PRISHITA RAY

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EDUCATION

Cornell University *Dec 2022*
M.Eng. in Computer Science (spec. in Robotics and Machine Learning)
GPA: 3.75/4.0
***Related courses**: Mathematical Foundations of ML, Introduction to Computer Vision, Foundations of Robotics, Principles of Large-Scale ML Systems, Digital Systems Design using Microcontrollers, Grad. Special Topics in Statistics (Graphical Models and Causal Discovery)*

Vellore Institute of Technology, Vellore *June 2021*
B.Tech. in Computer Science and Engineering
GPA: 9.1/10.0
***Related courses**: Data Structures and Algorithms, Natural Language Processing, Robotics and its Applications, Reinforcement Learning, Machine Learning [1], Data Mining, Compilers, Databases, Networks, Operating Systems, Statistics, Computer Architecture, Digital Logic and Design, Theory of Computation, Microprocessors*

RESEARCH INTERESTS

I am interested in exploring and improving **decision-making algorithms** to ensure better **robustness and task performance** in autonomous systems and robots for a wide variety of applications. Also would like to leverage recent trends in **foundation models** to aid in these learning strategies.

RESEARCH EXPERIENCE

I. Improving Environment Robustness of Deep Reinforcement Learning Approaches for Autonomous Racing Using Curriculum Learning Aug 2022 - Present
Supervisors: Prof. Mark Campbell Cornell University

Developed two **Curriculum Learning** methods to train **Reinforcement Learning agents** that are more robust to adversarial environments for the purpose of **Autonomous Racing**.

- i. In the first method, more-robust curricula were chosen through **Bayesian Optimization** over a **quadratic function** mapping RL agent **training epochs-based turnpoints to agent final reward** that successively generated more adversarial environments during training. (environment parameters: turnrates and obstacle probabilities)
- Published at Learning Robot Super Autonomy workshop, IROS 2023 [2].

- ii. In the second method, more-robust curricula were chosen through a more **sample-efficient automatic curriculum generation** algorithm that increased environment parameter difficulty level (turnrates and obstacle probabilities) over RL agent training epochs based on **gradients of estimated average value** with respect to the current environment parameters difficulty.
- Also applied **parameter-based** and **policy embedding-based** distribution shift regularizations to the above to boost performance.
- Under Submission.

II. Performing Human Shadow Detection for Camera-Based Privacy-Preserving Human-Robot Interactions Feb 2022 - Aug 2024
Supervisors: Prof. Guy Hoffman Cornell University

- Proposed a method for **preserving privacy** for **detection and tracking of humans in home environments** in real-time based on **physically obstructing** the robot's **camera input** to obtain a low-fidelity version, and **computer vision** methods to improve comfort-level and safety in the interactions.
- Published at IEEE RO-MAN 2024 [3] as part of the NSF NRI:INT: Ad-Hoc Collaborative Human-Robot Swarms project

III. Personalized Medication Message Design using Inverse Bandits, Reinforcement Learning and Large Language Models May 2024 - May 2025
Johns Hopkins University

- Worked at the Center for Digital Health and Artificial Intelligence to use **inverse contextual bandits, reinforcement learning** and **large language models** for personalized message design and prescription generation based on different patient cohort type pools.

IV. Stochastic Games for Energy Management in Microgrids May 2019 - July 2019
Supervisors: Prof. Shalabh Bhatnagar Indian Institute of Science

- Proposed a **Multi-Agent Reinforcement Learning** solution for **demand and supply management in Microgrids** using the RapSim simulator, using two DQN networks for scheduling of jobs (ADL Network) and trading energy (ET network) through a Dynamic Pricing scheme.
- Published at the IEEE-PES ISGT Europe 2020 [4] and funded through the Indian Academy of Sciences Summer Research Fellowship Programme (IAS SRFP 2019).

V. Scheduling Strategies to control flooding in a Renewable Energy Powered Automatic Water Dam Control System Jan 2021 - Jun 2021
Supervisors: Prof. Geraldine Bessie Amali D. Vellore Institute of Technology

- Experimented with **three scheduling algorithms** (RL-based(*) and Evolutionary Algorithms): Soft Actor Critic with Emphasized Recent Experience and Prioritized Experience Replay (SAC+ERE+PER)*, Proximal Policy Optimization (PPO)* and Natural Evolution Strategies (NES).
- Ensured maximum usage of available **renewable resources with lesser pollution** while controlling flooding optimally.
- Published at IEEE ICAIGE 2023 [5].

VI. Automated Multimodal Annotation using FrameNet Jun 2020 - Aug 2020
Supervisors: Prof. Tiago Timponi Torrent, Prof. Ely Edison Matos UFJF, Brasil

- Designed a **semi-automated annotation framework** for **multimodal corpora**, with the core and non-core frame elements present in the FrameNet database.
- Published at the LAW-XVI LREC 2022 workshop [6] and funded by the Google Summer of Code program (GSoC 2020) (in acknowledgements).

