Vivek **Agrawal**

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"Persistence is very important.You should not give up until you are dead or completely incapacitated."

Summary

- Third Year Undergraduate Student in department of **Electrical Engineering IIT Kanpur.**
- 1+ year experience working with **Deep Learning** models focused on **computer vision** and **autonomous navigation**
- 2+ year experience working with Motion Planning and control algorithms, CAD designing, and circuit design
- Strong Coding Skills in **C(2+ year)** & **Python(1+year)**

Education

Indian Institute of Technology Kanpur — *August. 2017 - Present*

B.Tech. in Electrical Engineering — *CPI : 8.2/10.0*

Creative Public Senior Secondary School — *2015 - 2016*

Class XII — *Percentage : 83.40%*

Creative Public Senior Secondary School — *2013 - 2014*

Class X — *Percentage : 90.83%*

Skills

Programming Language	C, C++, Python, R, HTML, CSS, Verilog, VHDL
Deep Learning Frameworks	Pytorch, Tensorflow, Keras
Python Libraries	Robot Operating System(ROS), Opencv, PCL, Numpy, Matplotlib, Scipy
Tools and Software	Matlab, Gazebo, AutoCad, Arduino, Autodesk Inventor, GNU-Octave, rviz, Azure
Operating Systems	Linux(Ubuntu), Windows, Raspbian
Utilities	Git, LaTeX

Field of Interest

Artificial Intelligence
Deep Learning & Reinforcement Learning
Computer Vision
Robotics
Reasoning and Planning
Algorithms
Internet of Things(IoT)
Human-Robot interface
Natural Language Processing

Academic Projects

Shared Autonomy Via Deep Reinforcement Learning and Formal Methods — IIT Kanpur

Advisor : Prof. Indranil Saha (Prof. at Dept of Computer Science and Engineering) — *MAY '19 - JUL '19*

- Developed a autonomous navigation system for robots using reinforcement learning algorithms and concepts of formal methods.
- Developed an incremental learning platform so that robot can learn from his experiences.
- Include human input in the loop to provide feedback & if robot controlled manually, model can be trained by inverse reinforcement learning.
- Used Astra Depth camera and odometry data on Turtlebot2 via ROS network to sense the environment.
- Used Gazebo for simulating Turtlebot in a real environment like situation.
- Applied **Dueling Deep Q-Learning** algorithm to train the robot for navigating in an environment without the need of any human intervention using Tensorflow library.
- Applied **Soft Actor-Critic** algorithm to train robot the with RGB image, and depth image as input, to predict a safe action to the robot using pytorch library.

Swarm Robotics

IIT Kanpur

Advisor : Dr. Soumya Ranjan Sahoo (Prof. at Dept of Electrical Engineering) *MAY '19 - JUL '19*

- Created a group of robots that navigate in an environment with avoiding obstacles and communicating with master server.
- Designed their model on **Autodesk Inventor** and then fabricated them.
- Designed PID controller for **Omnidirectional** robots using traditional control algorithms and Ziegler-Nichols tuning.
- Designed circuit for bots. Used Raspberry Pi as the master processing unit of swarm.
- Used **ROS** network for communicating between different nodes of sensors and actuators of the robots.
- Wrote the planning algorithm for robots to communicate and navigate in the environment.

ABU Robocon 2018 and 2019

IIT Kanpur

Advisor : Dr. Ashish Dutta (Prof. at Dept of Mechanical Engineering) *MAY '18 - APR '19*

- Worked upon the **autonomous navigation** of robots using computer vision algorithms
- Worked upon computer vision methods for **lane detection**, **ball detection**, **depth sensing** and designed algorithms for them.
- Designed circuit of robots and wrote **control algorithm** of a **4 legged** spider robot actuated with 12 servo motors.
- Designed a fully-fledged **wireless controller** for semi-autonomous robot.
- Modified the **Theo Jansen mechanism** for a **4 legged robot**, designed the CAD model of it. **Simulated** leg on **Matlab** to find optimal link lengths and **headed** a team to make a **working prototype** of the robot.
- Secured 5th place among 84 Universities of India in technical proposal round.

Awards & Achievements

2018	**Academic Excellence Award,** For best academic performance in academic session	*IIT Kanpur*
2017	**All Indian Rank(AIR) 456,** Among 0.5 million students in JEE Advance 2017	*India*
2017	**All Indian Rank(AIR) 1118,** Among 1.5 million students in JEE Mains 2017	*India*
2015	**International Rank 1041, City Rank - 1st,** In 17th Science Olympiad	*Delhi, India*

Relevant Course Work

Data Structure and Algorithms
Probability and Statistics
Partial Differential Equation*
Linear Algebra and Differential Equation
Principles of Communication***
Control System Analysis
Signal System and Networks
Introduction to Electronics
Deep Learning Specialization**
Robot Motion Planning***
Machine Learning for Signals***
Digital Electronics***
Introduction to Electrical Engineering
Artificial Intelligence for Robotics**

*Exceptional Performance **Audited ***Ongoing

Extracurricular Activity

Robotics Club

IIT Kanpur

Secretary *MAY '18 - APR '19*

- Represented club at **Techkriti 2019** in **Robowars** by building a destructive robot from scratch
- Assisted in conducting various workshops and took lectures of freshers on various topics related to computer vision and Embedded Electronics
- Proposed various project ideas and approaches to increase the involvement of campus community in club

Team Robocon IIT Kanpur

IIT Kanpur

Founder and Technical Head *MAY '18 - APR '19*

- Made a working environment in a Team of 24 Members.
- Made budget proposal of team Robocon for Science and Technology Council of IIT Kanpur
- Ensured proper management and clearance of bills

Learning While Travelling

IIT Kanpur

Campus Ambassador *MAR '18 - JUN '19*

- Guided many students to choose proper career options according to their interests and requirement.