Aseem Saxena

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Education

MS in Artificial Intelligence   Mar '21 - Current(Expected June 2023)
Oregon State University   Current GPA: 3.86/4.0
Areas of Research : *Multi-Task Learning, AI Safety, Bipedal Robots*

B.E(Hons) in Electrical and Electronics Engineering
M.Sc(Hons) in Biological Sciences   2011–2016
Birla Institute of Technology and Science Pilani, India   GPA: 7.34/10.00

Experience

Graduate Research Assistant : Oregon State University   Jun '21–Present
Advisor: Prof Alan Fern   *Corvallis, Oregon, USA*

- **Offline Policy Evaluation in Multi-Dynamic Settings.** We show that multi-task dynamics networks suffer from negative interference at small dataset sizes. **Skills -** *Pytorch, Mujoco, Crop Simulators*
- **Multi-Task Learning for Grape Cold-Hardiness Prediction.** We show that with just upto thirty seasons of data for any cultivar, our MTL model can consistently outperform the state-of-the-art scientific model. Our work is deployed on [AgWeatherNet](https://weather.wsu.edu) which is used daily by 14K subscribers. Published research at Machine Learning Journal, AAAI 2023, AIAFS 2023. [1] [2] [3]. **Skills -** *Pytorch, RNNs*
- **Sim-to-real Learning of Footstep Constrained Bipedal Locomotion.** We develop an RL formulation for training dynamic gait controllers that can respond to specified touchdown locations. Published research at IEEE ICRA 2022. [4] **Skills -** *Pytorch, Mujoco*
- **Side Effect Minimization in Reinforcement Learning.** We propose a formal criterion for side effect regularization via the assistance game framework and empirically demonstrate the reasonableness of our problem formalization via ground-truth evaluation in two gridworld environments. Published research at NeurIPS ML Safety Workshop 2022. [5] **Skills -** *Pytorch, AI Safety Gridworlds*
- **Teaching Assistant.** ME 430 **Systems Dynamics and Control**. Fall 2021.

AI Engineer   Jan '19–Jan '21
Panasonic : Technology Innovation Team   *Singapore*

- **Bayesian Optimization for Material Design.** Showed that with a single trial, we can obtain a material with similar properties to another material which was obtained over trial and error for a period of 2 years. **Skills -** *Pytorch, Gaussian Processes*
- **Edge Deployment of Deep Learning Models.**
  Skills - *Pytorch, OpenCV, TensorFlow, Android 6.0, ONNX*
- **Real-time Multi Object Tracking** Using Kalman filters for state estimation and Hungarian algorithm for data association. **Skills -** *C++*
- **Deep Learning for Gaze Estimation via Synthetic images.**
  Skills - *Pytorch, Unity*

Research Staff   Sep '17–Jul '18
National University of Singapore, Adaptive Computing Lab, Prof David Hsu   *Singapore*

- **Imitation Learning for Autonomous Driving in an Unstructured Environment.** Published research at Robotics: Science and Systems (RSS) 2019. [6] **Skills -** *Pytorch, C++, Unity*
- **Feature rich visualization tool** to visualize and debug QMDPNet, a deep learning algorithm for solving POMDPs. **Skills -** *TensorFlow, Tkinter*

- **Robust position and velocity controller for the Fetch robot.**
  Skills - ***ROS, C++***

Computer Vision Engineer   Jul '16–Apr '17
Ducere Technologies Pvt Ltd   *Hyderabad, India*

- Low cost LiDAR system using a Teraranger One ToF sensor on a pan tilt unit for 3D scanning. **Skills - *PointCloud Library***
- Obstacle Avoidance algorithm for depth data based on RANSAC for plane removal. **Skills - *PointCloud Library***

Research Assistant   Jun '15-Jul '16, Apr '17-Jul '17
Professor Madhava Krishna
Robotics Research Center, International Institute of Information Technology   *Hyderabad, India*

- ***Mahindra Driverless Car Challenge***: Robust system for traffic sign detection, recognition and tracking. **Skills - *Caffe, C++***
- **End-to-end learning based approach for visual servoing in diverse scenes**. Published research at ICRA 2019. [7] **Skills - *Caffe, OpenRAVE, MATLAB***
- **Implementation of 'Guess from Far Recognise when Near'**, a system for object search in unknown environments via frontier based navigation, far object recognition using 2D image segmentation and near object recognition using a bag of words model trained on 3D point clouds. **Skills - *ROS, PointCloud Library***
- **Deep Learning for Table Interest Point Detection** using cues from semantic segmentation and vanishing lines. **Skills - *OpenCV***
- **Automating GrabCut for Multilabel Image Segmentation** - Multi label image segmentation without user guidance by learning a Gaussian mixture model for each label and performing alpha expansion algorithm using MRF2.2 Library. **Skills - *C++***

