

# Rajendra Singh

Fourth year

Computer Science and Engineering

Indian Institute of Technology, Palakkad

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## SUMMARY

◆ <b>Domain</b>	:	Artificial intelligence(AI) and Robotics
◆ <b>Internships</b>	:	UST Global, Researchshala and IIT Madras.
◆ <b>Projects</b>	:	SLAM, Swarm robotics, Manipulators
◆ <b>Position</b>	:	Former Head, Robotics club, IIT Palakkad
◆ <b>Achievements</b>	:	KVPY fellowship, AWES Scholarship
◆ <b>About</b>	:	Passionate about vision-based robotics, research oriented and looking forward to work with enthusiastic team in this domain.

## EDUCATION

Program	Institution	%/CGPA	Year
• <b>B. Tech</b>	Indian Institute of Technology, Palakkad	7.19 (Till VI Semester)	2016 - April, 2020
• <b>XII</b>	Delhi Public School, Udaipur	89%	2015 - 16
• <b>X</b>	Delhi Rajasthan Public School, Rajsamand	96%	2013 - 14

## TECHNICAL SKILLS

Title	Skills
► <b>Robotics</b>	<ul style="list-style-type: none"><li>• SLAM(2D / 3D)</li><li>• Motion and path planning</li><li>• Swarm algorithms</li><li>• Control system</li><li>• Perception(Feature matching, Segmentation, Detection)</li><li>• Sensor fusion(Kalman, Particle filter)</li><li>• Robot kinematics and dynamics(DH/Newton/Euler/Lagrangian method)</li><li>• Embedded system(ARM, RTOS, FPGA)</li></ul>
► <b>Reinforcement Learning</b>	Q-learning, Sarsa, Monto carlo, TD, Multi-armed bandit, DQN, Genetic algorithm
► <b>Machine Learning</b>	Linear Regression, Regularization(Ridge,LASSO), Classification(Naive Bayes, SVM, KNN, Decision Trees), Clustering(K-mean/DBSCAN/BIRCH/DIANA), PCA, Ensembling, Cross validation
► <b>Deep Learning</b>	CNN, RNN, LSTM, Unstructured data, Topic modeling, Word embedding
► <b>Languages</b>	C, C++ , Python
► <b>Software/Tools</b>	ROS 1/2, Moveit, Gazebo, V-REP, Matlab, Fusion 360, Keil, Atmel studio 6, OpenGL
► <b>Hardware</b>	Rplidar A2M8, Realsense D435, Nvidia Jetson(Tx2, nano), Raspi3B+, GstarIV GPS, Zybo-zyng FPGA, KL25Z arm cortex-M0+ , Atmega16/32/2560, NodeMCU, GSM, Pyboard, OpenMV, PlutoX

## WORK EXPERIENCES

May-July, 2019

### ● Research intern, UST Global, Trivandrum

Studied various **SLAM** algorithm and implemented it using ROS by fusing sensor data of lidar and 3d depth camera. Later, I worked on control and planning of robotics manipulator for vision based pick and place task.

May-July, 2018

### ● Data Science intern, Researchshala, Chandigarh

Worked on **NLP projects** related to transfer learning, topic modelling, web and pdf scraping, extracting and analysing useful information from unstructured data.

May-June, 2017

### ● Vistaar Program, IIT Madras

Studied state of art 3D printing technology and then built **Prusa i3 3D printer** and a robotic arm using this printer.

## SEMINAR PRESENTATIONS

August, 2019

- **Visual SLAM on mobile manipulator using robot operating system**

- *Industry-Academia Conclave, IIT Palakkad*

Presented a **poster** showcasing implementation of 3D visual SLAM on a industrial manipulator robot.

October, 2017

- **Low cost Prusa-i3 3D printer**

- *Open House, Centre for Innovation(CFI), IIT Madras*

**Showcased** low cost, self made Prusa-i3 3D printer and its applications.

## SELECTED PROJECTS

► <b>Swarm</b>	Simulating swarm behaviour of flocking and foraging in V-REP and Argos simulator	<b>October-December, 2019</b>
► <b>Q-learning</b>	Q-learning based controlled for ARdrone, simulated in gazebo using ROS	<b>August - October, 2019</b>
► <b>Manipulator</b>	Vision based <b>control</b> and trajectory <b>planning</b> of robotics manipulator in pointcloud data	<b>June - July, 2019</b>
► <b>SLAM</b>	Implemented <b>SLAM</b> on <b>AGV</b> by sensor fusion of data from 2D lidar and 3D camera	<b>May - June, 2019</b>
► <b>Biomedical</b>	Built <b>EOG</b> based typing system for individual with motor neuron diseases	<b>January - April, 2019</b>

To know more about these projects, please visit: <https://iamrajee.github.io/projects/>

## SELECTED COMPETITIONS

► <b>SIH, Hardware</b>	<b>Path planning</b> to fly two drones in synchronized manner, maintaining same altitude and attitude.	<b>January - June, 2019</b>
► <b>E-yantra</b>	Simulated thirsty crow story using wheel robot, overhead camera, aruco marker, blender models, Augment environment using OpenGL, Path planning and navigation on hexagon grid us IR sensors.	<b>August,18-March, 2019</b>
► <b>Inter-IIT</b>	Build model for <b>Satellite image classification</b> using just 14 images, for Inter-IIT, IIT Bombay	<b>July - December, 2018</b>
► <b>Inter-IIT</b>	Built automated <b>Toilet Cleaning Robot</b> for cleaning toilet seat and floor, Inter-IIT, IIT Madras	<b>July - December, 2017</b>

## RELEVANT COURSES

Area	Courses
► <b>Maths</b>	Linear algebra, Probability, Stochastic Process and Statistics, Differential and Integral Calculus
► <b>CS</b>	Data Structures and Algorithms, DBMS, OS, Computer networks, Compilers, Parallel programming
► <b>AI</b>	Principle of machine learning, Deep learning, Reinforcement learning
► <b>Robotics</b>	Robotics manipulation and control, Embedded system, Signal and system, Engineering mechanics, Biomedical and Instrumentation

## POSITION OF RESPONSIBILITY

➤ **Head of Robotics Club, IIT Palakkad**

July 2018 - May 2019

- Teach basics and advance concept of robotics.
- Mentor student projects.
- Encourage student to participate in regional and national competition.
- Prepare and lead team in competitions.

## SCHOLASTIC ACHIEVEMENTS

- ◆ Winner, Kaizen Robotics Competition, Lema labs. 2017
- ◆ Awarded Kishore Vaigyanik Protsahan Yojana(KVPY) Fellowship by DST, Govt. of India. 2016
- ◆ Qualified IIT-Jee Advanced 2016 with a percentile of 99.3 amongst a total of 1.2 million students. 2016
- ◆ Best Student of Year Award 2014–15, Rajsamand District Private Education Committee. 2015
- ◆ Awarded Merit Scholarship Class X, Army Welfare Education Society(AWES). 2014

## REFERENCES

• **Mr. Ashok Nair**

Director Service Delivery,  
UST Global, Thiruvananthapuram  
E-Mail: [ashok.nair@ust-global.com](mailto:ashok.nair@ust-global.com)

• **Mr. Shubham Jain**

Founder and CEO,  
Researchshala, Chandigarh  
E-Mail: [shubham@researchshala.com](mailto:shubham@researchshala.com)

• **Dr. Piyush P. Kurur**

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