Saurabh Gupta

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Academic Qualification

- **Veermata Jijabai Technological Institute (VJTI), Mumbai** **Aug 2014 - Apr 2018**
  Bachelor of Technology in Electrical Engineering *CGPA : 6.85/10*

Experience

- **Centre of Excellence in Complex and Non-Linear Dynamical Systems, VJTI** **Dr.Faruk Kazi**
  Junior Engineer *Aug 2018 - July 2020*
  - My main role was to develop a testbench for mobile robotics research in our lab. It was used by many undergraduate students in the university as a platform for their Bachelor Thesis
  - Developed along with my colleagues an omni-directional mobile robot platform, equipped with encoded motors, 2D Lidar, Intel Realsense, ESP32 SoC and an Intel NUC on-board processor. It also has a 5 DoF manipulator fabricated using Robotis Dynamixel servo motors
  - Studied about the Particle filter algorithm for 2D metric SLAM in detail, **reproducing the results of 'gmapping' and 'amcl' packages in ROS**
  - I have written the code to extract odometry data from the encoded wheels and compiled a ROS navigation stack using odometry data and laser scan data
  - Explored Topological and Visual SLAM algorithms, read several seminal research papers on these topics
  - Mentored the undergraduate students working in the lab, and conducted lectures for them on topics like Linear Algebra, Particle Filter, ROS fundamentals, Gazebo Simulation and SLAM
- **Centre of Excellence in Complex and Non-Linear Dynamical Systems, VJTI** **Dr.Faruk Kazi**
  Research Intern *Jan 2017 - Aug 2017*
  - Studied Blockchain Technology with a focus towards its use in the Energy sector
  - Demonstrated a Proof of Concept for **Peer to Peer Energy Trading** in DC Microgrids using Ethereum
  - I was responsible for the integration of data from hardware like solar emulators and smart meters with the blockchain development software
- **Society of Robotics and Automation (SRA), VJTI** **Dr.A.S. Rao**
  Core team member *May 2015 - Apr 2018*
  - Taught topics like Robot Kinematics, Micro-controller Architecture and PID control in various workshops for over hundred freshmen year students
  - Served as the Treasurer of the society and also mentored students in various projects and competitions like the ABU Robocon and WRO-ARC

Projects

- **Surveillance and mobile rescue robot with human-in-loop feedback** **Dr.Faruk Kazi**
  Bachelor Thesis *Aug 2017 - Apr 2018*
  - Prototyped a human like robot capable of imitating human movements in a remote environment. The robot was developed using ROS and a Microsoft Kinect was used to detect a human operator's movements
  - While being maneuvered from a remote location, the robot possessed the dexterity to perform critical tasks such as toggling switches by using human-in-loop feedback
  - I designed the kinematic model of the human arm and mapped it to a 3DoF robotic arm mimicking the human arm. Also performed Inverse Kinematics to compute angles to control the dynamixel servo motors
  - The robot was also equipped with an on-board camera which provided visual feedback from the site of operation

- **Robocon - Asia-Pacific Robotics Competition** **Dr.A.S.Rao**
  Asia-Pacific Broadcasting Union *Nov 2015 - Feb 2016*
  - The task was to drive a passive robot deriving energy for its motion from another manually operated robot, over a complex terrain. Later, the manually operated robot had to detect and climb a 2 meter pole autonomously
  - My primary role was to design printed circuit boards for the two robots, using Atmega128 microcontroller
  - Designed an electronic braking mechanism for dc motors based on combinational logic along with a switch-mode voltage regulator to power the controllers
  - Collaborated with other team members to optimise the programming logic for the robots
- **Autonomous Grid Solver Robot** **Dr.A.S.Rao**
  Techfest, IIT-Bombay *Sep 2015 - Oct 2015*
  - Designed an autonomous line following robot to scan a grid and compute the shortest path between two nodes
  - Implemented the Dijkstras algorithm based on Graph Theory to compute the shortest path
  - Designed and fabricated a line sensing circuit with optimal positioning of sensors to detect and differentiate between different type of nodes in the grid
- **Self-Balancing Robot** **Dr.A.S.Rao**
  Eklavya Mentorship Programme, Society of Robotics & Automation, VJTI *May 2015 - June 2015*
  - Studied the 'Inverted Pendulum' control problem on a 2 wheeled robot with inertial feedback
  - Implemented the Kalman filter for data fusion from Inertial sensors to get a stable 3D pose of the robot
  - Learned the concept of PID control to keep the robot balanced and implemented the same on an AVR microcontroller used on the robot

Skills

- **Software Skills:** Robot Operating System(ROS), Gazebo Simulation, OpenCV, Matlab, Autodesk Eagle, Git, Linux
- **Programming Languages:** C, C++, Python

Co-curricular activities

- Volunteered in events organised by **Larsen & Toubro**, introducing young underprivileged students to the world of Robotics and STEM with a hands-on demo of various robots
- Scored **100%** in the course on **Control of Mobile Robots** offered by Georgia Tech on Coursera
- Scored **98.43%** in the course on **Machine Learning** offered by Stanford University on Coursera
- Excelled with an **A grade** in a 1-week credit course on '**Robotics for Human Movement Training**' conducted by **Dr. Sunil Agrawal** from Columbia University
- Successfully completed and received a passing grade in '**ROS1x: Hello (Real) World with ROS – Robot Operating System**', a course of study offered by Delft University of Technology through edX
- Conducted and taught in technical workshops on '**Robotic Arm kinematics and control using ROS**' and '**Self Balancing and Line Following robot**' for the freshmen students of VJTI

Achievements

- **Winner: Jury and People's Choice Award | Global Blockchain Congress** *Dec 2018*
- **Semi-Finalist | DRDO - Defense Robotics and Unmanned Systems Exposition** *May 2018*
- **Winner: People's Choice Award | Nvidia Jetson Developer challenge** *Mar 2018*
- **Winner | Ernst and Young Blockchain Hackathon** *Aug 2017*