Trishant Roy

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I am interested in research in Controls and Motion Planning algorithms with applications in Robotics. Autonomous Systems in Aerial Robotics pique my interest.

Education

Indian Institute of Technology, Bombay | B.Tech+M.Tech | CPI - 8.18/10.00 ['16-Present]

- Major: Energy Science and Engineering
- Minor: Systems and Controls

Intermediate/+2 | Central Board of Secondary Education | Percentage: 95.2% ['16]

Matriculation | Central Board of Secondary Education | CGPA: 10.0/10.0 ['14]

Research Projects

Dynamic Obstacle Avoidance for a Patrolling Mobile Robot [Oct'18-Present]

Guide: Prof. Leena Vachhani, Systems and Controls Department, IIT Bombay

- Working in a project to implement dynamic obstacle avoidance using a nodding 2D LIDAR comprised of a Hokuyo LIDAR and Dynamixel motor
- Implementing Velocity Obstacle-based Trajectory Replanning algorithm for dynamic obstacle avoidance
- Developed a simulation framework in GAZEBO with ROS control to test the algorithms
- Used Pioneer 3DX as mobile bot carrying the sensor and Firebird VI as a dynamic obstacle

International Aerial Robotics Competition | AUVSI [Jul'17-Present]

Guide: Prof. Vivek Sangwan, Department of Mechanical Engineering, IIT Bombay

- Contributed to control and hardware design of autonomous quadcopters capable of human and swarm interaction in a GPS-denied environment
- Implemented remote control of position and orientation of multiple quadcopters on ROS platform
- Designed PID control for stabilization and dynamic path following from SLAM and Path Planning data
- Analyzed, designed and fabricated the electronic platform for the autonomous quadcopters
- Explored and selected the suitable hardware and sensors suite like Pixhawk, LIDAR, Optical Flow etc.

Student Design Challenge | American Society of Mechanical Engineering [Nov'16-Apr'17]

Guide: Prof. Abhishek Gupta, Department of Mechanical Engineering, IIT Bombay

- Played critical role in a 16-member team to design and build a multi-functional mechatronic vehicle
- Designed a Lead Screw Mechanism to lift weight of 30 kg to a height 30 cm above top end of the bot
- Completed specified tasks, namely Sprint, Lift, Hit, Climb and Throw within given constraints
- Won the Asia-Pacific competition and advanced to the World Finals

Key Course Projects

Thermoelectric Generation using Laptop | Energy Engineering Fundamentals [Spring'17]

Guide: Prof. Rangan Banerjee, Department of Energy Science and Engineering

- Designed and fabricated a device to convert heat emitted by laptops into electricity using Peltier Effect
- Calculated efficiency of the fabricated system and assessed its economic feasibility at various scales

Study of Fluid Flow in porous medium | Transport Phenomena [Spring'18]
Guide: Prof Manaswita Bose, Department of Energy Science and Engineering

- Simulated the mathematical model of Darcy's Law for fluid flow through porous medium in MATLAB
- Analyzed the obtained results to understand nature of fluid flow parameters in porous media

Analysis of Noise Filtering in Signals | Signals and Systems [Autumn'17]
Guide: Prof. Subhasis Chaudhari, Department of Electrical Engineering

- Employed Fourier transforms and convolution as a filtering method to process broken or mixed signals
- Used MATLAB to process audio signals and filter out noise, and thereby extracting a clean audio track

Technical Skills

Programming	C++, Java, HTML, MySQL
Platforms	Robot Operating System (ROS), GAZEBO, Git, Arduino
Softwares	MATLAB, Wolfram, SolidWorks, AutoCAD, ANSYS Fluent, Mission Planner, QGroundControl

Relevant Coursework

Core Courses	Electrical Energy Systems*, Power Generation and System Planning*, Power Electronics, Electrical Machines, Thermodynamics and Energy Conversion, Material Science for Energy Applications, Thermo-fluid devices, Reaction Engineering and Combustion
Math and Controls Courses	Signals and Feedback Systems*, Controls and Instrumentation*, Mathematical Structures for Systems and Controls, Linear Algebra, Optimization Models, Numerical Analysis, Data Analysis and Interpretation
Other Courses	Computer Programming and Utilization, Economics, Signals and Systems, Mechanical Workshop, Engineering Drawing

(*- to be completed by Apr'19)

Notable Achievements

- Awarded Best Presentation Award in the IARC Symposium held in Beijing, China and co-authored a technical paper on Augmented Aerial Swarm Behavior via Natural Human Interaction ['18]
- Recipient of the Kishore Vaigyanik Protsahan Yojana (KVPY) Fellowship ['16]
- Ranked among top 0.18% in JEE Advanced and 0.24% in JEE Mains out of 1.2 million candidates ['16]
- Selected to pursue B.Stat in Indian Statistical Institute, Kolkata after 3 rounds of selection ['16]
- Among Top 1% in Maharashtra in National Standard Examination in Chemistry (NSEC) ['15]
- Secured an AIR 203 in National Level Science Talent Search Examination(NSTSE) ['15]

Extracurriculars

- Mentorship in events organized by Institute Technical Council, IIT Bombay:
  - First-year Undergraduate students for ITSP to design a Robotic Surveillance Bird ['18]
  - First-year Undergraduate students for XLR8 to fabricate a Bluetooth controlled car ['17]
- Showcased various projects at the Tech and RnD Expo and TechConnect in IIT Bombay ['16-'18]
- Organizer at CURED: Volunteered in execution of CURED campaign aimed at spreading awareness on diabetes at 150+ centers all around Mumbai which recorded 35,000 sugar level checkups ['17]
- Secured Second Place in Inter Hostel Chess General Championship ['17]
- Completed an one-year training in Athletics conducted by National Sports Organization (NSO) ['17]