022 - 2024
- Public Relations Officer, EECS Graduate Student Association, Oregon State University, 2022 - 2024
- Program Committee, The Fortieth Annual Conference on Neural Information Processing Systems (NeurIPS) 2026
- Program Committee Member, The Fifteenth International Conference on Learning Representations (ICLR) 2027
- Program Committee, Association for the Advancement of Artificial Intelligence (AAAI) 2024, 2025, 2026
- Program Committee, Computer Vision and Image Understanding Journal (ranked 69 of 273 in Engineering, Electrical & Electronic)
- Kitware's AI team, Committee member, September 2020 - August 2021
- Awarded 1st place in SJBIT's inter-collegiate on-spot photography competition held in Bangalore, 2015.
- Awarded 1st place in the national abacus hunt by 'BRAINOBRAIN' in Madras, India, 2009.

Languages

Native/Fluent: English, [Telugu](#), [Kannada](#), [Hindi](#)

Conversational: [Tamil](#), [Malayalam](#)

