

# Pranay Mathur

pranay.mathur@gatech.edu | [in](#) pranay-mathur1998 | [G](#) Matnay | [@](#)matnay.github.io | +14049335405

## RESEARCH INTERESTS AND SKILLS

Computer Vision, SLAM, Deep-Learning, Robot Operating System, C++, Python, Tensorflow, OpenCV, Linux, MATLAB, Github, Java, LATEX

## EDUCATION

M.S Robotics	Georgia Institute of Technology	Aug 2022 – 2024 (Exp.)
B.E Electronics and Instrumentation	BITS Pilani, K.K Birla Goa Campus	Aug 2017 – July 2021

## EXPERIENCE

<b>Engineering Development Group Intern — MathWorks</b>	<b>May 2023 – Present</b>
<ul style="list-style-type: none"><li>Added feature to the Simulink Test Toolbox scheduled for release in MATLAB &amp; Simulink 2024a</li><li>Improved performance of features in the toolbox achieving a 20% speed-up over original time</li></ul>	
<b>Developer — Google Summer of Code</b>	<b>June 2022 - Present</b>
<ul style="list-style-type: none"><li>Built a path-finding algorithm for an <b>autonomous vehicle</b> using <b>Efficient-Det</b> architecture and <b>mapped landmarks</b> exploiting known camera intrinsics and landmark geometry</li><li>Ported Efficient-Det to TFlite and <b>improved inference</b> speed to <b>22 FPS</b> on a Raspberry Pi using Coral Edge TPU</li></ul>	
<b>Graduate Engineer Trainee — Addverb Technologies, Noida</b>	<b>Aug 2021 – July 2022</b>
<ul style="list-style-type: none"><li>Worked on <b>appearance-based Navigation</b> of ground-based robots using semantic-scene understanding</li><li>Integrated autonomous mobile-robots with <b>5G cloud-control</b> based capabilities using web-sockets and ROS</li><li>Deployed system for augmenting LiDAR based <b>SLAM</b> and executing <b>recovery behaviour</b> in mobile robots</li></ul>	
<b>Intern — Technoantra, Pune</b>	<b>Jan 2021 - Aug 2021</b>
<ul style="list-style-type: none"><li>Developed a <b>localization algorithm</b> using EKF based fusion of pose estimates from <b>fiducial tags</b> and particle-filter based LIDAR SLAM</li></ul>	
<b>Undergraduate Researcher — University of Nevada, Reno, USA</b>	<b>July 2020 - Jan 2021</b>
<ul style="list-style-type: none"><li>Developed a generalizable Resource-Aware algorithm for deployment of <b>Visual Inertial Odometry</b> algorithms on computationally constrained aerial vehicles under the guidance of <b>Prof. Kostas Alexis</b></li><li>Released and maintain two packages in ROS and ROS2 incorporated into ROS-perception and presented the work as a <b>Lightning Talk</b> at <b>ROS-World 2020</b></li></ul>	
<b>Technical Intern — KPIT Technologies, Pune</b>	<b>May 2020 - July 2020</b>
<ul style="list-style-type: none"><li>Worked on <b>multi-modal sensor fusion</b> based Object Detection using 3D LIDAR, monocular camera and a RADAR which <b>improved detection</b> performance upon occlusion and low illumination for <b>self-driving cars</b></li></ul>	
<b>Research Intern — CSIR Central Electronics Engineering Research Institute, Pilani, India</b>	<b>May 2019 - July 2019</b>
<ul style="list-style-type: none"><li>Implemented RTAB-Map <b>SLAM</b> for Autonomous Navigation of Quadcopters using PX4 and ROS in <b>visually-degraded GPS denied</b> environments using an RGBD camera</li><li>Implemented multi-modal sensor fusion and visual noise-removal using classical image processing</li></ul>	

## PUBLICATIONS

**Sparse Image based Navigation Architecture to Mitigate the need of precise Localization in Mobile Robots**  
Pranay Mathur, Rajesh Kumar, Sarthak Upadhyay - arXiv, 2022

**Resource-aware Online Parameter Adaptation for Computationally-constrained Visual-Inertial Navigation Systems**  
Pranay Mathur, Nikhil Khedekar, Kostas Alexis - IEEE-RAS International Conference on Advanced Robotics, 2021

**A Generalized Kalman Filter Augmented Deep-Learning based Approach for Autonomous Landing in MAVs**  
Pranay Mathur, Yash Jangir, Neena Goveas - IEEE International Symposium of Asian Control Association on Intelligent Robotics and Industrial Automation, 2021

**Multi-Sensor Fusion-Based Object Detection Implemented on ROS**  
Pranay Mathur, Ravish Kumar, Rahul Jain - Springer International Conference on Machine Learning and Autonomous Systems, 2021

