ANKIT V. MANERIKAR

West Lafayette,
Indiana, USA.

Tel No. : +1 765 602 6962
Email ID: amanerik@purdue.edu

❖ EDUCATIONAL QUALIFICATIONS:

Purdue University, USA	**Doctor of Philosophy (PhD)** **Major**: Electrical and Computer Engineering	-	Aug 2021
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% (1st Rank)	July 2015
Shri Baghubhai Mafatlal Polytechnic, Mumbai	**Pre-University Course (Engineering Diploma)** **Major**: Industrial Electronics Engineering **Division**: First Class with Distinction	89.26% (1st Rank)	July 2012

❖ WORK/TEACHING EXPERIENCE:

- **Robot Vision Lab** — August 2017 – December 2020
  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.
- 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.
- Primary Author, *DEBISim* – a CT simulator software for dataset synthesis/augmentation for security scanners to test and implement machine learning algorithms for threat detection.
- 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]
  (Graduate Research Project - 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* Preprint: 1-27. [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++ (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:

- **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", *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 for the academic years 2008-09, 2009-10, 2010-11, 2011-12.