Akshay L Chandra

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https://akshaychandra.com

Education

- **University of Freiburg** — Freiburg, Germany
  Master of Science in Computer Science, 1.4; — *Oct. 2021 – Feb. 2025*
- **Indira Gandhi National Open University** — Hyderabad, India
  Post-Graduate Diploma in Applied Statistics, 85%; — *Jul. 2017 – Jun. 2018*
- **Jawaharlal Nehru Technological University** — Hyderabad, India
  Bachelor of Technology in Computer Science & Engineering, 76% (Top 15/300); — *Aug. 2013 – May 2017*

Publications

1. **Akshay L Chandra**, I. Nematollahi, C. Huang, T. Welschehold, W. Burgard, A. Valada. DiWA: Diffusion Policy Adaptation with World Models. Under review.
2. I. Nematollahi, B. DeMoss, **Akshay L Chandra**, N Hawes, W. Burgard, I. Posner. LUMOS: Language-Conditioned Imitation Learning with World Models. IEEE International Conference on Robotics and Automation 2025. (**ICRA'25**)
3. S. Rawat, **Akshay L Chandra**, S.V. Desai, Vineeth N Balasubramanian, S. Ninomiya, Wei Guo. How Useful is Active Learning for Plant Organ Segmentation. **Plant Phenomics** 2022. *[Impact Factor: 7.6]*
4. **Akshay L Chandra**, S.V. Desai, C. Devaguptapu, Vineeth N Balasubramanian. On Initial Pools for Deep Active Learning. Proceedings of Machine Learning Research 2021. NeurIPS 2020 Workshop on Pre-registration in Machine Learning. (**PMLR/NeurIPS'20 Workshops**)
5. **Akshay L Chandra**, S.V. Desai, Vineeth N Balasubramanian, S. Ninomiya, Wei Guo. Active Learning with Point Supervision for Cost-Effective Panicle Detection in Cereal Crops. **BMC Plant Methods** 2020.
6. **Akshay L Chandra**, S.V. Desai, W. Guo, S. Ninomiya, Vineeth N Balasubramanian. An Adaptive Supervision Framework for Active Learning in Object Detection. British Machine Vision Conference 2019. (**BMVC'19**)
7. **Akshay L Chandra**, S.V. Desai, Vineeth N Balasubramanian, S. Ninomiya, W. Guo. EasyRFP: An Easy-to-Use Edge Computing Toolkit for Real-Time Field Phenotyping. Computer Vision Problems in Plant Phenotyping Workshop at ECCV 2020. (**ECCV'20 Workshops**)

Research/Work Experience

- **Robot Learning Lab, University of Freiburg** — Freiburg, Germany
  Doctoral Canditate (Full-Time) — *Mar. 2025 - Now*
  - I am a PhD student supervised by Prof. Dr. Abhinav Valada. My research is at the intersection of Reinforcement Learning, World Models and Robot Manipulation.
- **Robot Learning Lab, University of Freiburg** — Freiburg, Germany
  Student Research Assistant (Part-Time) — *Jul. 2022 - Sept. 2024*
  - My work in the lab, supervised by Iman Nematollahi, Chenguang Huang and Dr. Tim Welschehold, mostly enabled robot manipulators to learn and refine skills with deep reinforcement learning while being sample-efficient.
- **Machine Learning and Vision Lab, IIT Hyderabad** — Hyderabad, India
  Research Assistant (Full-Time) — *Dec. 2018 - Oct. 2021*
  - I spent nearly three years working under the guidance of **Dr. Vineeth N Balasubramanian**, in the intersection of deep active learning, object detection, semantic segmentation and plant-phenotyping.
  - Also, I frequently collaborated with **Dr. Wei Guo** from the University of Tokyo.
- **GGK Technologies (ACS Corp.)** — Hyderabad, India
  Associate Software Engineer, AI/ML (R&D) Team (Full-Time) — *June 2017 - Sept. 2018*
  - Optimized business processes for clients in health care, retail, and e-commerce by building useful prediction models and capturing customer/patient behaviour patterns. Exclusively worked on building an accelerated computer vision application that detects product pickups in a retail store from CCTV footage.
  - Won **Best Trainee** and **Best Employee** awards during my time at the company.

