ANKIT V. MANERIKAR

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EDUCATION:

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

WORK EXPERIENCE:

- **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 distributed deep learning models to identify performance bottlenecks for state-of-the-art ML workloads – worked specifically on the profiling of 3D-UNets and Vision Transformers.

  - 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- Present)* – an Openstack-based custom cloud ecosystem for vision applications. [link]

  - Developed Robot Motion Planning Algorithms in a ROS environment using RRT and CHOMP techniques. [link]

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

  - Headed the Firmware team to design HMM/Machine Learning 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.

Teaching Experience:

- **Graduate Teaching Assistant,** *Purdue University, USA*   *Terms*
  - **Course:** ECE 404 -   *Introduction to Computer Security*   Jan 2021 – May 2021
  - **Course:** ECE 382 -   *Feedback System Analysis and Design*   Jan 2016 – May 2017

RESEARCH EXPERIENCE:

- **Self-Supervised One-Shot Learning for Automatic Segmentation of StyleGAN Images:** [pub][code][video]
  (Supporting Software - PhD 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]
  (DoHS AATR Initiative – 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 using 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 ResNet CNNs 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:2305.05639* (2023). [pdf] [code] *(Submitted to and under review by IEEE T-PAMI)*.
- 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++ (Proficient), C (Proficient), Matlab (Proficient).
- **Machine Learning** — **PyTorch** (Expert), TensorFlow, scikit-learn, oneDNN, OpenVINO.
- **Computer Vision /Graphics** — **OpenCV**, PCL, Qt, ASTRA, Blender.
- **Robotics** — **ROS** (Expert), Gazebo, ARIA.
- **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.