Nithun Selva

Curriculum Vitæ

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EDUCATION

Colby College, Waterville, ME *Expected May 2025*
Bachelor of Arts in Astrophysics and Computer Science: AI GPA: 4.0/4.0
Honors: Dean's List (Spring 2022 – Spring 2024)
Relevant Coursework: Galaxies and Cosmology, Modern Physics, Quantum Mechanics, Thermodynamics and Statistical Mechanics, Vector Calculus, Computational Modeling and Simulation, Deep Learning, Neural Networks

SKILLS

Astronomy: Observational Astronomy, Image Processing & Data Reduction, Time-Series Analysis, Astrometry, Photometry, Spectroscopy, Telescope Calibration & Instrumentation
Research Interests: Galaxy Evolution & Morphology, Machine Learning, Computational Astronomy
Programming: Python, SQL, MATLAB, C/C++, IDL, Shell, Javascript, Swift, Java, HTML/CSS
Frameworks/Tools: Astropy, Anaconda, NumPy, SciPy, Matplotlib, TensorFlow, OpenCV, JAX, PIL, Git, Linux/Unix, LaTeX, Docker, Jupyter, KVM/QEMU
Software: Maxim DL, SAOImage DS9, NINA, ASCOM, KStars/INDI, PixInsight, Aladin, SkyX
Languages: Tamil (native/bilingual), Mandarin Chinese (elementary), Hindi (elementary)

RESEARCH EXPERIENCE

Research Assistant Feb 2023 – Present
Colby College Department of Physics and Astronomy
PI: Prof. Dale Kocevski

- Built contrast-invariant ML models to classify galaxy morphologies across redshifts using James Webb Space Telescope (JWST) data from the CEERS collaboration–being developed into an Honors Thesis.
- Curated and manually classified an extensive galaxy morphology dataset from JWST for optimal model training, improving accuracy over existing Hubble-based classifications.
- Integrated JWST and Chandra X-Ray Telescope data to assist in identifying new Active Galactic Nuclei (AGN) candidates.
- Optimized code to run on the Colby HPC GPU cluster, significantly reducing training time for deep learning models.

Observatory Assistant Feb 2022 – Present
Colby College Young-Collins Observatory
Supervisors: Prof. Elizabeth McGrath, Michaela Allen

- Maintain and operate the Colby College Young-Collins Observatory, ensuring the functionality of a PlaneWave 0.7m CDK700 telescope, a FLI CCD camera, six 8" Schmidt-Cassegrain telescopes (SCTs), a 14" SCT, and four CMOS/DSLR cameras.
- Perform routine maintenance and calibration of the CDK700 and CCD, including optical cleaning, encoder adjustments, filter installation, secondary camera mounting/alignment, and dome alignment.
- Capture exoplanet transit data for UMaine graduate research using the CDK700 telescope and CCD.
- Develop and implement observing plans for astronomical targets like nebulae, star clusters, and galaxies.
- Improve image processing pipelines for FITS data reduction and analysis, including bias, dark, and flat field corrections, as well as calibration and astrometric alignment using Astropy and PixInsight.
- Train students in telescope operation, observational techniques, and data acquisition.
- Organize public observing nights and outreach events to promote astronomy education.

Research Assistant Feb 2022 – Feb 2023
Colby College Department of Physics and Astronomy
PI: Prof. Elizabeth McGrath

- Analyzed galaxy evolution based on local environments using data from the Hubble CANDELS sky survey.
- Migrated 10+ astronomical IDL scripts to Python.

Research Assistant Feb 2023 – Present
Colby College Department of Computer Science
PI: Prof. Ying Li

- Leveraged Python and TensorFlow to design and simulate a network of collaborative drone agents.
- Improved task success rates using advanced reinforcement learning algorithms like Proximal Policy Optimization (PPO).
- Tackled the curse of dimensionality by limiting information sharing to adjacent/local drone agents, achieving comparable performance to global sharing, optimizing code to enhance execution speed and scalability.
- Co-authored a conference paper submitted to ICCCN 2025 (under review).

Summer Research Assistant June 2024 – August 2024
Colby College Department of Computer Science
PIs: Prof. Ying Li, Prof. Hong Zhang

- Engineered textual and image analysis solutions for a digital archiving project of Chinese magazines from the 1950s–1970s for the East Asian Studies department, with the Davis Institute for AI.
- Filtered 500+ magazine pages to improve OCR accuracy for mixed traditional/simplified Chinese text and rectify scan issues.
- Employed the OpenAI API and prompt engineering to integrate images and transcribed text to generate descriptions and tags for each magazine page.
- Created a comprehensive list of identified objects/themes enhancing search functionality and accessibility.

TEACHING EXPERIENCE

Teaching Assistant Feb 2022 – Present
Colby College Department of Physics and Astronomy

- Teaching Assistant for AS151: Stars, Stellar Systems and Cosmology (Spring '22, Spring '23, Spring '24), AS231: Introduction to Astrophysics (Fall '22, Fall '23, Fall '24), and AS342: Galaxies and Cosmology (Spring '23, Spring '25).
- Hosted weekly office hours to assist students with problem sets and conceptual questions.
- Graded problem sets, providing feedback and support to students.
- Aided students with image reduction and analysis in Python during weekly labs.
- Supported nighttime labs at the Colby Young-Collins Observatory, ensuring optimal functioning of telescopes and observing equipment.

PUBLICATIONS & PRESENTATIONS

Modern Astrophotography Methods (Imaging & Processing)
Presentation, Colby Liberal Arts Symposium April 2024
Nithun Selva

Distributed Energy-Aware Multi-Agent K-hop Proximal Policy Optimization for Mission-Oriented Drone Networks
Conference Article, ICCCN 2025 (under review)
Ying Li, Nithun Selva, Ruihan Zhu

REFERENCES

Prof. Dale Kocevski
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