Akanshu Mahajan

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EDUCATION

KTH Royal Institute of Technology, Stockholm, Sweden — 2019 - Present

Master's of Science in Systems, Control and Robotics

Track: Robotics and Autonomous Systems

Sri Venkateswara College, Delhi University, New Delhi, India — 2013 - 2017

Bachelor of Technology in Electronics: 77.3%

WORK EXPERIENCE

Senior Engineer (Driverless), ***KTH Formula Student****, Stockholm* — October 2019 – Present *(Voluntary)*

- Team member of the perception and localization pipeline of the KTH Formula Student Driverless team.
- Working on **LIDAR motion distortion and ego-motion estimation** using other sensors such as a 3D camera

Team Leader (Electronics & Software), ***KTH Hyperloop****, Stockholm* — October 2019 – Present *(Voluntary)*

- Responsible for the overall electronics and software module of the KTH Hyperllop's pod.
- Working on **sensor fusion of onboard sensors** such as IMU, optical encoders etc. Using filtering techniques such as **KF, EKF, and UKF**.

Data Scientist, ***iGloble Software Solutions****, New Delhi* — June 2017 – August 2019

- Implemented **brake failure prediction** model for a Tier I supplier on the iotaSmart (cloud) platform. The algorithm used **LSTM network (developed in TensorFlow environment**) for **brake pad wear** prediction of an automobile
- Developed a novel **driving behaviour** algorithm using the data received from a car's (onboard) OBD-II device.
- Developed a **NARX model** in MATLAB **to predict the remaining useful life** of a Lithium Ion/ Lead Acid battery
- Developed a **MLP ANN** to predict the number of passengers travelling in an E-Rickshaw using the current drawn/weight ratio
- **Development of an IoT device** using Linkit One that collected battery parameters (voltage, current etc.)
- Analysed customer feedback data shared by SpiceJet; **predicted the customer turnaround rate** helping them in their CRM strategy
- Developed large scale **machine learning based footfall prediction** and route optimization for Haryana Roadways, a fleet of 4200 buses
- Developed **flask-based REST APIs** in order to integrate the developed algorithms with the existing IT framework

ACADEMIC PROJECTS

Design and Development of a Crazyflie Drone — *Ongoing*

- Working on the crazyflie drone in the ROS environment and developed the localization, path planning and trajectory following submodule; used algorithms such as A-Star, EKF and cubic- spline interpolation for the same
- Is working on Swedish road sign detection system using the onboard camera and Deep Learning algorithms

Robotic Food Cutting — *Ongoing*

- Research project aimed at investigating data-driven methods for fast and accurate event prediction, in this case knife being stuck, based on (and coupled with) the dynamics model of a cutting task.
- Using deep learning techniques such as representation learning and classification using SVM at the output node

Motion Model and Filtering Techniques for SVEA Vehicles with Fiducial Detection — *2020*

- Estimated real time pose of a mobile robot using the Extended Kalman Filter (EKF) and Particle Filter (PF) technique.
- ArUco markers were used as observation measurements and control inputs with IMU was used as motion model

Graduate Projects *2013-2017*

- **Lead a team** and developed a **IoT based** smart switch to autonomously control the temperature, humidity and luminosity in a Green House.
- **Lead a team project** and developed an in house mobile manipulator (4DOF) that worked on the principle of **Visual-SLAM** using 3D map environment.
- **Lead** a team project aimed at design and development of a **laser following robot using image processing** using image processing on a PC. The robot was controlled using PID and the laser was assumed as the setpoint.
- **Lead** a team project aimed at development of a robotic arm. Worked on the image processing algorithm to identify grasping point and the **artificial neural network** controller to solve the inverse kinematics of the manipulator

TECHNICAL SKILLS

General	: **Robotics**, **Deep Learning, Machine Learning,** IoT and Computer Vision
Programming Languages	: **Python, MATLAB**, **Embedded C, C++** and SCILAB
Framework and Tools	: **TensorFlow**, **ROS**, **PyTorch,** git, flask
Database	: MongoDB, SQLite
Embedded Platform	: **Raspberry Pi, Arduino**, LINKIT ONE, 8056, AVR, ARM**,** and PIC
Simulation Software	: **Simulink**, **Gazebo**, **Rviz,** AVR Studio, Proteus, and Webots

INTERNSHIPS

Summer Research Intern, **Cluster Innovation Centre**, Delhi University, New Delhi June 2016 – August 2016

- Worked in a team project entitled “Autonomous Pick and Place mobile manipulator using 3D vision and Visual SLAM".
- Worked on different algorithms such as ICP, RANSAC and SIFT and successfully created a **3D point cloud of a room** and **computed the dynamics and kinematics** of the on-board robotic manipulator

Summer Research Intern, **IIT-Roorkee**, Roorkee June 2015 – August 2015

- Worked under Prof. N. Sukavanam (H.O.D.) on an individual project entitled "Trajectory Tracking by Robot Manipulators".
- Worked on the problem of solving **inverse kinematics** for serial manipulators using **unsupervised learning based ANNs**

PUBLICATIONS

- **Mahajan, Akanshu** & Singh, H & Nagarajan, Sukavanam. (2017). An unsupervised learning based neural network approach for a robotic manipulator**.** International Journal of Information Technology. 9. 1-6. 10.1007/s41870-017-0002-2.
- Singh, H & Kumar, Surendra & Kumar, Pravesh & **Mahajan, Akanshu**. (2018). Virtual Experimental Analysis of Redundant Robot Manipulators Using Neural Networks. 21-30. 10.1007/978-981-10-5699-4_3.
- Pradeep & **Mahajan, Akanshu** & Bharti, Varun & Singh, H & Josyula, Lalita & Kumar, Pravesh. (2018). Construction of a 3D Map of Indoor Environment. Procedia Computer Science. 125. 124-131. 10.1016/j.procs.2017.12.018.
- Singh, H & **Mahajan, Akanshu** & Nagarajan, Sukavanam & Budhraja, Veena & Singh, Swarn & Kumar, Amit & Vashisht, Anadi. (2015). Control of an autonomous industrial fire fighting mobile robot. DU Journal of Undergraduate Research and Innovation.

AWARDS

- Won the **best project award** in a special session of B.Tech project presentation during National Conference on Recent Developments in Electronics (NCRDE)-2017.
- Winner of numerous robotic events, notable being **National Robotryst Championship** (IIT-Delhi in 2015**)**, **Robocon (**IIIT–Delhi in 2016**)** and **JECRC University–Jaipur (**in 2015 and 2016**)**.
- First Runner-up in the Digital World category at **Antardhvani- 2015**, the annual cultural fest of Delhi University.
- First Runner-up in **Star Innovator Competition by IEEE** India Student Activities Committee held at NSIT, Delhi-2014
- Awarded with the honour of youngest participant (~500 teams) at **National Robotryst Championship** held at IIT- Delhi in 2012.

SOCIETIES AND PARTICIPATION

- **Founder and former President** of Robotics Society of Sri Venkateswara College, University of Delhi
- Student member of Institute of Electrical and Electronics Engineers **(IEEE), IEEE-RAS and IEEE- PES**