Research Intern   May '14–Jul '14
Strand Life Sciences Pvt. Ltd.   *Bangalore, India*

- **Decision Trees and Support Vector Machines for classifying cancerous mutations**.
  Skills - ***Scikitlearn***

Academic Projects

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[1] **Avoiding Side Effects in Complex Navigation Environments** [Link]

[2] **Distributed Q-Learning** [Link]

[3] **Offline-RL for Bipedal Robots** [Link]

[4] **Studying Robustness of Semi-supervised Visual Features to Adversarial Attacks** [Link]

[5] **MC Dropout for Efficient Exploration** [Link]

Skills

Distributed Computing	Docker, Ray, MultiProcessing
Deep Learning	Pytorch, Tensorflow, Caffe
Computer Vision	OpenCV, Point Cloud Library
Robotics Platforms	Nvidia Omniverse, Mujoco, Robot Operating System(ROS)
	Unity, Gazebo, OpenRAVE, Nvidia Isaac
Programming Languages	Python, C/C++, JAVA, MATLAB

Relevant Coursework

Intelligent Agents and Decision Making, Deep Learning, Optimization, Probabilistic Graphical Models, Natural Language Processing, Big Ideas in AI, Algorithms, Kinematics Dynamics and Control, Social and Ethical Issues in AI, Linear Algebra, Fundamentals of Statistics, Machine Learning, Multivariate Calculus, Differential Equations, Probability and Statistics, Object Oriented Programming

Service

Led **Generative AI reading group 2023** at OSU with AI Grad Student Association.
Faculty Relations Chair at the AI Graduate Student Association in Oregon State University.(2022)
Faculty Relations Chair at the Robotics Graduate Student Association in Oregon State University. (2021)
thegradient.pub - Writing articles on recent developments and long term trends in Artificial Intelligence.
Stanford Scholar Initiative - Led and actively participated in the creation of research talks on influential research papers viz. Deep Residual Learning, FRAUDAR, Rovables, Real-Time 3D Reconstruction and 6-DoF Tracking with an Event Camera and Bayesian Active Learning for Posterior Estimation.

Publications

[1] **Multi-Task Learning for Temporal Processes: A Case Study on Modeling Plant Cold Hardiness**
Aseem Saxena, Paola Pesantez-Cabrera, Jonathan Magby, Markus Keller, Alan Fern
(Under Review) Machine Learning Journal, Springer, 2024

[2] **Multi-Task Learning for Budbreak Prediction**
Aseem Saxena, Paola Pesantez-Cabrera, Rohan Ballapragada, Markus Keller, Alan Fern
AIAFS *Association for Advancement of Artificial Intelligence (AAAI) 2023* [Link]

[3] **Grape Cold Hardiness Prediction via Multi-Task Learning**
Aseem Saxena, Paola Pesantez-Cabrera, Rohan Ballapragada, Kin-Ho Lam, Markus Keller, Alan Fern
IAAI (Innovative Applications of Artificial Intelligence), 2023 [Link]

[4] **Sim-to-Real Learning of Footstep-Constrained Bipedal Dynamic Walking**
Helei Duan, Ashish Malik, Jeremy Dao, Aseem Saxena, Kevin Green, Jonah Siekmann,
Alan Fern, Jonathan Hurst
IEEE ICRA (International Conference on Robotics and Automation), 2022 [Link]

[5] **Formalizing the Problem of Side Effect Regularization**
Alexander Matt Turner*, Aseem Saxena*, Prasad Tadepalli
Equal Contribution, *NeurIPS ML Safety Workshop 2022* [Link]

[6] **LeTS-Drive: Driving in a Crowd by Learning from Tree Search**
Panpan Cai, Yuanfu Luo, Aseem Saxena, David Hsu, Wee Sun Lee
RSS (Robotics Science and Systems) 2019 [Link]

[7] **Exploring Convolutional Networks for End-to-End Visual Servoing**
Aseem Saxena*, Harit Pandya*, Gourav Kumar, K. Madhava Krishna
Equal Contribution, IEEE ICRA(International Conference on Robotics and Automation), 2017 [Link]

Scholarships and Certificates

Kishore Vaigyanik Protsahan Yojana Fellowship(KVPY)	2011–2016
Department of Science and Technology, Government of India.	
All India Rank 1 - National Cyber Olympiad	2010
Climate Reality Leadership Corps	2020

Extra-Curricular Activities

Amateur Triathlete
Guitarist, Bassist, Vocalist and Keyboardist at Music Club BITS Pilani.