# PATANJALI MAITHANI

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## EDUCATION

Master of Science, Mechatronics and Robotics **2022-2024**
**New York University**, New York, USA **3.722 GPA**

Bachelor of Engineering, Manufacturing Processes and Automation Engineering (MPAE) **2016-2020**
Netaji Subhas Institute of Technology (NSIT), **University of Delhi**, New Delhi, India **7.85 CGPA**

## WORK EXPERIENCE

**Omnipresent Robot Tech, New Delhi, India** ***September 2020 - September 2021***

- Improved the security, traceability, and integrity of the company's Remotely Piloted Aircraft Systems (RPAS) by augmenting the open-source software **PX4** with **Public Key Infrastructure (PKI)** to meet Indian regulatory requirements.
- Developed and documented the company's **NPNT (No Permission, No Take-off)** architecture to ensure compliance with Indian regulations.

**Industrial Automation Lab ( MPAE Department, NSIT), New Delhi** ***June 2019 - September 2019***

Worked on a project titled, **"Quaternion based estimation and disturbance observer-based control of attitude for a quadrotor"** in the requirement of the Internship. Project included the following:-

- Simulated **disturbance-rejection-based PID** attitude control on a quadrotor using **MATLAB**.
- Executed **Multiplicative Extended Kalman Filter** for estimating orientation of quadrotor from noisy sensor measurements.
- Implemented a harmonic disturbance observer to detect and reject time-varying disturbances, making the quadrotor robust to external varying forces like wind gusts.

## PROJECTS

**Modified Rodrigues Parameters based Non Linear Disturbance Observer Control of Quadrotor**

- Designed a **robust global full degree of freedom discontinuous trajectory tracking controller** for a quadrotor using **control-lyapunov function** in MATLAB.
- Demonstrated the stability of the proposed control scheme through a rigorous **Lyapunov stability proof**, ensuring asymptotic convergence.
- Innovated a novel algorithm for the upside-down orientation of the quadrotor, making the take-off condition more versatile.
- Incorporated Non-linear Disturbance observer to make the controller robust to **exogenous disturbances**.

**Trajectory Tracking Controller for SCARA Manipulator**

- Generated **trapezoidal velocity profile** of the end-effector with anticipation time in the robot's operational space
- Deployed **Second order inverse kinematics** to compute desired joint position, velocity and acceleration.
- Derived **equations of motion** of the SCARA manipulator using first principles.
- Implemented **Inverse Dynamics Controller** in MATLAB/SIMULINK

## SKILLS

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|---|---|
| **Programming:** | C, C++, Python, MATLAB |
| **Software & Tools:** | PX4 Flight Stack, MAVSDK, Latex, Matlab Simulink, Git |
| **Languages:** | Hindi(Native), English(Proficient) |
| **Certifications:** | Aerial Robotics, Computational Motion Planning, Algorithms, Estimation and Learning, Control of mobile robots |