# ANKIT V. MANERIKAR

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## EDUCATION:

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|---|---|---|---|
| **Purdue University,** *USA* | **Doctor of Philosophy (Ph.D.)**<br>*Electrical and Computer Engineering* | 3.80/4.00 | Aug 2023 |
| **Purdue University,** *USA* | **Master of Science**<br>*Electrical and Computer Engineering* | 3.84/4.00 | Aug 2017 |
| **Mumbai University,** *India* | **Bachelor of Engineering**<br>*Electronics Engineering (First Class with Distinction)* | 81.52%<br>*(1st Rank)* | July 2015 |
| **SBM Polytechnic,** *India* | **Pre-University Course (Engineering Diploma)**<br>*Industrial Electronics (First Class with Distinction)* | 89.26%<br>*(1st Rank)* | July 2012 |

## WORK EXPERIENCE:

- **Intel Corporation** — Aug 2023 – Present
  ***Title:*** *AI Algorithm Engineer - oneDNN* — ***Hillsboro. US***

- Responsible for development and maintenance of oneDNN, a cross-platform performance library providing highly vectorized and threaded building blocks for deep learning applications. [link]
- Developed new features and algorithms for the library which are optimized for Intel processors, GPUs and other hardware.

- **Intel Corporation** — May 2022 – December 2022
  ***Title:*** *Deep Learning SWE Intern* — ***Santa Clara. US***

- Conducted design and development to build and optimize AI software for the latest Intel x86 isa.
- Profiled deep learning models to identify performance bottlenecks for ML workloads (specifically for 3D-UNets and ViTs).
- Worked on ML-based autotuning of DGEMM kernels for deep learning workloads for varying hardware specifications.

- **Robot Vision Lab, Purdue University** — August 2017 – May 2022
  ***Title:*** *Graduate Research Assistant* — ***West Lafayette, US***

- **Project Member**, *BAA-1703 Contract on Dual Energy ATR for Airport Security:* A DoHS (Department of Homeland Security) project to research machine learning methods for X-ray-based threat detection at airport checkpoints. [link]
- **Project Member**, *ALERT TO-7 AATR Initiative:* An ALERT-sponsored project on Adaptive Automatic Target Recognition (AATR) for CT-based Threat Detection Systems for airport baggage screening. [link]
- **Author,** *GANecdotes:* A SwAV-based self-supervised learner for one-shot segmentation of StyleGAN images. [link]
- **Author,** *BagGAN:* A StyleGAN-based framework for high-resolution synthesis of baggage CT scans. [link]
- **Author,** *DEBISim:* A model-based CT simulator software for security screening with ML-based threat detection. [link]
- **Cloudmaster**, The RVL Cloud (2020 - 2023) – an Openstack-based custom cloud ecosystem for vision applications. [link]

- **School of Electrical & Computer Engineering, Purdue University** — January 2016 – May 2021
  ***Title:*** *Graduate Teaching Assistant* — ***West Lafayette, US***

- Courses: ECE404 - Computer Security (Spring 2020-21)
  ECE382 - Feedback System Design & Analysis (Spring 2016-17)

- **Gade Autonomous Systems** — June 2016 - July 2016
  ***Title****: Intern: Machine Learning, Firmware & Robotics* — ***Mumbai/Frankfurt***

- Headed the Firmware team to design HMM-ML Algorithms for smart devices in fitness/automotive applications.

- **Citizen Scales India (P) Ltd.** — Dec 2011 - May 2012
  ***Title****: Research Intern/Co-op* — ***Mumbai***

- Collaborated with the Firmware team for designing Moisture Analysis and Micro-Precision Weighers on an ARM7 platform.

- **Technophilia Systems** — June 2010 – Nov 2010
  ***Title****: Robotics Intern /Co-op* — ***Mumbai***

- Designed navigation algorithms for a four-wheel drive robot with a centroid-based object-tracking algorithm.

## RESEARCH EXPERIENCE:

- **Self-Supervised One-Shot Learning for Segmentation of StyleGAN Images:** [pub][code][video]
  *(PhD Doctoral Thesis, Purdue University)*
  A novel SwAV-based self-supervised learning framework for one-shot segmentation of GAN images – the proposed model outperforms baselines in terms of IoU (by 1.02 %) and speed (by a factor of 4.05).