**BCI Controlled Quadcopter using SVM and Recursive LSE Implemented on ROS**  
Kshitij Chhabra, **Pranay Mathur**, Veeky Baths - IEEE International Conference on Systems, Man and Cybernetics, 2020

## AWARDS AND POSITIONS OF RESPONSIBILITY

**Best Paper Award** - IEEE IRIA, **Mantra Innovator of the Year** - CEL, BITS Goa, **Prof. Suresh Ramaswamy Memorial Award** - BITSAA International, **Teaching Assistant** – Computer Vision, Principles of User Interface Software, Signals and Systems, Microelectronic Circuits

## COURSES

Deep-Learning, Data Structures and Algorithms, Object Oriented Programming, Microprocessors and Interfacing, Digital Image processing, Signals and Systems, State Estimation and Localization for Self-Driving Cars, Linear and Non-Linear Control Systems

## PROJECTS

<b>Human-Motion Prediction: With great power comes great res-pose-ability</b> ( <a href="#">GitHub</a> ) ( <a href="#">Report</a> )	Jan 2023 – May 2023
<ul style="list-style-type: none"><li>Worked on Convolutional Seq-to-Seq models for human-motion prediction on computationally-constrained systems</li><li>Achieved comparable performance to several baselines implemented in the <a href="#">fairmotion</a> library at reduced computational costs</li></ul>	
<b>Drone Delivery Using SLAM and Object Avoidance</b> ( <a href="#">GitHub</a> )	May 2019 - July 2021
Faculty Advisor: Dr. Sarang C. Dhongdi, Assistant Professor, Dept. of EEE	
<ul style="list-style-type: none"><li>Developed an algorithm for autonomous navigation of drones in GPS-denied environments using RTAB-Map V-SLAM and an RGBD camera</li><li>Developed custom computer vision algorithms using CNN based attention maps for obstacle recognition and avoidance implemented in Tensorflow and OpenCV</li><li>Selected for funding by the EEE Dept. and Sandbox Fabrication Lab, BITS Goa</li></ul>	
<b>Autonomous Landing of MAVs using a Kalman Filter and Faster-RCNN</b> ( <a href="#">Paper</a> )	Jan 2021 - July 2021
Faculty Advisor: Prof. Neena Goveas, Associate Dean & Prof. BITS Goa	
<ul style="list-style-type: none"><li>Developed an algorithm for autonomous landing of MAVs exploiting transfer learning to eliminate the need for fiducial markers on landing sites</li><li>Used the Faster-RCNN architecture implemented in Tensorflow along with a Kalman Filter based controller deployed using the PX4 stack and mavros</li></ul>	
<b>Drone Control using Brain Wave Mapping</b> ( <a href="#">GitHub</a> ) ( <a href="#">Paper</a> )	Dec 2018 - July 2021
Faculty Advisor: Dr. Veeky Baths, Associate Professor, BITS Goa	
<ul style="list-style-type: none"><li>Fabricated a BCI based Quadcopter using SVM classification and Recursive LSE</li><li>Worked with Processing3, Python, Emotiv, Robot Operating System (ROS), mavros</li><li>Received the prestigious Prof. Suresh Ramaswamy Memorial Award</li></ul>	
<b>Human Machine Teaming — DRDO</b>	Jun 2018 - Apr 2019
Faculty Advisor: Prof. Neena Goveas, Associate Dean and Prof. BITS Goa	
<ul style="list-style-type: none"><li>Contributed to a project on Human Machine Teaming and swarm robotics for the Defence Research and Development Organization (<a href="#">Certificate</a>)</li><li>Simulated a mission-plan involving a swarm of quadcopters on RotorS</li><li>Deployed using ROS (Robot Operating System), Python, RotorS and Gazebo</li></ul>	
<b>Project Kratos – Mars Rover</b> ( <a href="#">LinkedIn</a> ) ( <a href="#">GitHub</a> )	Dec 2017 - Jun 2019
Faculty Advisor: Dr. Toby Joseph, Dept. of Physics, BITS Goa	
<ul style="list-style-type: none"><li>Contributed in building a Mars Rover that ranked 10<sup>th</sup> of 25 teams in the Indian Rover Challenge</li><li>Lead the communication sub-system and implemented a scheduling algorithm to transmit multiple camera and data feeds with minimal latency</li><li>Set up Communication Networks using the Ubiquiti Networks Platform and automated processes using BASH scripting in Linux</li></ul>	
<b>Stabilisation of UAVs using Gyroscope and Accelerometer</b> ( <a href="#">GitHub</a> )	Dec 2017 - Jun 2018
<ul style="list-style-type: none"><li>Implemented a PID controller using gyroscope and accelerometer data from an IMU for stabilization of aircraft in adverse operating conditions</li><li>Used an MPU 6050 Inertial Measurement Unit and an Arduino Mega 2560 microcontrollers</li></ul>	