

# Rajendra Singh

Fourth year

Computer Science and Engineering

Indian Institute of Technology, Palakkad

**Address** : 315, Tilang-B, IIT Palakkad, Kerala, India

**E-Mail** : 111601017@smail.iitpkd.ac.in

**Phone** : +91 7073091997

**DOB** : 27<sup>th</sup> November 1997

**Web** : <https://iamrajee.github.io/>



## 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>	:	I have passionate interest in vision-based robotics. I'm research oriented, team player and looking forward to work with enthusiastic team or startup 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

Area	Skills
► <b>Robotics</b>	• SLAM(2D gmapping/3D RtabMap) • Perception(Feature matching, Semantic segmentation, Object detection) • Motion and path planning • Sensor fusion(Kalman, Particle filter) • Swarm behaviour and algorithms • Robot kinematics and dynamics(DH/Newton/Eular/Lagrangian method) • Closed loop control system • Embedded system(ARM, RTOS, FPGA)
► <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
► <b>Other</b>	Shell scripting, Latex, Open source projects, Review and research paper, Knowledge of patents

## WORK EXPERIENCES

May-July, 2019

### ● Research intern, UST Global

- Trivandrum, India

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, India

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, Centre for Inovation, IIT Madras

- Chennai, India

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/>

## 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 thrifty 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, IIT Bombay	<b>July - December, 2018</b>
► <b>Inter-IIT</b>	Built automated <b>Toilet Cleaning Robot</b> for cleaning toilet seat and floor, IIT Madras	<b>July - December, 2017</b>

## RELEVANT COURSES AND WORKSHOPS

Area	Courses
► <b>Maths</b>	Linear algebra, Probability, Stochastic Process and Statistics, Differential Calculus
► <b>CS</b>	Data Structures and Algorithms, DBMS, OS, Computer networks, Compilers, Parallel programming
► <b>AI</b>	ML basic(workshop), Principle of machine learning(CS4801), ML by Andrew Ng(CS229), DL(CS5007), RL basic and Advanced
► <b>Robotics</b>	Robotics manipulation and control, Robotics basics and Advanced, IOT basics, Embedded system, Signal and system, Engineering mechanics, Biomedical and Instrumentation, ROS basics and Advanced, Navigation stack, ROS Manipulation, ROS OpenAI gym

## POSITION OF RESPONSIBILITY

### ➤ Head of Robotics Club, IIT Palakkad

July 2018 - May 2019

- Taught basics and advance concept of robotics to group of 40 students(12 teams).
- Supervised 9 student projects.
- Mentored 2 student projects(Humanoid and Submarine robots).
- Encouraged and motivated student to participate in regional and national competition.

## SCHOLASTIC ACHIEVEMENTS

- 2017 ♦ Winner, Kaizen Robotics Competition, Lema labs.
- 2016 ♦ 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.
- 2015 ♦ Best Student of Year Award 2014-15, Rajsamand District Private Education Committee.
- 2014 ♦ Awarded Merit Scholarship Class X, Army Welfare Education Society(AWES).

## 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

Professor, Department of Computer  
Science and Engineering, IIT Palakkad  
E-Mail: [ppk@iitpkd.ac.in](mailto:ppk@iitpkd.ac.in)