Previous Research Projects

- **Fine-Tuning Diffusion Policies with World Models (Master's Thesis)** *Sep. 2024 - Jan. 2025*
  Advisors: Dr. Tim Welschehold & Iman Nematollahi & Chenguang Huang *Grade 1.0*
  - In my Master's Thesis, I fine-tuned diffusion policies inside world models to learn robot behaviours entirely offline.
- **Robot Skill Refining and Sequencing (Master's Project)** *Jul. 2023 - Feb. 2024*
  Advisors: Dr. Tim Welschehold & Iman Nematollahi *Grade 1.0*
  - In my Master's Project, I used deep reinforcement learning to stitch up to seven Riemannian manifold-aware robot skills to perform long-horizon manipulation tasks more sample-efficiently than existing methods.
  - Report: https://akshaychandra.com/assets/pdf/master-project-report.pdf
- **Deep Active Learning for Semantic Segmentation** *Jul. 2021 - Oct. 2021*
  Advisor: Dr. Vineeth N Balasubramanian (IIT Hyderabad)
  - This work studies the effectiveness of existing deep active learning methods on plant segmentation datasets, which are intrinsically specialized and differ a great deal from other benchmark datasets.
  - The study was co-supervised by Prof. Wei Guo and was published in the Plant Phenomics journal in January 2022.
- **Deep Active Learning for Image Classification** *Nov. 2020 - Apr. 2021*
  Advisor: Dr. Vineeth N Balasubramanian (IIT Hyderabad)
  - This work combines self-supervised methods with active learning methods to intelligently select initial pools of data, which are often labelled randomly. The importance of good initialization in weight space is well understood by the community. However, there have been no such efforts to understand the importance of good initialization in data space for AL methods.
  - This paper was accepted at the Preregistration Workshop of NeurIPS 2020 and at PMLR 2021 (Volume 148).
- **Deep Active Learning for Object Detection** *Dec. 2018 - Oct. 2019*
  Advisors: Dr. Vineeth N Balasubramanian (IIT Hyderabad) & Dr. Wei Guo (UTokyo)
  - We were able to design a framework that allows the detection model to specifically query for what it needs, either object localization information or object class information or both. This reduced 30% annotation time on the PASCAL-VOC dataset
  - Consequently, we were also able to create 3 active learning query metrics for detection with point supervision.
  - These two works were accepted at the BMVC'19 and BMC Plant Methods journal.

Applied Projects[†]

- **Batch Gaussian Mixture Regression in PyTorch** *Aug. 2024*
  - The main motivation behind this implementation is to enable parallel GMR for multiple GMMs. In a robotics research project, we had to roll out several hundreds of slightly different but largely similar GMM-based robot policies in parallel in an RL simulation environment.
  - Code: https://github.com/acl21/batch-gmr
- **Evaluating Zeroth and First-Order MPC Methods with a World Model** *Oct. 2022*
  - As part of our Model-Predictive Control and Reinforcement Learning (MPC-RL) course objective, two fellow course students and I evaluated zeroth and first-order MPC methods with a World Model.
  - Report: https://akshaychandra.com/assets/pdf/mpcrl-report.pdf
- **Scaling Up Worst-Case Soft Actor-Critic (WCSAC) to Saftey-Gym** *Aug. 2022*
  - As part of our Deep Learning Lab course objective, I and two fellow course students successfully implemented and analyzed the limits of WCSAC on OpenAI's Saftey Gym environment.
  - Code: https://github.com/acl21/wcsac
  - Report: https://akshaychandra.com/assets/pdf/wcsac-report.pdf
- **Introducing Exploration and Regularization into DEHB Pipeline** *Aug. 2022*
  - As part of our course objective, two fellow course students and I attempted to understand how a differential evolution-based hyperparameter tuning method worked when exposed to forced exploration and regularization.
  - Report: https://akshaychandra.com/assets/pdf/automl-report.pdf

[†]Full list of projects can be found on my GitHub account.

- **Deep Active Learning Toolkit in PyTorch** *Sept. 2020*
  - This is an end-to-end PyTorch toolkit with 8 popular deep active learning query methods implemented.
  - Code: https://github.com/acl21/deep-active-learning-pytorch
- **Image & Bounding Box Annotation Slicer** *Apr 2019*
  - Slices images and their bounding box annotations into smaller tiles as needed. It can also resize them, both by specific sizes and by a resizing/scaling factor.
  - Code: https://github.com/acl21/image_bbox_slicer

Relevant Skills

- **Research Topic**: Reinforcement Learning, Robot Learning, World Models
- **Coursework**: Reinforcement Learning, Statistical Pattern Recognition, Computer Vision, Deep Learning, Numerical Optimization, Model Predictive Control, Mobile Robotics, AutoML
- **Languages, Libraries & Packages**: Python, PyTorch, TensorFlow, ROS, C++
- **Certifications**: Deep Learning (IIT Madras; AICTE-FDP approved), Computer Vision Nanodegree (Udacity), Deep Learning Specialization (Coursera), Java SE 6 Programmer (Oracle).

Positions of Responsibility

- Student Research Assistant at the Robot Learning Lab from July 2022 to September 2024. I am fortunate to have had the opportunity to work closely with and maintain the robots in the lab every day.
- Teaching Assistant to Dr. Vineeth N Balasubramanian for the courses: AI2100 & AI5100 - Deep Learning, CS5370 - Deep Learning for Vision, CS6360 - Advanced Topics in Machine Learning in 2020 & 2021, Summer School of AI in 2019 & 2021 (Project Mentor as well).
- Teaching Assistant to Dr. Vineeth N Balasubramanian & Project Mentor during the Summer School of AI in 2019 & 2021 held at IIT Hyderabad.