Sahib Singh **Dhanjal**

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Education

MS: Robotics, Automation and Mechatronics *(GPA - 3.7/4.0) - University of Michigan, Ann Arbor* — Sep '17 – Present

B.E(Hons): Mechanical Engineering *(GPA – 9.05 /10) – Birla Institute of Technology and Science, Pilani* — Aug '12 – Jun '16

Skills

Languages: Python, C/C++, JavaScript (Proficient); MATLAB, Java, HTML, CSS, Latex (working knowledge)

Technologies: Git, Machine Learning (ConvNetJS, SciKit, TensorFlow), Robot Operating System (Indigo, Hydro), OpenCV

Strong implementation skills (have solved over 200 problems on various online judges)

Work Experience

ExxonMobil Chemicals | Sales Assistant – South Asia — Jun '16 – Jul '17

- Handled India and subcontinent operations for EM's largest global distributor. Managed portfolio of 12 customers
- Implemented custom dashboard which led to increase in sales performance by 15% and the analytics efficiency by 65%

PEPL Lab, University of Michigan |Search Engine Optimization — Oct '17 – Nov '17

TATA Steel | Quality Control Intern — May '14 – Jul '14

Projects

SLAM in autonomous maritime systems — Dec'17 – Current

- SLAM stack being implemented on top of ROS Hydro for the RobotX Competition held in Dec '18
- Sensor fusion algorithm being implemented for Velodyne VLP-16, Ladybug-5 and GPS/IMU module based on open-source Apollo library
- Keywords – SLAM, Path Planning, Sensor Fusion, ROS

Robot Kinematics Simulator and Motion Planner — Sep '17 – Dec '17

- Forward kinematics using matrix stack & DH convention implemented based on URDF structure of the robot (model for Fetch available)
- Inverse Kinematics simulated using cyclic coordinate descent and gradient descent using manipulator jacobian implemented
- RRT/ RRT-Connect/ RRT-Star planner implemented for high dimensional motion/ trajectory planning
- Keywords – Serial Manipulation, Trajectory Planning, Simulator, Fetch

SLAM and autonomous exploration in differential drive robot — Oct '17 – Dec '17

- Implemented the occupancy gird mapping algorithm, action model, sensor model, and particle filter for SLAM (in C/C++)
- Implemented Yamauchi's autonomous exploration algorithm on the robot. Keywords – SLAM, LiDAR, sensor fusion

Vision based autonomous 4-DOF dynamixel robotic manipulator — Sep '17 – Oct '17

- Used a Microsoft Kinect and a 4-DOF dynamixel arm to develop an autonomous arm capable of completing tasks such as block stacking based on color and building 5-level pyramids. Keywords – OpenCV, Kinect, LCM, serial manipulation

Path planning and multi-robot autonomous exploration on Turtlebot — Dec'15 – May '16

- Path Planning / Navigation stack developed for Turtlebot on ROS Indigo
- Python simulator developed for simulation of multi-robot autonomous exploration and path planning algorithms
- Simulation of autonomous multi-robot exploration in Gazebo. Project was sponsored by DRDO, India
- Keywords – ROS, navigation, exploration, multi-robot, path planning

Gesture controlled robotic arm — Oct '14 – Dec '14

- Gesture controlled 4-DOF serial manipulator fabricated to augment human capability
- The arm was controlled using 2 Arduino UNOs, IMUs for gesture tracking and an XBee module for wireless communication

Design/ fabrication of an autonomous white-board cleaner — May '15 – Jun '15

- Autonomous serial manipulator fabricated which was capable of wiping boards of numerous sizes
- Research paper on this work presented at IEEE UPCON '15

Formula Student – FSAE Italy Oct '12 – Sep '14

- Responsible for design and fabrication of a suspension package for a formula student prototype
- Worked on bell crank geometry, double wishbone suspension design, dynamic roll center migration, spring and roll rates for the car, anti-dive and anti-squat parameters for the car
- Keywords – Suspension design, SolidWorks, ANSYS

Coursework

Graduate/ Undergraduate: Design & Analysis of Algorithms, Computer Vision, Mobile Robotics, Machine Learning, Robot Kinematics & Dynamics
Online/ Self: Deep Learning in Self-Driving Cars, Data Structures and Algorithms, Intro to Networks, Artificial Intelligence for Robotics

Positions of Responsibility

- *CoStAA (Techfest Coordinator*), APOGEE'15, Annual tech fest of BITS Pilani
- *Coordinator*, Aarohan'15, an outreach initiative by BITS Pilani
- *Coordinator*, Department of Visual Media, BITS Pilani
- *Marketing Head*, Inspired Karters, BITS Pilani
- *Vehicle Dynamics Lead*, Inspired Karters, BITS Pilani

Achievements

- Placed 8th in ACM ICPC Amritapuri Regional '13 and 12th in ACM ICPC Calcutta Regional '14
- Won Track-O-Mania (a line following bot competition), iStrike (Vision based autonomous bot competition), APOGEE '14
- Won Junkyard Wars, APOGEE '15
- Won iBOSM '14 soccer and volleyball tournament and represented East Singhbhum district soccer team
- Cleared Regional Maths Olympiad 2010

Extra - Curricular

- Taught Robotics, Algorithms, and Mechanical Engineering on Chegg Tutors
- Front-end developer for main-site APOGEE'15
- Webmaster for APOGEE'15 and Aarohan'15
- Animator and web-designer, Department of Visual Media, BITS Pilani
- 2nd in BITS Premiere Soccer League