# Prajwal Thakur

Bachelor of Technology Electronics and Communication Engineering

-Indian Institute of Technology Dhanbad , India


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## Research Interests

- **Human Inspired Dynamics And Control**
- **Robust control and state estimation, Evolving controllers**
- **Aerial Robotics**
- **Application of Reinforcement and Deep learning in Robotics**

## EDUCATION

**Indian Institute of Technology (ISM),** Dhanbad — *B.Tech, Electronics, and Communication Engineering*

JULY 2017 - MAY 2021 **CGPA – 7.73 (till 6th Semester)**

**Kendriya Vidyalaya AFS Hindon,** Ghaziabad — *12th / Board*

APRIL 2015 - APRIL 2016 87%

**Kendriya Vidyalaya AFS Hindon,** Ghaziabad— *10th / Board*

APRIL 2014 - APRIL 2015 **CGPA=9.2**

## Internship

**IIIT HYDERABAD-** Research *Intern under guidance Dr.* *Harikumar Kandath*

**JUNE 2020 - JULY 2020**

Worked on the modeling of a hybrid vertical takeoff and landing air vehicle (VTOL) in MATLAB.

Literature review on dynamics of VTOL and various control design algorithms for VTOL.

Designed Linear model Prediciive Controller to track small changes in height for VTOL .

## Volunteer Experience

- **AIESEC Volunteer**
  **JUNE 2018-JULY 2018**
  Volunteered in Malaysia under the Global Volunteer Program provided by AIESEC. Worked with teachers and other Volunteers in designing the course and teaching soft skills to underprivileged students.

## Research PROJECTS

***Designing Learning-Based Model Predictive Control Of hybrid vertical takeoff and landing air vehicle***

*Research guide: Dr.* *Harikumar Kandath* **June 2020 - Present**

This work is focused on the application of Model Based Reinforcement learning in which aim is to design a algorithm where a MPC control system would learn the prediction dynamics of VTOL online and use it for optimization .

**Perception Informed by Navigation for Search and Rescue link : Synopsis**

*Research guide & Project Incharge : Dr. Mrinal Sen-IIT (ISM)* **JUNE 2019- January 2020**

(Sponsored By CAIR LAB, DRDO India)

Developed temporal based Algorithms for human detection and tracking.

Incorporated the developed Algorithm in pre-existing Detection and Tracking algorithms like (YOLO, Deep Sort, etc) and analyzed the results.

Optimization and Testing of Designed Algorithm for Real-time Aerial application on Nvidia Jetson Tx2 .

### Innovative methodologies for Understanding Power Semiconductor Device

*Research guide: Dr. Biplab Sarkar(IIT Roorkee, India)* August 2018 - January 2019

**This work has been focused to develop an interactive computer game using MIT App Inventor that helps to visualize the BFOM.**

Baliga figure of merit (BFOM) a difficult to visualize formula is a measure of semiconductor applicability in power electronics. This formula is used to determine the Optimum Semiconductor at a given frequency and temperature by taking into consideration of various effects.

## Professional Development and Projects

*** Certificate are shared on Linkdin**

**Reinforcement learning Specialization*:** Implementation of Various Reinforcement learning Algorithms and comparison of their Results.

**Projects link** : **github_project_link**

Learned Basics; Monte Carlo Simulation; SARSA; Q-learning; Deep Q networks and its variants; Policy Gradient; Actor critic; Model-Based Reinforcement Algorithms(MBRL). Implementation of MBRL to control 7-joint robot arm in MUJOCO simulator.

**Basic of Industrial Robotics and ROS Specialization***

**Project link**: **github_project_link**

Forward Kinematics; Inverse Kinematics; Differential Kinematics; Motion Planning.

Essentials of ROS; Introduction to URDF; Autonoums Navigation; Movelt; Behavior Design with flexible

**Project**: Implementation of RRT motion planner on a 7-jointed robot arm in ROS kinetic

**MITx Micromaster Program on Statistics and Data-Science and Specialization in Deep learning(on going)**

worked on CNN;Neural style transfer;sequence model;RNN; Ensemble learning ;Bayesia Networks

**Walmart-Smart-Shopping Cart (designed at hackfest-2019) Project link**: **github_project_link**

Aimed at designing the best substitute for the counter that could substitute and drastically reduce the time spent at the billing counters by designing smart shopping Cart .

## Languages and Skills

- **Programming:** C, C++, Python, MATLAB
- **Softwares:** Drake, ROS(Robot Operating System), V-REP
- **Basic Tools:** Linux, LYX, HTML/CSS, Git
- **Spoken Languages:** Hindi and English

## References

- **Dr. Mrinal Sen (Assistant Professor at IIT (ISM) Dhanbad)**
- **Dr. Biplab Sarkar (Assistant Professor at IIT Roorkee)**
- **Dr. Harikumar Kandath (Assistant Professor at IIIT Hyderabad)**