

# Aseem Saxena

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## EDUCATION

### Oregon State University

Corvallis, OR

M.S in Artificial Intelligence | GPA: 3.89/4.0

Mar '21 - Expected Jun '24

*Courses: Reinforcement Learning, Deep Learning, Algorithms, Optimization, Probabilistic Graphical Models*

*Research: Multi-Task Learning, Bipedal Robots, Forecasting, AI Safety, Offline RL*

### Birla Institute of Technology and Science, Pilani

India

B.E in Electrical & Electronics Engineering, M.Sc in Biological Sciences (Dual Major)

'11- '16

## SKILLS

**Programming:** Python (10+ years exp.), MATLAB (9+ years exp.), C/C++ (9+ years exp.), JAVA (9+ years exp.)

**Software and Libraries:** PyTorch, OpenCV, ROS, Mujoco, TensorFlow, Git, Gazebo, Point Cloud Library, Docker, Ray, Isaac

## EXPERIENCE

### Oregon State University Graduate Research Assistant, Prof. Alan Fern

Jun '21 – Present

- **Multi-Task Learning** - Developed a model for Grape Cold-Hardiness Prediction that outperforms the state-of-the-art scientific model with just thirty seasons of data.
  - Our work is deployed on AgWeatherNet which is used monthly by 14K subscribers.
  - Our flexible framework is applied to other crops and their properties such as cherries, grape bud-break.
  - **[ML Journal]**(Under Review), **[AIAFS 2023]**(Accepted), **[IAAI 2023]**(Accepted). **Pytorch, RNNs**
- **Sim2Real RL for Bipedal Robots** - Developed RL controller for generating gaits to reach goal foot locations.
  - Transferred to the real world from simulation via randomizing the parameters of the simulation.
  - Trained a model to accurately check if a footstep is feasible. Published at **[ICRA 2022]**. **Pytorch, Mujoco**
- **AI Safety** - Proposed a Formal Criterion for avoiding Side Effects, demonstrated its effectiveness on gridworlds.
  - Published at **[NeurIPS ML Safety Workshop]** 2022. **Pytorch, AI Safety Gridworlds**
- **Forecasting (Ongoing)** - Grape Cold-Hardiness Forecasting via Multi-Task Learning without weather forecasts.
  - Early promising results for Soil temperature Forecasting. Plan to deploy on AgWeatherNet. **Pytorch, RNNs**
- **Offline RL** - Studied effect of different farmer strategies across different farms (without access to a simulator).
  - Trained a Multi-Dynamics World Model and showed that it incurs negative interference under limited data, undermining generalization. **World Models, Crop Simulators, Model-based Off-Policy Evaluation**
- **Teaching** - Systems Dynamics and Control, Fall 2021 with weekly office hours and evaluation duties.

### Panasonic Singapore AI Engineer, Technology Innovation Team

Jan '19 – Jan '21

- **Bayesian Optimization for Material Design** - With just a single trial, obtained a material having properties similar to another material obtained with over 20 trials conducted in a period of 2 years. **Pytorch, Gaussian Processes**
- **Edge Deployment** of Deep Learning Models - Successfully deployed vision models on dated Android TV boxes with lower computational resources, achieving a 30 FPS. **Pytorch, OpenCV, TensorFlow, Android 6.0, ONNX**
- Real-time **Multi-Object Tracking** - Developed a 50+ FPS tracker using Kalman Filters for state estimation and Hungarian algorithm for data association. Tracker deployed in a shop with 1000 daily visits. **OpenCV, C++**
- Deep Learning for **Gaze Estimation** - Trained a robust gaze prediction model entirely on synthetic images, fine-tuned on real images and successfully deployed on a beta trial in a shop with 1000 daily visits. **Unity, Pytorch**

### National University of Singapore Research Staff, Prof David Hsu

Jan '17 – Jun '18

- Autonomous Driving in a Crowd by **Learning from Tree Search** - Published at **[RSS 2019]**. **Pytorch, C++, Unity**
- Developed a feature rich **visualization tool** to debug **QMDPNet**, an approx. POMDP Solver. **TensorFlow, Tkinter**
- Developed a **robust position and velocity controller** for the Fetch Robot for indoor navigation. **ROS, C++**

### Ducere Technologies, India Computer Vision Engineer

Jul '16 – Apr '17

- Developed a **Low cost 3D LiDAR** system using Teraranger One ToF sensor on a pan-tilt unit. **Point Cloud Library**

### IIIT Hyderabad, India Research Staff, Prof Madhava Krishna

Apr '17- Jul '17, Jun '15 – Jul '16

- **Learning** based approach for **Visual Servoing** - Published at **[ICRA 2017]**. **Caffe, OpenRAVE, MATLAB, Drones**
- Developed a robust system for **traffic sign detection, recognition and tracking** as part of a driverless car challenge for Indian automobile manufacturing company - Mahindra. Deployed and tested on a car. **OpenCV, C++**

## COURSE PROJECTS

- Avoiding Side Effects in Conway's Game of Life Environments via Multi-Task Learning **[Slides]**
- Distributed DQN Q-Learning with Ray Framework via CPU parallelism for data collection and updates **[Code]**
- Offline-RL for Bipedal Robots via Behavior Cloning and Actor-Critic Learning **[Report]**
- Studying Robustness of Semi-supervised Visual Features to Adversarial Attacks **[Report]**
- Monte Carlo Dropout for Efficient RL Exploration in Continuous Maze Environments **[Report]**

## EXTRACURRICULAR Musician **[Youtube]**, Amateur Triathlete **[Certificate]**