VII. Malware Classification with Reduced Label Dependency Dec 2019 - Sep 2021
Supervisors: Prof. Kakelli Anil Kumar Vellore Institute of Technology

- Performed multiclass classification of **network intrusion malwares** by extracting relevant features from log files of running processes in the web server system using variants of autoencoders and the FSFC Clustering algorithm.
- Used those features to classify each malware using **limited labeled examples** for training through Ladder Networks.
- Published at ICIIC 2021 [7] and received the Best Paper Award for presentation.

PUBLICATIONS

[1] **Ray, Prishita**, R. Kaluri, T. Reddy, K. Lakshmanna, *et al.*, "Contemporary developments and technologies in deep learning–based iot," in *Deep learning for internet of things infrastructure*, CRC Press, 2021, pp. 61–82. DOI: 10.1201/9781003032175-3.

[2] R. Banerjee*, **Ray*, Prishita**, and M. Campbell, "Improving environment robustness of deep reinforcement learning approaches for autonomous racing using bayesian optimization-based curriculum learning," *Learning Robot Super Autonomy Workshop, IROS 2023*, 2023. DOI: 10.48550/arXiv.2312.10557.

[3] Y. Hu*, **Ray*, Prishita**, and G. Hoffman, "Performing human shadow detection for camera-based privacy-preserving human-robot interactions," in *2024 33rd IEEE International Conference on Robot and Human Interactive Communication (RO-MAN)*, IEEE, 2024, pp. 1013–1020. DOI: 10.1109/RO-MAN60168.2024.10731324.

[4] S. Nayak, C. A. Ekbote, A. P. S. Chauhan, R. B. Diddigi, **Ray, Prishita**, A. Sikdar, S. K. R. Danda, and S. Bhatnagar, "Stochastic game frameworks for efficient energy management in microgrid networks," in *2020 IEEE PES Innovative Smart Grid Technologies Europe (ISGT-Europe)*, IEEE, 2020, pp. 116–120. DOI: 10.1109/ISGT-Europe47291.2020.9248952.

[5] **Ray, Prishita** and G. B. A. D., "An intelligent rl-based scheduler to control flooding in a renewable energy powered automatic water dam control system," in *2023 IEEE International Conference on Artificial Intelligence Green Energy (ICAIGE)*, 2023, pp. 1–6. DOI: 10.1109/ICAIGE58321.2023.10346395.

[6] F. Belcavello, M. Viridiano, E. Matos, and T. Timponi Torrent, "Charon: A framenet annotation tool for multimodal corpora," in *Proceedings of the 16th Linguistic Annotation Workshop (LAW-XVI) within LREC2022*, Marseille, France: European Language Resources Association, Jun. 2022, pp. 91–96. [Online]. Available: https://aclanthology.org/2022.law-1.11.

[7] **Ray, Prishita**, T. Nandan, L. Anne, and K. A. Kumar, "A new combined model with reduced label dependency for malware classification," in *3rd International Conference on Integrated Intelligent Computing Communication Security (ICIIC 2021)*, Atlantis Press, 2021, pp. 23–32. DOI: 10.2991/ahis.k.210913.004.

ACHIEVEMENTS/HONORS

Academic Excellence Recognition (GPA: 3.9/4.0), CS department, Cornell University	*Spring 2022*
Best Paper Award, ICIIC Conference 2021	*Aug 2021*
Google Summer of Code 2020 (2.77% acceptance rate), Google	*Summer 2020*
Summer Research Fellowship (0.83% acceptance rate), Indian Academy of Sciences	*Summer 2019*
VIT Academic Merit Scholarship (Branch Rank 4, GPA: 9.6/10.0), VIT	*Spring 2018*
National Talent Search Examination (NTSE) Scholarship (State Rank 19)	*Summer 2015-2016*

SERVICE

Peer Reviewer, IEEE RO-MAN Conference	*2024*
Peer Reviewer, Journal of Network and Systems Management- Special issue for Cybersecurity management in the era of AI.	*2020*

PROFESSIONAL EXPERIENCE/OPEN SOURCE CONTRIBUTIONS

American Express, Engineer III	*Apr 2023-Jan 2024*
HARMAN International, Associate ML Engineer	*Sep 2021- Jan 2022*
VISA Inc., Software Engineering Intern	*May 2020- Jul 2020*
Google, Google Summer of Code Program	*Jun 2020- Aug 2020*
Hewlett Packard Enterprise, CTY Program Intern	*Jan 2020- Jun 2020*
Samsung R&D Institute, PRISM Program Intern	*Oct 2019- Jul 2020*

SKILLS/HOBBIES

Programming Languages	Python, LaTeX, C/C++, MATLAB, HTML
Machine Learning Tools	PyTorch, Tensorflow, ROS2, StableBaselines3, JAX
Research Areas	Reinforcement Learning, Robotics, Foundation Models
Robotic Platforms	Reachy by Pollen Robotics, Jibo
Simulators	Mujoco, OpenAI Gym, Rapsim
Microcontrollers and Microprocessors	Raspberry Pi 4B, Arduino Uno, Intel 8086
Hobbies	piano/keyboard, dancing, traveling, art