- **BagGAN – A StyleGAN-based Data Synthesis Software for Baggage CT scans:** [pub][code]
  *(PhD Doctoral Thesis – Robot Vision Lab, Purdue University)*
  - A StyleGAN-based simulation software for data synthesis of baggage CT and X-ray scans.
- **DEBISim – A Simulation Pipeline for Material Detection with Dual Energy X-ray Inspection Systems:** [pub][code]
  *(DoHS AATR Initiative – Robot Vision Lab, Purdue University)*
  - A CT simulation pipeline for X-ray image data generation for CT based object detectors in non-destructive testing applications.
- **Classifier Design for 3D Segmentation using Dual Energy X-ray Tomography:** [pub]
  *(DoHS AATR Initiative – Robot Vision Lab, Purdue University)*
  - This project involves the design of improved classifier and image reconstruction frameworks for X-ray based object detection.
- **Adaptive Automatic Target Recognition (AATR) for CT-Based Object Detection Systems:** [pub]
  *(ALERT TO-7 AATR Initiative – Robot Vision Lab, Purdue University)*
  - This project deals with AdaBoost-based X-ray Threat Detectors for segmenting target objects with varying specifications.
- **Indoor Place Categorization for Visual SLAM:** [video] [GitHub]
  *(Course Project: BME595 (Deep Learning), Fall 2017 – Purdue University)*
  - Developed a Place Recognition Classifier using ResNets to learn indoor visual landmarks during mobile robot navigation.
- **SLAM-Assisted Coverage Path Planning for Lidar Mapping Systems:** [pub1] [pub2]
  *(Digital Photogrammetry Research Group, Purdue University)*
  - Developed a SLAM-based Pseudo-GNSS/INS framework for a ROS Mobile-Mapping System for terrestrial/aerial mapping.
- **Optimal Constrained Coverage Path Planning for Mobile Robot Navigation:** [pub] [GitHub]
  *(Course Project: AAE568 (Applied Optimal Control & Estimation), Spring 2016 – Purdue University)*
  - Developed a Pseudospectral Optimal Control Algorithm for Coverage Path Planning for complex obstacles and boundaries.

## MAJOR PUBLICATIONS:

- Manerikar, Ankit, and Avinash C. Kak. "**Self-Supervised One-Shot Learning for Automatic Segmentation of StyleGAN Images.**" *arXiv preprint arXiv:2303.05639* (2023). [pdf] [code] *(Submitted to and under review by IEEE Transactions on Pattern Analysis and Machine Intelligence)*.
- Manerikar, Ankit, Fangda Li, and Avinash C. Kak. **"DEBISim: A simulation pipeline for dual energy CT-based baggage inspection system**s." *Journal of X-Ray Science and Technology* 29.2 (2021): 259-285. [pdf] [code]
- Manerikar, Ankit, Tanmay Prakash, and Avinash C. Kak. "**Adaptive target recognition: A case study involving airport baggage screening**." *Anomaly Detection and Imaging with X-Rays (ADIX) V*. Vol. 11404. International Society for Optics and Photonics, 2020. [pdf]
- Manerikar, Ankit, Fangda Li, and Avinash Kak. "**A Spectrum-Adaptive Decomposition Method for Effective Atomic Number Estimation using Dual Energy CT**." IS&T Electronic Imaging: *Computational Imaging VIII, IS&T International Symposium on Electronic Imaging*, 2020. [pdf]
- Li, Fangda, Ankit Manerikar, Tanmay Prakash, and Avinash Kak. "**A Splitting-Based Iterative Algorithm for GPU-Accelerated Statistical Dual-Energy X-Ray CT Reconstruction**." IS&T Electronic Imaging: *Computational Imaging VIII, IS&T International Symposium on Electronic Imaging*, 2020. [pdf]
- Li, Fangda, Ankit V. Manerikar, and Avinash C. Kak. "**RMPD—A Recursive Mid-Point Displacement Algorithm for Path Planning.**" In *Twenty-Eighth International Conference on Automated Planning and Scheduling*. 2018. [pdf].
- Shamseldin, Tamer, Ankit Manerikar, Magdy Elbahnasawy, and Ayman Habib. "**SLAM-based Pseudo-GNSS/INS localization system for indoor LiDAR mobile mapping systems**." In *2018 IEEE/ION Position, Location and Navigation Symposium (PLANS)*, pp. 197-208. IEEE, 2018. [pdf]
- Manerikar, Ankit, Tamer Shamseldin, and Ayman Habib. "**SLAM-Assisted Coverage Path Planning for Indoor LiDAR Mapping Systems**." *arXiv preprint arXiv:1811.04825* (2018). [pdf]
- Manerikar, Ankit, and Anandpara, Tanvi. "**Design of a Practical Cat-righting Reflex (CRR) Model**." *Procedia Computer Science* 45 (2015): 514-523. [pdf][GitHub]

## SKILLS:

- **Core Programming** — **Python** (Expert), C++ (Expert), C (Proficient), Matlab, OpenCL, SYCL.
- **Machine Learning** — **PyTorch** (Expert), **oneDNN** (Expert), TensorFlow, OpenVINO,
- **Computer Vision / Robotics** — **ROS** (Expert), **OpenCV**, PCL, Qt, ASTRA, Blender.
- **Code Development** — Git, SVN, Gitlab, Confluence, JIRA, CloudBees**.**
- **Cloud Computing** — **Openstack** (Expert), Docker, AWS.

## HONORS/AWARDS:

- **J.R.D. Tata Trust Scholarship Award** — Scholarship for Undergraduate Engineering (Years: 2012-13, 2013-14)
- **Best Student Paper Award** — "Particle Swarm Optimization in Control Systems Design", *IEEE Technomania 2013*,
- **Student Award for Academic Merit** — 1st Rank in B.E. (Electronics, DJSCoE), 6th Rank in University of Mumbai.