

# AYUSH GUPTA

Junior Undergraduate  
Department of Mechanical Engineering  
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## EDUCATIONAL QUALIFICATIONS

Year	Degree	Institution(Board)	CGPA/%
July'17 – June'21 (expected)	B.Tech, ME & Minor in IME	Indian Institute of Technology, Kanpur	9.1*/10.0
2017	ISC – XII	City Montessori School, Lucknow (CISCE)	95.5%
2015	ICSE – X	St. Francis' College, Lucknow (CISCE)	95%

## HONORS AND ACHIEVEMENTS

- 2nd in 15+ teams, Student AUV Competition (SAVe), organised by **NIOT, Chennai** in 2019
- Top 0.7%, JEE Advanced (amongst 160,000 candidates)
- Top 0.1%, JEE Main (amongst 1.3 million candidates)
- Top 1% (U.P.), National Standard Examination in **Physics**
- Top 1%, National Standard Examination in **Chemistry**

## PROJECTS

### Team AUV-IITK

Software Team Member

Faculty Advisor: Prof. Mangal Kothari

May 2018 - Present

- Created **multi-class dataset** of labeled underwater photos, trained model and setup real-time inference on Jetson TX2
- Designed a **hierarichal finite state machine** for robust autonomous behavior of the vehicle with failsafes
- Fused sensor readings from Doppler Velocity Log (DVL) and IMU using an **EKF** to estimate odometry
- Developed and tested acoustic localization system capable of estimating the Direction of Arrival of ultrasonic underwater signals from pinger, using **STFT** and **Cross-Correlation**
- Extensively used **Gazebo**, a **physics engine** to simulate vehicle model in a hydrodynamically realistic environment

### Realtime Onboard Dense RGB-D Mapping on UAVs

Mentor: Prof. Mangal Kothari

May 2019 - Present

- Studied and experimented various techniques related to 3D mapping of environment using monocular and stereo cameras on Jetson TX2 for onboard implementation
- Evaluated approaches for shortcomings and processing requirements while focussing on the scarce size, computation and energy resources on Unmanned Aerial Vehicles (UAVs)

### Chat-IITK

Advanced Track Project - ESC101

Mentor: Prof. Puroshottam Kar

2nd Semester

- Designed and developed a chat application on NodeJS, Express, and MongoDB, selected in **12** out of 400+ students
- Implemented real-time chat using Socket-IO with PassportJS for extensively implemented **authentication** and **cookie handling** for session management
- **Database management** implemented using MongoDB, and application deployed online on Heroku's server

### Team Humanoid, IITK

Software Team Member

Robotics Club, IIT Kanpur

Dec. 2017 - April 2018

- Worked on a Bipedal Prototype of the humanoid bot, capable of performing statically stable walking
- Implemented the MATLAB simulated **inverse kinematics walking algorithm** based on ZMP criteria on the actual robot using a Robot Operating System framework
- Developed a Web Graphical User Interface for monitoring current status and easier debugging of servos using ROS Web Bridge Server and JavaScript, with a CSS frontend

## RELEVANT COURSEWORK

Fundamentals of Programming (A*)	Probability & Statistics	Introduction to Robotics (i)
Data Structures and Algorithm (i)	Engineering Design and Graphics (A*)	Introduction to Microeconomics (A)

A\*: Grade for exceptional performance, i: In progress, A: grade

## WORK EXPERIENCE

### Intelligent Systems Lab

Robotics Intern

Supervisor: Mr. Ravi Prakash, Doctoral Student April 2019 - Present

- Ported outdated available ROS code to operate on current development platform using ROS Kinetic on Ubuntu 14.04
- Actualized setup for simulation using **Rviz and Gazebo** for Universal Robots manipulator on a Guardian Robot
- Tweaked the hardware drivers and changed odometry publishers to fix position drift estimated by motor encoders
- Assisted in final aim to create **collaborative autonomous robots** capable of building walls, extinguishing fires

### New York Office, IIT Kanpur

Backend Software Intern

Supervisor: Prof. Manindra Agrawal

May 2018 - July 2018

- Worked on **Scala with Akka-HTTP** for scalable and concurrent multi threading using functional programming
- Documented and compiled the entire collection of backend Application Programming Interfaces using **PostMan**
- Fixed bugs in the Scala backend, and collaborated using Phabricator, while developing an upcoming social platform

## POSITIONS OF RESPONSIBILITY

### Team AUV-IITK

Science and Technology Council

Software Team Lead

April 2019 - Present

- Spearheading a group of 8 people working on the software of Anahita, planning and implementing technical changes
- Maintaining software stack of Autonomous Vehicle, deployed on Git, developed using ROS, OpenCV and Gazebo

- **Secretary, Robotics Club, IIT Kanpur 2018-19**
- **Secretary, Consulting Hobby Group, IIT Kanpur 2018-19**
- **Student Guide, Counselling Service, 2018-19**
- **Academic Mentor, Counselling Service, 2018-19**

## SKILLS

**Robotics:** ROS, OpenCV, Arduino, Gazebo, CUDA, Gym

**Data Science:** Tensorflow, Keras, Scikit, MATLAB

**Web Development:** Node.js, MongoDB, Flask, Express,

Socket-IO, Bootstrap, HTML5, Jekyll, Travis CI

**Programming Languages:** C++, Python, Scala, Javascript

**Utilities:** LabView, L<sup>A</sup>T<sub>E</sub>X, Git, SVN, Bash, Unity, Postman

## MISCELLANEOUS

- **Runners Up** in robotic soccer event *Wild Soccer*, and *Visualise*, in inter-hall competition
- Developed an application which generated summaries of the latest news based on the current trending hashtags on Twitter as **code.fun.do** submission
- Developed basic platform game while in high school, on game development framework **Unity** using JavaScript & C#, updated on Github with Android & Windows builds