# Abhinav Jain

abhinav98jain@gmail.com | linkedin.com/in/abhinavj98 | +1(541)908-3982

## Summary

I am a roboticist and AI researcher with hands-on experience in designing complex simulations for generating synthetic robot data. I excel in simulation tools such as **Pybullet, Isaac Lab, Newton Physics Engine**. Using this simulations I have applied **Deep Reinforcement Learning** and **Imitation Learning** with applications in robotic control. I have developed and deployed learning-based control policies on **real robotic systems**. My research contributions have been recognized in top-tier conferences, including **ICRA**, **CVPR**, and **AAAI**. Further I have experience with training LLMs and generative models.

## Education

**Oregon State University** Sep 2021 - Aug 2026
*PhD, Major - Robotics. Minor - Artificial Intelligence* *Corvallis, OR, USA*

Advisors: Dr. Cindy Grimm and Dr. Stefan Lee

Courses: Deep Learning, Learning Based Control, Natural Language Processing, Kinematics/Dynamics

GPA: 3.91/4

**Oregon State University** Sep 2021 - Aug 2026
*MS, Major - Robotics. Minor - Artificial Intelligence* *Corvallis, OR, USA*

Advisors: Dr. Cindy Grimm and Dr. Stefan Lee

GPA: 4.0/4.0

**Sardar Vallabhbhai National Institute of Technology** Aug 2016 – Jul 2020
*Bachelor's of Technology, Electronics and Communication Engineering* *Surat, India*

Seminar: Generative techniques to generate artificial datasets

Capstone: Birding - Generative Adversarial Networks to convert text description to bird images. (Language conditioned Image generation)

## Experience

**Oregon State University** Dec 2021 - Present
***Graduate Research Assistant - Robotic tree pruning*** *OR, USA*

- Funded under AgAID grant, a collaboration of stakeholders in AI and Agriculture.
- Built a learning pipeline to perform the task of robotic tree-pruning and dexterous apple-picking using learning based methods. This pipeline included **simulation design**, **reinforcement learning**, **synthetic data generation** for **imitation learning** and image segmentation, and **ROS2** implementation to run the robot in the real world.

**Simulation**

- Built a procedural tree generation tool which incorporates tying down and pruning branches as in an orchard TreeSim_Lpy in **Python** to build visually similar 3D meshes.
- Built a tree pruning simulator, incorporating a custom robot with domain randomization in Pybullet
- Simulating Apple Picking: Using spring-mass damper models and AVBD solver in Newton Physics Engine built a stable apple pick simulation
- In progress: System identification to match branch parameters to simulation
- Implemented synthetic data generation pipeline in these simulations for computer vision and imitation learning tasks

**Learning**

- Applied **Deep Reinforcement Learning** algorithms such as PPO to train a **servoing** policy for a UR5 manipulator. The policy used images as input to reach pruning points while avoiding collisions and maintaining correct orientation. Proficient with Stable Baseline 3 and SKRL
- Developed a novel hybrid RL method to incorporate **suboptimal expert data** into an online reinforcement learning framework and benchmarked it against **Imitation Learning** to outperform it.

- Currently working on dexterous manipulation to perform the task of apple-picking

**Perception**

Synthetic data generation for semantic and instance segmentation of orchards

Using SAM2 with a custom-trained YOLO to automatically label large datasets

**Robotics**

- Implemented the learned policy on a real UR5 arm with **ROS2**, **MoveIt!** and **Behavior Trees**.
- Tested in a real orchard by running the policy real time to show transfer from **simulation to real-world.**
- Benchmarked performance of RL policy by running **RRT-Connect** in the real-world using point clouds.

**Large Language Models - Class NLP with Deep Learning**

- Tokenizers and Word Vectors Documentation and Code
- RNNs for Part-Of-Speech Tagging Documentation and Code
- Autoregressive Translation using Attention Documentation and Code
- Transformer Language Models: Story Generator Documentation and Code
- Post RL fine-tuning on math-word problems GSM8K with custom RL algorithm Documentation and Code

**AgRobotics** Jun 2025 - Sep 2025
***Robotics Engineer Intern*** *CA, USA*

- Building the future of Agricultural Robots

**Samsung Research Institute, Bangalore** Jan 2021 - Aug 2021
***Engineer*** *Bangalore, India*

- Employed as an engineer in 5G NR MAC team.
- Wrote **Unit Tests** and **Block Tests** according to Google Test framework and increasing test coverage metric from 2.1 to 3.2, beyond required threshold of 3.
- Awarded Software Professional Certification for skills in **Data Structure and Algorithms**.

**RBCCPS LAB, Indian Institute of Science (IISc)** Jul 2020 – Jan 2021
***Research Intern*** *Bangalore, India*

- Worked in Robert Bosch Centre for Cyber-Physical Systems, IISc Bangalore, under Dr. Chiranjeeb Bhatacharyya.
- Adapted state-of-the-art models of Image Inpainting in **PyTorch** to the problem of Dynamic to Static LiDAR Reconstruction. Used **ROS** to run **SLAM** on reconstructed **LiDAR** output obtained to evaluate the quality of reconstruction.
- Proposed the metric "LiDAR Quality Index", which ranked the quality of a LiDAR frame without any reference ground truth.

## Publications

**Abhinav Jain**, Cindy Grimm, Stefan Lee."Visuomotor Robotic Pruning in Planar Orchards Using Hybrid Reinforcement Learning" (In review)[Paper]

Tieqiao Wang, **Abhinav Jain**, Sinisa Todorovic, Cindy Grimm."A Dataset for Semantic and Instance Segmentation of Modern Fruit Orchards" CVPR V4A Workshop (Vision for agriculture)[Paper]

**Abhinav Jain**, Cindy Grimm, Stefan Lee. "Learning to Prune Branches in Modern Tree-Fruit Orchards." (ICRA 2025)[Paper]

Deanna Flynn, **Abhinav Jain**, Heather Knight, Christina G. Wilson, Cindy Grimm."Integrating Stakeholder Perspectives into Robot Pruning Designs". In review [Paper]

**Abhinav Jain** [1], Dhruv Patel[1], Kalpesh Prajapati, K.P. Upla. "SRTGAN: Triplet Loss based Generative Adversarial Network for Real-World Super-Resolution". CVIP 2022

Prashant Kumar[1], Sabyasachi Sahoo[1],Vanshil Shah, Vineetha Kondameedi, **Abhinav Jain**, Akshaj Verma, Chiranjib Bhattacharyya, Vinay V. (Sep 2020). "DSLR : Dynamic to Static LiDAR scan Reconstruction using adversarially trained autoencoder". **AAAI Conference on Artificial Intelligence 2021** (conference submission)[web-page]

## Other fun stuff

Graduate Research Showcase - A TedX-like event where I presented my research [Video]

Volunteer editor for the 100 page LLM book [Link]

Robotics Grad Student Association @OSU - President (2023-2024)

Scavanger hunt using Fetch Robot [Video]

Predicting upcoming Coronavirus Hotspots - Analytics Vidhya [Blog Post]

DotSlash Hackathon: Runners up. Jyoti- An assitant for people with vision impairment. Github

Robocon 2020: Secured **12th** rank out of 120 participating teams. Video:(Blue Team) [Video]

## Technical Skills

**Languages**: Python, C, C++, Embedded C, Git
**Frameworks**: Flask, W&B, PyTorch, TensorFlow, Keras, ROS2
**Libraries**: pandas, NumPy, Matplotlib, OpenCV, MoveIt!
**Robots worked with**: Fetch, TurtleBot, UR5, Franka Panda PR3, XArm7, Amiga FarmNG

[1]Equal Contribution