

# 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

| 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                                                                                                                                                                                                                 |
| ► <b>Other</b>                  | Open source projects, Shell scripting, Latex                                                                                                                                                                                                                                                                                                                                                  |

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

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.                                                                                       | January - June, 2019  |
| ► <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. | August,18-March, 2019 |
| ► <b>Inter-IIT</b>     | Build model for <b>Satellite image classification</b> using just 14 images, IIT Bombay                                                                                                       | July - December, 2018 |
| ► <b>Inter-IIT</b>     | Built automated <b>Toilet Cleaning Robot</b> for cleaning toilet seat and floor, IIT Madras                                                                                                  | July - December, 2017 |

## 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(workshop by Lema labs), IOT basics, 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

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