

EDUCATION

Bachelor of Technology – Mechanical Engineering

Rajiv Gandhi University of Knowledge Technologies, Nuzvid – RGUKT - Nuzvid, AP, India

Jul 2014 – Apr 2018

GPA: 7.62/10 – First Class

Senior Secondary School

Rajiv Gandhi University of Knowledge Technologies, Nuzvid – RGUKT - Nuzvid, AP, India

Jun 2012 – Apr 2014

GPA: 8.17/10 – Distinction

Secondary School – (10th Grade)

Kendriya Vidyalaya, India Security Press (I.S.P.), Nashik Road, Nashik, Maharashtra, India

Mar 2012

GPA: 10/10

PUBLICATIONS

[1] N. Mohanty, **M. S. Gadde**, S. Sundaram, N. Sundararajan and P. B. Sujit, “Context-Aware Deep Q-Network for Decentralized Cooperative Reconnaissance by a Robotic Swarm,” *IEEE Transactions on Automation Science and Engineering (T-ASE)*, 2020. [[Link](#)]

[2] Lima Agnel Tony, Shuvrangshu Jana, Varun VP, Vidyadhara B V, **Mohitvishnu S Gadde**, Abhishek Kashyap, Rahul Ravichandran, Debasish Ghose, “Collaborative Tracking and Capture of Aerial Object using UAVs,” *Springer Nature Applied Sciences - Topical Collection: Engineering - MBZIRC Symposium Mohamed Bin Zayed Symposium*, 2020. [[Link](#)]

[3] Lima Agnel Tony, Shuvrangshu Jana, Aashay Bhise, Varun V P, Arul Mozhi Varman S, Vidyadhara B V, **Mohitvishnu S Gadde**, Debasish Ghose, Raghu Krishnapuram, “Vision based Target Interception using Aerial Manipulation,” *Springer Nature Applied Sciences - Topical Collection: Engineering - MBZIRC Symposium Mohamed Bin Zayed Symposium*, 2020. [[Link](#)]

SKILL SET

Robotics - Hardware Platforms: Nvidia Jetson TX2, Jetson Nano, Odroid (XU4), Raspberry Pi, Arduino, Pixhawk Flight Controller, DJI Platforms

Robotics - Software Platforms: ROS, Gazebo, AirSim, PX4, APM, Blender, DJI SDK, QGround Control, Mission Planner

Operating Systems: Windows, Ubuntu, Android, and other lighter variants of Linux

Programming Languages & Libraries: C, C++, Python, MATLAB, OpenCV, Keras, TensorFlow, PyTorch

Design & Fabrication: AutoCAD, SOLIDWORKS, Ansys, Vectric Aspire, Proteus Design Suite, Keil, CNC machining

EXPERIENCE IN ACADEMIC R&D

Project Assistant – Guidance Control and Decision Systems Laboratory

Feb 2019 – Ongoing

Guide: **Prof. Debasish Ghose**, Dept. of Aerospace Engineering, Indian Institute of Science (IISc), India

Main Project: *MBZIRC 2020*, funded by Robert Bosch Centre for Cyber Physical Systems and Tata Consultancy Services

Platforms: GA3, DJI Matrice 600 – [Pixhawk, DJI A3 Autopilot, Nvidia TX2] ROS, C++, Python, OpenCV, Darknet

Role: Drone Pilot, Team lead for 'Drone Design and Integration' sub-team.

(a) Automation of Challenge 1 for MBZIRC 2020 [[Video](#), [Video](#)]

- Developed vision algorithm for ball detection using OpenCV.
- Developed and tested vision based guidance and estimation algorithms for the detection and tracking of target drone and ball.
- Electronics and other sub-systems integration with onboard ROS (Nvidia Jetson TX2).

(b) Custom-designed V-shaped Hexarotor platform for Autonomous applications

- Involved in design, machining and assembly of parts constituting the body frame using carbon fiber reinforced polymer.
- Designed and integrated the electronic sub-system for V-shaped hexacopter which was designed for agile maneuverability for target drone interception..

Research Assistant – Artificial Intelligence and Robotics Laboratory

Jan 2019 – Ongoing

Guide: **Prof. Suresh Sundaram**, Dept. of Aerospace Engineering, Indian Institute of Science (IISc), India

Main Project: *Autonomous UAV and UGV systems*, funded by Robert Bosch Centre for Cyber Physical Systems and General Aeronautics

Platforms: GA3, Botsync Copernicus, Turtlebot 3, DJI Matrice 210 V2 – [Pixhawk, DJI A3 Autopilot, Nvidia TX2] ROS, C++, Python, OpenCV.

(a) Decentralized Co-operation of Multi-Robotic Swarm using Reinforcement Learning. [[Video](#)] [1]

- Developed a scalable decentralized co-operation algorithm for search and reconnaissance mission in uncertain environments using Reinforcement Learning framework.
- Implemented the same on TurtleBot3 to achieve decentralized co-operation of multirobotic swarm.

(b) GPS Denied Localization for Unmanned Aerial Vehicles.

- Developed a novel neural network architecture for GPS position estimation for prediction of GPS position using IMU data.
- Developed and integrated 2D Lidar, IMU etc. based sensor fusion for optimal localization using Extended Kalman Filters.
- Developed and integrated vision based SLAM for outdoor application using multiple sensor fusion techniques.

