Nitesh **Kumar**

About Me

A passionate, steadfast and innovative engineer with more than two years of industrial and research experience.

Personal Information

Nationality: Indian
D.O.B: 08-May-1999

Areas Of Specialization

- Control Systems
- Optimization
- Scheduling
- Soft Robotics

Programming Skills

C++, Python, MATLAB, Julia, OpenSim, MS Office

Contact

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Academic Qualification

Aug'23-Present — **MS in Mechanical Engineering**
Texas A&M University
CGPA – 4/4.

Aug'16-Jul'20 — **B.Tech in Mechanical Engineering**
Indian Institute of Technology Madras
CGPA – 8.85/10.
Minor in Control Engineering (*CGPA-**9.24/10***)

Apr'14-Mar'16 — **Senior secondary (10+2)**-Maths, Physics and Chemistry
K.S.M Senior Secondary School Jhajjar
Aggregate- 87.6%.

Apr'12-Mar'14 — **Secondary**
K.S.M Senior Secondary School Jhajjar
CGPA- 9.2/10.

Professional and Research Experience

Oct'23-Present — **Persistent Drone Charging Problem in Long-Term Autonomy**
GRUADUATE ASSITANT RESEARCHER – Texas A&M University

- Conducted a comprehensive literature review on optimal periodic schedule of charging pads for refueling UAVs.
- Formulated an ILP based algorithm using JULIA/IBM Cplex for optimal charging scheduling of heterogenous drones.
- Devised an auction-based scheduling algorithm for optimal charging of heterogenous drones.
- Developing a proof of concept for charging stations to optimize UAV recharging and minimize human intervention.

Jul'22- Jul'23 — **Wearable soft robotics for Upper Limb Muscle Power Augmentation with BMI interface.**
RESEARCH FELLOW- IIT Delhi

- Controller design in **simulation framework** of an upper limb augmentative exosuit
  - *Gravity Compensation controller*
  - *Adaptive Gravity Compensation controller*
  - *Reinforcement learning-based controller*
  - *Extended Kalman Filter based prediction controller*
- Implemented Gravity Compensation Controller in the **fabricated upper limb augmentative exosuit**
- Implemented mathematical model of upper arm muscles in the digital imitation of human body and soft exosuit co-simulation
- Developed mathematical model of tendon-sheath actuator

Oct'20–Jul'22

New Parliament Construction Project

MANAGER- Tata Projects Ltd

- Collaborated with relevant stakeholders for design approvals of IBMS, Access control and security system
- Coordinated as a single point of contact for Light fixtures and automation package between vendor and the client
- Learned about the functioning principles of HVAC, Substation, DG Set, Access Control System, and Light Fixtures.

May'19-Jun'19

Machine Performance Team

PROJECT TRAINEE- Caterpillar India Engineering Solutions Pvt Ltd

- Worked on **real-time** model of 794AC mining truck which is used in **ECU tests** on a **hardware-in-loop** simulator
- Modelled dynamic behaviour of an induction drive motor of a 794AC mining truck with an engine of **3500HP** and **320 tons** payload in **Simulink**
- Estimated **characteristic parameters** of the induction motor using **FEMM**

PROJECTS & COMPETITIONS

Sep'19 -Nov'19
Guide

Robotic Interception of Moving Objects

Assistant Professor Satadal Ghosh (Dept of Aerospace Engineering, IIT Madras)

- Modelled a **hybrid robot-motion planning** by integrating AIPNG navigation technique and PD-type Control torque tracking
- Implemented the **guidance algorithm with the optimal switching point** between two tracking algorithms in MATLAB for various trajectories.
- Resulting method is computationally efficient for the interception of fast manoeuvring objects over conventional tracking methods

Mar'18 -May'18
Guide

Self-Balancing Cycle

Professor Sathyan Subbiah (Dept of Mechanical Engineering, IIT Madras)

- Designed and manufactured the chassis and flywheel of the self-balancing bicycle
- Implemented **PID control** systems by installing Arduino controllers, motor drivers and MPU 6050 sensor
- Analysed the dynamics of the closed loop system in Simulink to obtain the optimal PID parameters

