

# Sparsh Agarwal

2nd Year Undergraduate  
Department of Mechanical Engineering

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## Academic Qualifications

Year	Degree/Certificate	Institute	CPI/%
2018 - Present	B.Tech	Indian Institute of Technology, Kanpur	8.44*/10
2018	CBSE(XII)	GRM School, Bareilly	97.2%
2016	CBSE(X)	Neerja Modi School, Jaipur	10/10

\*as of August 2019

## Scholastic Achievements

- Secured **All India Rank 1339** in **JEE Advanced 2018** among the 1.6 Lakh shortlisted candidates
- Secured **All India Rank 5440** in **JEE Main 2018** among 13 Lakh participating students
- Secured **State Rank 72** in **Uttar Pradesh State Entrance Exam**

## Key Projects

- **IEEE ICRA DJI RoboMaster AI Challenge 2020** (April'19-Present)  
*Mentor: : Prof. Laxmidhar Behera, Department of Electrical Engineering, IIT Kanpur*
  - Formulated the 3 minute game as a **reinforcement learning** problem consisting of an agent which can shoot in a span of 180 and move based on a mecanum wheel system; an **environment** consisting of obstacles, enemy with similar capabilities as our agent, bonus zone and projectile supply zone; with states as Health Points and time left; the rewards as number of successful shots on the enemy; the action space consisting of firing speed, direction as well as the chassis speed, direction. Simulations of game done using **PyGame**. Algorithms like **Actor-Critic** were used
  - Member of ERA-IITK, **first Indian Team** to qualify for the competition held at Montreal, Canada
- **ABU-ROBOCON, 2019 (ABU ASIA-PACIFIC ROBOT CONTEST)** (Aug'18-April'19)  
*Mentor: : Prof. Ashish Dutta, Department of Mechanical Engineering, IIT Kanpur*
  - With a team of 15 members, conceptualised the designs for a remote-controlled bot and an autonomous Quadruped
  - Worked on CAD modelling, design analysis and fabrication of the gripping, throwing and locomotion mechanisms of the remote-controlled bot, and performed simulations on MATLAB for motion control of the autonomous Quadruped information to forecast traffic data while maintaining the low rank constraint
  - Worked on the Idea proposal-cum-Technical documentation of both the bots for stage-1 of ABU-ROBOCON and stood 6th across India while also received 55/60 points for overall desired functioning of the remote-controlled bot in Stage-2
- **Summer of Code, CSE, IIT Kanpur** (May'19-July'19)  
*Mentor: Prof. Sandeep Shukla, Department of Computer Science and Engineering, IIT Kanpur*
  - With a team of five, created the first **successful** and **scalable** Web App for the IITK community to find, share and download study resources across a plethora of courses using Googles development framework: **Angular**, for front-end and **Firestore** for cloud storage and hosting
  - Implemented **real-time** notifications, **user-auth** login using Facebook and Google+ registration, **UI-UX animations** and a **NoSQL** database for user favorites in a span of 4 weeks
- **Smart Gamer** (May'19-July'19)  
*Under Electronics Club, Science and Technology Council, IIT Kanpur*
  - Created a 2-D game using **PyGame** and trained a bot to play the game with the help of **Artificial Neural Networks**
  - Made an interface for a 3-D First Person Shooter to be played using **hand gestures** with the help of a depth sensing camera

## Technical Skills

- **Programming Languages:** C, C++, Javascript, L<sup>A</sup>T<sub>E</sub>X, MATLAB, Python, Typescript
- **Software and Libraries:** React, Angular, Nodejs, ROS, GNU Octave, Git, Numpy, Tensorflow, Keras, matplotlib, Travis CI

## Positions of Responsibility

- **Manager, Web and App Team, Antaragni19 (IIT Kanpurs Annual Cultural festival)** (April'19-October'19)
  - Worked on the Web App of Antaragni'19 on the Angular framework utilising Firebase as back-end
  - Implemented **real-time** notifications and maintained a record for the participants using **Nodejs** and a **NoSQL** database system
- **Student Guide, Counselling Service Team** (2019-20)
  - Coordinated with the Counselling Service and helped in the organisation of **Orientation Programme 2019** of over a 1000 freshmen students
  - Personally guided and mentored **6 students** in acclimatizing to the Environment of the Institute throughout their first year and more

- **Academic Mentor, Counselling Service Team**

(2019-20)

- Provided academic assistance to students from junior batches both individually and by organising classes, specifically for the subject of Quantum Mechanics
- Further helped them with their academics by arranging meetings with the academic mentors of other subjects to guide them better

- **Secretary, Electronics Club**

(2019-20)

- Responsible for conducting lectures, workshops and maintaining a proper record of club components
- Organised a winter camp for the students teaching various skills related to micro-controllers, internet protocols, Internet of things and embedded systems and conducted a winter hackathon for the teams to come up with projects

## Relevant Courses

Fundamentals of Computing	Linear algebra
Ordinary Differential Equations	Partial Differential Equations
Applied Probability and Statistics ( <i>i</i> )	Introduction to Electronics

*i*: in progress

## Extra-Curricular Activities

- Participated and cleared the first stage of Microsoft **codefundo++ 2019** and successfully created a Blockchain application on Microsoft Azure
- Participated in Robotricks in **Takneek'18**, the intra-hall Science and Technology Championship of IIT Kanpur