(c) *Autonomous Lane following and Obstacle Avoidance using a Custom Designed UGV* [[Video](#) , [Video](#)]

- Integrated Yolo-Lite on the Unmanned Ground Vehicle for real-time object detection and classification.
- Developed and Integrated 2D Lidar based obstacle avoidance and mapping on the UGV.
- Developed vision based obstacle avoidance and tested on TurtleBot3.
- Developed and Integrated vision based lane detection and following using monocular camera.

Project Assistant -- Unmanned Aerial Vehicles Lab

Jun 2018 – Dec 2018

Guide: **Dr. S.N. Omkar**, *Dept. of Aerospace Engineering, Indian Institute of Science (IISc), India*

Main Project: *Autonomous Drones*, funded by Robert Bosch Centre for Cyber Physical Systems

Platforms: Custom-designed quadcopter – [Pixhawk, Odroid-XU4], Parrot Bebop 2, ROS, C++, Python, OpenCV, Keras

(a) *Package delivery using Autonomous Road Following in UAVs based on Monocular Vision* [[Video](#)]

- Implemented RIFT (Road Identification, Following & Tracking) using pixel-wise filtering based on spectral analysis, block-wise filtering based on edge energy measures, and morphological processing for package deliver for about 1km distance.
- Implemented Road-junction Detection using binary classifier based on a 2-CNN/2-FCN Neural Network

(b) *Custom-designed Quadcopter platform for Autonomous Navigation Applications*

- Involved in design, machining and assembly of parts constituting the body frame using carbon fiber reinforced polymer
- Integrated various sensors – GPS, optical flow (PX4FLOW), and lidar (LIDAR-Lite) with Pixhawk flight controller for autonomous operations.

Undergraduate Thesis

Aug 2017 – Apr 2018

Guide: **Prof. J.S. Rao**, *Dept. of Mechanical Engineering, Rajiv Gandhi University of Knowledge Technologies, Nuzvid, India.*

Bachelor's Project: *Estimation of Realtime Speed and Tracking of a Vehicle using Computer Vision Techniques and Raspberry Pi.* [[Video](#)]

- Motivation of the project was to determine the relative velocity of a moving body using an inexpensive monocular camera.
- Developed an improved adaptive background mixture model for Real-time tracking. This uses fusion of adaptive gaussian mixture model along with density estimation per image pixel for background subtraction.
- Implemented the proposed algorithm on a two-wheel drive robot to track overspeeding objects.

Summer Research Intern -- Unmanned Aerial Vehicles Lab

May 2017 – Jul 2017

Guide: **Dr. S.N. Omkar**, *Dept. of Aerospace Engineering, Indian Institute of Science (IISc), India*

Project: *Design, Optimization, Fabrication and Assembly of Heavy Lift Octocopter for Organ Transportation.* [[Video](#)]

- Designed a octocopter aircraft for high lift low drag and for high tolerance for payload of 10kg.
- Structural design and analysis was done in CATIA and ANSYS; framework modeling in Vectric Aspire followed by CNC Machining.
- Designed the Octocopter control system for longitudinal and lateral stability in MATLAB (both aerodynamic and electronic control).

MAJOR PROJECTS

Gesture Controlled Drone Using Computer Vision

Dec 2017 – Apr 2018

Guide: **Prof. J.S. Rao**, **Prof. Amit Patel**, *Dept. of Mechanical Engineering, Dept. of Computer Science Engineering, RGUKT, Nuzvid, India.*

- The hand gestures were classified and dynamic gestures were recognised using trained Artificial Neural Networks.
- A 3-axis accelerometer was used to sample the classification data set ; suitable geometric messages were sent to on-board Odroid computer (MAVROS) for quadcopter control.

18 Dof Bi – Pedal Humanoid Robot

Dec 2016 – Apr 2017

Guide: **Prof. J.S. Rao**, *Dept. of Mechanical Engineering, Rajiv Gandhi University of Knowledge Technologies, Nuzvid, India.* [[Video](#)]

- Designed a coherent control algorithm for the robot to adapt to the ground conditions.
- Implement a linear inverted pendulum model on the Robokits 18 DoF DIY Humanoid Robot.

Team ROBOCON – RGUKT Nuzvid

Jul 2015 – Apr 2017

Guide: **Prof. Shyam Perika**, *Faculty Advisor – Student Development and Campus Activity Cell, RGUKT, Nuzvid, India.*

- In Mechanical Subsystem Design: Designed a pole climbing robot as a part of the Robocon 2016 to perform various tasks such as (a) pole climbing, (b) driving ecorobot using a propeller, (c) propeller picking and placing, (d) line and wall following.
- In Electronics Subsystem : Designed and developed the required circuitry of the robot that included power management circuit and the controller circuit to control the thrusters for movement of the ecorobot.

POSITION OF RESPONSIBILITY

Founding Head – Student Robotics Club, RGUKT - Nuzvid, AP, India

Jun 2015 – Apr 2017

As, the founding head of *Student Robotics Club*, RGUKT Nuzvid's student robotics club, I lead the team of over 40 students for preparation, development and manufacturing robots for various National (Robocon 2016) and International level robotics competitions.

President – Student Development and Campus Activity Cell (SDCAC), RGUKT - Nuzvid, AP, India

Jul 2017 – Mar 2018

As, the president for the student activity cell, I conducted the Annual National Level Techfest Teckzite 2018 at RGUKT Nuzvid.

Team Member – National Team of Maharashtra U-17 (Basket Ball)

Apr 2010 – Mar 2012

Kendriya Vidyalaya, India Security Press (I.S.P.), Nashik Road, Nashik, Maharashtra, India