Oct'17 -Jan'18

Technologies for Soldier Support

Centre For Innovation IIT Madras-Inter IIT Technical Meet

- Modelled a device to **monitor physiological conditions** of soldiers in order to provide faster medical aid to them
- Integrated Micro-Electronics Mechanical System Sensors (**MEMS**) to perceive pulse rate and body temperature
- Used Accelerometer, Flex sensor, and **Machine Learning** to recognize basic infantry hand signals used by soldiers
- Achieved 90% accuracy in **recognizing gestures using pre-trained 4SVM** with radial basis kernel function (Gaussian)

Feb'17 -Oct'17

Indoor Positioning System

Centre For Innovation IIT Madras

- Devised a positioning system to locate objects and people in the enclosed areas where GPS is not reliable
- Conceptualised and implemented the idea of using Wi-Fi module and their single strength to localise objects in enclosed areas
- Posted RSSI data of Wi-Fi module on open source **IoT** platform (ThingsSpeak) and estimated coordinates of the individual using **triangulation** method

May'17 -Oct'17

Android Smartphone-Controlled Floor Cleaning Robot

Centre For Innovation IIT Madras

- Fabricated a remote controlled IoT based Floor Cleaning robot
- Used proximity sensor for obstacle avoidance purpose and Bluetooth module for remote control purpose

Extra Curriculars

Sep'18-April'19 | **Institute Athletics Captain, IIT Madras**
- Served as Institute Men's Athletics team captain to represent IIT Madras at the 53rd Inter IIT Sports meet 2018, Guwahati
- Organized a 30 days long summer camp for the first time which witnessed a participation of over 30 students
- Successfully conducted Schroeter (Inter Hostel Sports Meet) and Inter-Departmental League (2018-2019)

Mar'17-Apr'18 | **Coordinator Electronics Club**
Centre For Innovation IIT Madras
- Organized 12 sessions on basics of Arduino, Bluetooth sensors and ping sensors with a footfall of over 250
- Conducted 5 sessions, with 100+ participation strength on the basics of IoT using NodeMCU, at summer school

Relevant Course Work

Robotics and Control	Modern Control Theory, Automatic control (NPTEL), Linear Dynamical Systems (NPTEL), Process dynamics and control, Introduction to autonomous vehicles, Fundamentals of automotive systems, Principle of guidance for autonomous vehicles
Maths and Computer Sc	Probability, Statistics and Stochastic Process, Neural Network and deep learning (Coursera), Differential Equations

Accolades

SCHOLASTIC
- Secured **98.34** percentile out of **0.17 M** students in IIT JEE Advanced, 2016
- Secured international rank 214 (**zonal rank 14** – Haryana) at the 8th International Mathematics Olympiad, 2015

SPORTS
- Member of **Institute Athletics Team** representing IIT Madras in All India Inter IIT Sports Meet since freshman year (2016-2020)
- Acquired **3 Gold, 8 Silver and 4 Bronze medals** at Sports fest and Inter Hostel Sports Meet (2016 -2020)
- Member of Hostel Water polo, Cycling, Running, Triathlon team and winner of IIT Madras annual Dean's Trophy competition 2018

TECHNICAL
- Acquired a place in **Asia Book of Records and India Book of Records** with highest number of cleaning robots (45 at a time) that cleaned 750 square feet of area within 15 minutes using an android based application
- Awarded consolation prize by honourable **Finance Minister of India**, Nirmala Sitharaman during DEFEXPO'18 for the project *Indoor Positioning System*
- Secured **2nd position in 6th Inter IIT Tech Meet 2018**, IIT Madras for developing *technologies for soldier support*
- Secured **3rd position** in Manual Robotics during the annual fest of Mechanical engineering department ,2017
- Represented IIT Madras at Engineer's Conclave amongst 23 IITs during Inter-IIT Tech Meet, Madras, 2018

SOCIAL
- Finished 10 km running at GAVS DRHM 2018, annual fund raiser event to provide prosthetics legs for the needy
- Secured 2nd place in 'Life Goes On' Organ Donation Marathon organized by the IITM, Management Studies Dept
- Successfully completed the 'Sports for Mental Health Run' conducted by Shaastra and Decathlon