ANKIT V. MANERIKAR

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EDUCATION:

Purdue University, *USA*	**Doctor of Philosophy (PhD)** *Electrical and Computer Engineering*	3.79/4.00	May 2022
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:

- **Robot Vision Lab** August 2017 – May 2022
  Title: *Graduate 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 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]
- **Primary Author,** *BagGAN-HQ* – a StyleGAN-based framework for annotated data synthesis of baggage CT scans.
- **Primary Author,** *DEBISim* – a model-based CT simulator software for security screening with ML-based threat detection.[link]
- P**roject Member**, *RVL-Botzee SLAM Collaboration for Hospital Robotics* – a collaboration with Botzee Inc, a robotics think-tank to develop Visual SLAM frameworks for modular robot motion in hospital environments. [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 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
  Title*: 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
  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:

- **BagGAN-HQ – A StyleGAN-based Data Synthesis Software for Baggage CT Scans:** [link]
  (DoHS AATR Initiative – Robot Vision Lab, Purdue University)
  - A novel StyleGAN-based simulation software for annotated data synthesis and augmentation of baggage CT scans – a variant version for medical imaging is under development.
- **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 generation designed to train and test 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.

MAJOR PUBLICATIONS:

- 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).
• **Computer Vision**	**OpenCV**, PCL, PyTorch3D.
• **Machine Learning**	**PyTorch** (Expert), TensorFlow, **scikit-learn**.
• **Computer Graphics/Simulation**	**Qt**, MayaVi, ASTRA, Simulink.
• **Robotics**	**ROS** (Expert), Gazebo, ARIA
• **Developer Tools/IDEs**	**VSCode, PyCharm**, Eclipse IDE, AVR-gcc.
• **Cloud Computing**	**Openstack** (Expert), Eucalyptus, 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.
• **Juhu Lions Club Scholarship Award**	1st Rank in Industrial Electronics (Years: 2008-09, 2009-10, 2010-11, 2011-12)