

ANKIT V. MANERIKAR

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❖ EDUCATIONAL QUALIFICATIONS:

Purdue University, USA	Doctor of Philosophy (PhD) Major: Electrical and Computer Engineering	-	May 2022
Purdue University, USA	Master of Science Major: Electrical and Computer Engineering	3.84/4.00	Aug 2017
D. J. Sanghvi College of Engineering, University of Mumbai	Bachelor of Engineering Major: Electronics Engineering Division: First Class with Distinction	81.52% (1 st Rank)	July 2015
Shri Baghubhai Mafatlal Polytechnic, Mumbai	Pre-University Course (Engineering Diploma) Major: Industrial Electronics Engineering Division: First Class with Distinction	89.26% (1 st Rank)	July 2012

❖ WORK/TEACHING EXPERIENCE:

- **Robot Vision Lab** August 2017 – May 2022
Designation: Research Assistant **West Lafayette**
 - 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 Dual Energy X-ray based threat detection in airport checkpoint security.
 - 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.
 - Primary Author, DEBISim – a CT simulator software for dataset synthesis/augmentation for security scanners to test and implement machine learning algorithms for threat detection.
 - Project Member, RVL-Botzee SLAM Initiative for Hospital Robotics – a collaboration with Botzee Inc, a robotics think-tank to develop Visual SLAM frameworks for modular robot motion in hospital environments.
 - Developed 3D Object detection classifiers and reconstruction/decomposition algorithms for Dual Energy Computed Tomography.
 - Developed Robot Motion Planning Algorithms in a ROS environment using RRT and CHOMP techniques.
- **Gade Autonomous Systems** June 2016 - July 2016
Designation: Intern: Machine Learning, Firmware & Robotics **Mumbai/Frankfurt**
 - Headed the team for Cortex-based Firmware development of smart devices for fitness/automotive applications.
 - Designed HMM Machine Learning Algorithms for smart networks with inertial and IR sensing systems.
- **Citizen Scales India (P) Ltd.** Dec 2011 - May 2012
Designation: Research Intern/Co-op **Mumbai**
 - Collaborated with a team of Firmware Engineers for design of a Moisture Analysis Device on an ARM7 platform.
 - Implemented Regression-based algorithms for Temperature Compensation in Micro-Precision Weighing Scales.
- **Technophilia Systems** June 2010 – Nov 2010
Designation: Robotics Intern /Co-op **Mumbai**
 - Designed a Partial Gait Model for the Autonomous Navigation of a Biped.
 - Designed navigation algorithms for a four-wheel drive robot with a centroid-based object-tracking algorithm.
- Teaching Experience:
- **Purdue University – West Lafayette** **Terms**
Designation: Graduate Teaching Assistant
 - 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:

- **BagGAN – A GAN-based Data Augmentation Tool for Baggage CT scans:**
(DoHS AATR Initiative – Robot Vision Lab, Purdue University)
 - A data augmentation tool for single / dual energy baggage CT scans to aid threat detector design for security screening.
- **DEBISim - A Simulation Pipeline for Material Detection using Dual Energy X-ray Inspection Systems:** [[pub](#)] [[code](#)]
(DoHS AATR Initiative – Robot Vision Lab, Purdue University)
 - Research and development for a CT Simulation pipeline (DEBISim) for X-ray image data/dataset generation designed to aid the training and testing of Single-/Dual-energy CT based object detection systems for 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 frameworks for X-ray based object detection using Dual Energy CT.
 - It encompasses decomposition algorithms for Dual Energy CT data as well as 3D object segmentation/classification.

- **Adaptive Automatic Target Recognition (AATR) for CT-Based Object Detection Systems:** [\[pub\]](#)
(ALERT TO-7 AATR Initiative – Robot Vision Lab, Purdue University)
- This project (a part of the TO-7 DHS ALERT Initiative) dealt with the design of an Adaboost-based Automatic Target Recognition System for adaptively segmenting and identifying target objects of 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.
- **Position Control Using Ultrasonic Levitation Assembly:** [\[video\]](#)
(Senior Year Project – Bachelors in Engineering (B.E.), University of Mumbai.)
- Designed a Contactless Precision Position Control system harnessing sound waves to suspend particles in mid-air.

❖ PUBLICATIONS / PAPERS:

- Manerikar, Ankit, Fangda Li, and Avinash C. Kak. "DEBISim: A simulation pipeline for dual energy CT-based baggage inspection systems." *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:

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| • Core Programming: | Python (Expert), C++ (Advanced), C (Proficient), Matlab (Proficient). |
| • Computer Vision Tools: | OpenCV, PCL. |
| • Machine Learning Tools: | PyTorch (Expert), TensorFlow, scikit-learn. |
| • Computer Graphics/Simulation: | Qt, MayaVi, ASTRA, Simulink. |
| • Robotics Tools: | ROS (Expert), Gazebo, ARIA |
| • Developer Tools: | PyCharm, Eclipse IDE, AVR-gcc. |
| • Embedded Platforms: | ARM Cortex (TI TivaC, Stellaris), ARM7 (NXP), AVR Family. |

❖ HONORS / AWARDS:

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| • J.R.D. Tata Trust Scholarship Award | Scholarship for Undergraduate Engineering for the academic years: 2012-13, 2013-14. |
| • Best Student Paper Award | "Particle Swarm Optimization in Control Systems Design", <i>IEEE Technomania 2013</i> , |
| • Student Award for Academic Merit | 1 st Rank in B.E. (Electronics, DJSCoE), 6 th Rank in University of Mumbai. |
| • Juhu Lions Club Scholarship Award | 1 st Rank in Industrial Electronics for the academic years 2008-09, 2009-10, 2010-11, 2011-12. |