MANU MADHU PILLAI

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EXPERIENCE

Systems Engineer at Newspace Research and Technologies- Bengaluru, India [link] **Sept 2024- Present**

- Improving the current feature integration testing process by adding HITL testing to SITL testing, Bench testing and Flight testing.
- Assess and correct issues and make improvements across complex cyber-physical swarming aerial robotic systems.

Journeyman Fellow at DEVCOM Army Research Laboratory- Adelphi, MD, USA **Dec 2022- May 2023**

- Developed and implemented a simulated environment on ROS platform to test and evaluate novel quality metrics in multi-agent mapping.
- Assist in developing and testing distributed information-gathering methods using autonomous ground vehicles.

Systems Analyst & GCS Operator at Skye Air Mobility- Bengaluru, India [link] **Aug 2020 - Jun 2021**

- Conducted extensive testing on a medical UAV delivery solution, accumulating over 80 flight hours of testing and validating its ability to transport a payload capacity of 4.5 lbs within an operational radius of 6 miles.
- Collaborated with cross-functional teams on experiments to allow safe and regulated BVLOS flights in India with Civil Aviation Authorities.
- Developed comprehensive CONOPS document outlining flight readiness review guidelines, testing, and operations procedures for 100 hours of experimental BVLOS flights, ensuring compliance with Civil Aviation Authority regulations and safety protocols.

Intelligent Systems Engineer at Curl Tech- Bengaluru, India [link] **Apr 2019 - Jul 2020**

- Developed three prototype UAVs for automated surveying using multispectral cameras and LIDARs.
- Developed and tested UAV solutions to detect spontaneous combustion in coal at Krishnapatnam port using multispectral computer vision.
- Integrated flight controller and sensors like LIDAR, camera, altimeter and GPS to an onboard computer using ROS for autonomous flights.

Data Scientist at Curl Tech- Bengaluru, India [link] **Jul 2018 - Mar 2019**

- Developed and implemented computer vision algorithms to analyze railway track conditions using autonomous UAVs, resulting in a 50% reduction in maintenance time.
- Developed and implemented a cutting-edge LIDAR-based 3D mapping solution on UAVs, enabling the state government to efficiently survey rural roads with an accuracy of over 90%, surpassing industry standards.

SKILLS

Programming Languages: Python, C++, Matlab | **Embedded Systems:** Jetson TX2, AGX, Jetson Nano, Raspberry Pi, Arduino, Pixhawk
Libraries and Tools: ROS, ROS2 , OpenCV, Pytorch, Git, MoveIt!, Ardupilot, PX4, Solidworks, Cameo Systems Modeler
Licenses: 14 CFR Part 107, Amateur Radio License (KB1UIS / VU3MIV) **| Manufacturing Skills:** Rapid Prototyping, Soldering, PCB Design

PROJECTS

- **Systems Engineering Exercise: Autonomous Delivery Robot (ADR)**[link] **| Model Based Systems Engineering | Cameo Systems Modeller**
  Simulated Systems Engineering activities such as management, requirements, architecture, and analysis for an autonomous delivery robot.
- **Pick and Place Robot** [video] **| Autonomous Robots | OpenCV, Python, Path Planning, Raspberry Pi, IMU, Ultrasonic Sensor**
  Built and programmed a pick and place robot to detect colored blocks, localize, pick and place in designated locations.
- **Autonomous Kitting Robot** [link] **| Software Development for Robotics | C++, AIP, ROS2, OpenCV, MoveIt, Gazebo, RViz, CI/CD**
  Using an overhead camera and Panda Arm Manipulator, performed kitting using color as a criteria within the Gazebo simulation environment.
- **Reversi UCT** [link] **| Introduction to Computational Game Theory | Upper Confidence bounds applied to Trees, Python**
  Implemented a UCT algorithm to make decisions on a Reversi game and made improvements to the algorithm for better performance.
- **Aerial Plant Health Monitoring Using Drones** [video] **| UAV Development, Computer Vision, Image Stitching, NDVI**
  Developed a tiltrotor H-quad-plane solution with 7.5 g/W hover thrust efficiency to study vegetation stress patterns in a field based on the Normalized Differential Vegetation Index (NDVI) using a multispectral camera.
- **Tiltrotor H-Quadcopter: Blackhawk:** Developed a tiltrotor H-quadcopter for autonomous pylon racing based on IMAV 2017 competition rules. Completed 10 laps in 8 minutes (500m per lap) with a max speed of 13 m/s.
- **H-Quadcopter: Terminator**[video]**:** Created a multifunctional H-quadcopter from scratch using iterative design with an endurance of 40 minutes and a max payload capacity of 3.5 kg (8lb). Used for small goods delivery, flying banners, and aerial surveillance.

EDUCATION

University of Maryland, College Park **Maryland, USA**
Professional Master of Engineering in Robotics | GPA: 3.5/4.0 **Aug 2021- May 2023**

Rashtreeya Vidyalaya (R.V.) College of Engineering **Bengaluru, India**
Bachelor of Engineering in Electronics & Communication Engineering | GPA: 8.67/10 **Aug 2014- Jun 2018**

ACCOMPLISHMENTS

- Winner, AIAA Innovative Drone Exploration and Application (IDEA), San Jose, California, USA. **Oct 2017**
- 7th place among 13 teams, outdoor team, International Micro Aerial Vehicles Challenge, Toulouse, France. **Sep 2017**
- 1st place, proposal report, among 138 teams, AIAA Design, Build, Fly, Tucson, Arizona, USA. [report] **Apr 2017**

ACTIVITIES & INTERESTS

- Design lead and management head of Team Vyoma, RVCE aero design club. [brochure] **Mar 2015 - Jun 2018**
- Conducted aerodynamics workshops for 2500 students in 30 schools in Bengaluru. [video] **Jul 2015 - Jul 2017**
- Detect issues and discuss solutions in the ArduPilot forum, an open-source autopilot project. **Jun 2017 - Present**