

PRISHITA RAY

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Homepage: [Portfolio](#)

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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 preparation.

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 - Present

Supervisors: Prof. Ritu Agarwal

Johns Hopkins University

- Working 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](#)).

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] P. Ray, R. Kaluri, T. Reddy, K. Lakshmanan, *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](https://doi.org/10.1201/9781003032175-3).
- [2] R. Banerjee*, P. Ray*, 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](https://doi.org/10.48550/arXiv.2312.10557).
- [3] Y. Hu*, P. Ray*, 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](https://doi.org/10.1109/RO-MAN60168.2024.10731324).
- [4] S. Nayak, C. A. Ekbote, A. P. S. Chauhan, R. B. Diddigi, P. Ray, 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](https://doi.org/10.1109/ISGT-Europe47291.2020.9248952).
- [5] P. Ray 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](https://doi.org/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] P. Ray, 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](https://doi.org/10.2991/ahis.k.210913.004).

ACHIEVEMENTS/HONORS

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

SERVICE

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

PROFESSIONAL EXPERIENCE/OPEN SOURCE CONTRIBUTIONS

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

SKILLS/HOBBIES

Programming Languages

Python, L^AT_EX, C/C++, MATLAB, HTML

Machine Learning Tools

PyTorch, Tensorflow, ROS2, StableBaselines3, JAX

Robotic Platforms

Reachy by Pollen Robotics, Jibo

Microcontrollers and Microprocessors

Raspberry Pi 4B, Arduino Uno, Intel 8086

Hobbies

piano/keyboard, dancing, traveling, art