MAYANK MITTAL

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EDUCATION

Year	Degree	Institute	C.P.I/Percentage
2014-present	Electrical Engineering (B. Tech.)	I.I.T. Kanpur	9.2/10.0*
2014	Grade XII (CBSE)	A.I.S. Noida	97%
2012	Grade X (CBSE)	A.I.S. Noida	10.0/10.0

SCHOLASTIC ACHIEVEMENTS

- Secured 2^{nd} position in Student Underwater Vehicle (SAVe) competition organized by NIOT, Chennai in 2016
- Received Dhananjay Mohan award for contribution to Science and Technology at A.I.S. Noida in 2014
- Awarded the Kishore Vaigyanik Protsahan Yogna (KVPY) Fellowship in 2012
- Secured 1^{st} place in the regional fair of Odyssey of the Mind (Division III) organized by CCI, USA in 2012
- All India Rank 12 in National Science Talent Search Examination organized by Unified Council in 2011
- Awarded the National Talent Search Examination (NTSE) Scholarship in 2010

RESEARCH EXPERIENCES

Autonomous Exploration System — Boeing-IIT Kanpur Joint Venture July- December 2016
Supervisors: Prof. Shantanu Bhattacharya, Prof. S. Kamle, IIT Kanpur

- The project aims to build an aerial and ground vehicle team to perform a bomb-disposal operation autonomously
- Built a modular two-wheeled differential drive robot with on-board processor and sensors for navigation
- Wrote interrupt code sequence to receive data from rotary encoders based on I^2C communication protocol
- Implemented ground mapping package available on ROS to map a meter-wide corridor using the ground robot

Autonomous Underwater Vehicle (AUV)— Research and Development Project Nov 2014 - present
Supervisors: Prof. K. S. Venkatesh , Prof. Sachin Y. Shinde, IIT Kanpur

- Designed and conceptualized institute's first AUV, *Varun*, capable of shooting torpedo and drop markers
- Optimized robots structure (frames) using SolidWorks and Ansys Workbench (Static Structure and Fluent)
- Fabricated waterproof casings and components using in-house available facilities like CNC Milling and Lathe
- Built an omni-wheeled drive mobile robot to test algorithms before running them on the underwater vehicle
- Designed battery management system for the vehicle that ensured isolation between processor and motors, and provided protection against reverse polarity, short circuiting and over-shooting of voltage

Implementation of SLAM for Marine Robotics— NYU-IIT Kanpur Research Track May- July 2016
Supervisor: Prof. Farshad Khorrami, New York University

- Reviewed back-end implementation techniques for SLAM namely EKF, UKF, Least Square, SEIF, FastSLAM
- Implemented Extended Kalman Filter SLAM on Pioneer 3Dx robot in a virtual environment created on V-REP
- Studied spherical Unscented Kalman Filter for pose estimation using Inertial Navigation System (INS)

Finite Element Analysis in Electromagnetism— NPDE-TCA Winter Internship December 2015
Supervisor: Dr. B.V. Rathish Kumar, IIT Kanpur

- Studied the Ritz-vibrational and Glarenkins finite element analysis in one-dimension and two-dimensions
- Solved two dimensional boundary valued problems on electrostatics and time harmonics using MATLAB

SELECTED PROJECTS

Failure Handling in Swarm of Quadrotors Oct - Nov 2016

- Course Project for course Embedded and Cyber-Physical Systems, under Prof. Indranil Saha

- Proposed an extended state machine design for communication in a swarm, with ability to handle failures, while ensuring properties like redundancy, decentralization and anonymity; wrote a package for it on ROS
- Used Gazebo to simulate swarm behavior in quadrotors using `hector-quad` repository by TU Darmstadt
- Tested communication network on hardware using X-Bees(Series 2) in broadcasting mode to exchange messages

Applying $\mathcal{H}_\infty$ Control to Reduce Risks of Diabetes Mellitus in Patients Oct - Nov 2016

- Course Project for course Robust Control Systems, under Prof. Ramprasad Potluri
- Critically reviewed and attempted reproduction of results of the paper from IEEE Transactions on Bio-medical Engineering, 'Reducing Risks in Type 1 Diabetes Using $\mathcal{H}_\infty$ Control´ by Patricio Colmegna
- Proposed an alternate design to original controller by varying the performance weights in the mixed sensitivity design problem and using a P- regulator for loop shaping instead of an Insulin Feedback Loop (IFL)
- Showed that proposed controller ensured better performance for the considered nominal model of adult patient

Adjustable Medical Chair Feb - March 2016

- Course Project for course Manufacturing Processes-II, under Prof. Neeraj Sinha
- Designed and fabricated a scaled-down model of dental chair with independent controls for various motion

RELEVANT COURSEWORK

Embedded and Cyber-Physical Systems	Linear Algebra	Signals and Systems
Robot Manipulators: Dynamics and Control	Robust Control Systems	Data Structures and Algorithms *
Probabilistic Robotics *	Probability and Statistics	Microelectronics- I
Robot Motion Planning *	Fundamentals of Programming	Digital Electronics

** represents course to be completed in Spring 2017*

TECHNICAL SKILLS

Software/Utilities	Autodesk Inventor, SolidWorks, Ansys Workbench, MATLAB, GNU Octave, LaTeX
Languages	C++, C, Python, bash, HTML, CSS, Java
Frameworks/Tools	ROS, OpenCV, Gazebo, V-REP, Git, Android SDK

POSITIONS OF RESPONSIBILITY

Coordinator, Robotics Club, IIT Kanpur April 2016 - present

- Handling a budget of Rs.125,000 and leading team of 18 secretaries to organize workshops, and competitions
- Mentored and ensured completion of projects: humanoid, robotic arm, gaming console, in Summers 2016
- Conducted a week-long lecture series in collaboration with institutes Center of Mechatronics in October 2016

Project Lead, AUV Team, IIT Kanpur Jan 2016 - present

- Ensured unity in the team of 16 members and motivated members at difficult times
- Safeguarded interest of professors towards the future development of project as research platform
- Managing funds of Rs.769,000 under the terms to participate in RoboSub at San Diego, California in 2018

Student Guide & Academic Mentor, Counseling Service, IIT Kanpur August 2015 - 2016

- Assisted 6 freshmen students in adjusting to the college environment and helped them tackle personal issues
- Personal tutoring to academically weak students in their courses, particularly Introduction to Electrodynamics

EXTRA-CURRICULAR ACTIVITIES

- Secured 1^{st} position in lawn tennis tournament at Shiv Nadar University, Greater Noida in October 2015
- Secured 3^{rd} position at annual sports festival *Sangram*, IIT Roorkee in March 2015
- Participated in Indian Robotics Olympiad (IRO) in 2008-2011 organized by Techtronics India Pvt. Ltd.