Dimple Bhuta

Website | Email | LinkedIn | GitHub | +918369205615

Education

Virginia Common Wealth University — Richmond, VA, USA
Master of Science in Biomedical Engineering, (GPA:3.828/4.000, Top 12 % in class) — *Aug. 2009 – May 2012*

K.J.Somaiya College of Eng/ Mumbai University — Mumbai, INDIA
Bachelors of Engineering in Electronics — *Aug. 2005 – May 2009*

Work experience

Principal Engineer – State Estimation and Control — April 2024 – present
Senior Engineer – State Estimation and Control — June 2022 – March 2024
Technology Innovation Hub for IoT and IoE (TIH-IoT), IIT-Bombay — *Mumbai, India*

- **Multispectral Image Acquisition & Data Inference using UAVs**
  Leading a team on two key projects [Project Link]
  - **Surface Detection of Underground Pipeline Leaks using Multispectral Imaging** – Led UAV-based multispectral data acquisition for oil vs. water leakage classification, currently analyzing the data and implementing deep learning models. The project is sponsored by Hindustan Petroleum Corporation Limited (HPCL), Indian Oil Corporation Limited (IOCL), and Gas Authority of India Limited (GAIL).
  - **Drone Phenotyping for AI Farm Advisory** – Collaborating with scientists from the ICAR-Directorate of Onion and Garlic Research (ICAR-DOGR), India, to build models for plant stress, drought, and yield prediction; setting up an AI pipeline for integration with the iSaarthi App to deliver farm advisories to Indian farmers.
- **Lightweight Smart UAV Module Development for Agricultural Applications** – Led a team of engineers to develop, implement, and test a plug-and-play sense-and-avoid solution for Pixhawk-based UAVs, validated in agricultural fields. [Project Link]
- Implemented odometry calculations for a ground robot using encoders and orientation sensors. [Project Link]
- Conducted research by reviewing relevant literature and implemented localization (VIO SLAM) algorithms for a multi-rotor UAV, using depth camera input in a simulated environment, tailored for precision agriculture.[Project Link]
- Skills : Python, Robot Operating System (ROS), MAVROS, MicroPython, Gazebo, Software-in-the-Loop (SITL), Hardware-in-the-Loop (HITL), NVIDIA Orin Nano, NVIDIA AGX Xavier, Git, Linux.

Senior research fellow — March 2019 - August 2021
Autonomous Robots and Multi-robot Systems (ARMS) Lab, IIT-Bombay — *Mumbai, India*

- Worked with the team at ARMS lab on developing path planning algorithms for multi-agent robots to patrol campus area/ army cantonments, with an aim to enhance security against attacks. Project in collaboration with Centre for Artificial Intelligence and Robotics (CAIR), Defence Research and Development Organisation (DRDO), India. [Project Link]
- Contributed to path generation, trajectory tracking, and controller integration.
- Implemented static and dynamic obstacle avoidance techniques.
- Assisted in analyzing patrolling algorithms for secured monitoring of selected areas.
- Developed a code stack to integrate the algorithm with Robot Operating System (ROS) and Webots simulator.
- Skills: Python, Robot Operating System (ROS), Webots Simulator, Matlab.

Software Developer — July 2018 – January 2019
AISIGHT video analytics pvt ltd./AITOE Lab — *Mumbai, India*

- Collaborated with a team to develop vision-based surveillance systems for ATM deployment. [Project Link]
- Developed image processing algorithms and deep learning models for human detection and tracking in videos/live streams.
- Implemented logical and deep learning algorithms for anomaly detection.
- Skills: C++, OpenCV, Python, TensorFlow, PyTorch.

Drone and Robotics Engineer December 2017 – June 2018

Dhristi works *Mumbai, India*

- Developed motion planning algorithms for a 7-DOF manipulator for beach cleaning applications. [Project Link]
- Implemented household object detection using a Kinect camera and point clouds, motion planning with the MoveIt package to reach target positions, and grasping algorithms based on existing literature.
- Skills: Python, ROS, Gazebo Simulator.

Research assistant March 2016 – March 2017

Singapore Institute of Neurotechnology, National University of Singapore *Singapore*

- Designed a slip control setup with the WidowX robot to emulate human reflexes under slip conditions under the guidance of a post-doctoral fellow. Implemented a Simulink model to read sensor data and control the gripper position every 0.01 seconds. [Project Link]
- Developed a haptic glove and GUI to replicate the sense of touch, creating a first-generation interface between the tactile and haptic gloves to enable users to feel objects gripped by the robot. [Project Link]
- Developed motion planning algorithms for Universal Robots (UR10) to perform tasks like coin picking, bread cutting, and opening a wine bottle, and integrated iLIMB prosthetic hand control. [Project Link]
- Skills: C++, Matlab, Simulink, Python, Altium Designer (PCB Design Software).

Project Assistant August 2015 – December 2015

Multimodal Perception Laboratory, International Institute of Information Technology *Bangalore, India*

- Compared various algorithms for jewelry segmentation in images. [Project Link]
- Implemented Grab cut algorithm with modifications to achieve segmentation task.
- Skills: C++, OpenCV.

Assistant Professor August 2014 – April 2015

Electronics and Communication Eng, Haryana College of Technology and Management *Haryana, India*

- Taught courses on Digital Signal Processing and Microprocessors with Interfacing.
- Conducted lab sessions on Digital Communication and Microprocessors to reinforce theoretical concepts through hands-on learning.

Project Manager - Embedded Software Engineer September 2012 – April 2013

Infinite Biomedical Technologies *Baltimore, USA*

- Conceptualized and engineered a pattern recognition based prosthetic arm which successfully classified hand-open, close, flex, extend, pronate, supinate and hook hand positions using subject's EMG signals. The aim of this project was to assist trans radial amputees to control their prosthesis.[Project Link]
- Implemented best practices with developers to streamline communication protocols between arm and remote GUI interface.
- Skills : C++, MATLAB

Research Experience

Brain controlled switch (MSc Biomedical Engineering thesis) | *Embedded systems* August 2010 – May 2012

- Developed a standalone single-channel EEG device to detect user intent for switching room lights ON/OFF in real time, aimed at assisting locked-in patients.

Design of cipher (BE Electronics Engineering thesis) | *VHDL, Cryptography* August 2008 – May 2009

- Designed a secure cryptographic system by integrating the Data Encryption Standard (DES) algorithm with a 64-bit Fibonacci LFSR; implemented in VHDL and tested on an FPGA.

Technical Skills

Languages: Python, C, C++
Frameworks and Libraries: Robot Operating System (ROS), PyTorch, OpenCV
Embedded Platforms and Microcontrollers: NVIDIA Jetson (Nano, Orin Nano, AGX Xavier), STM32 Microcontrollers, Arduino, Microchip PIC Microcontrollers, Raspberry Pi (Model 3/4)
Simulation and Robotics Tools: Gazebo, Webots, Simulink, MATLAB
PCB Design Tools: Altium Designer, KiCad
Certifications: Udacity Nanodegree in Computer Vision and Deep Learning
Others: Git, Linux, MAVROS (Micro Air Vehicle Robot Operating System), MicroPython, Software-in-the-Loop (SITL), Hardware-in-the-Loop (HITL) Integration