**Gaurav Kohad** | **193010037**
**Aerospace Engineering** | **M.Tech.**
**Indian Institute of Technology, Bombay** | **Gender: Male**
**Specialization: Dynamics and Control** | **DOB: 19-03-1997**

| Examination | University | Institute | Year | CPI / % |
|---|---|---|---|---|
| Post Graduation | IIT Bombay | IIT Bombay | 2021 | 9.44 |
| Graduation | RGPV | SGSITS, Indore | 2019 | 8.03 |
| Graduation Specialization: Electronics and Instrumentation Engineering | | | | |
| Intermediate | CBSE | St. Paul's Hr. Sec. School, Indore | 2015 | 87.40% |
| Matriculation | CBSE | St. Paul's Hr. Sec. School, Indore | 2013 | 9.8 |

## INTERNSHIPS

**Firewires Solutions Pvt. Ltd.** | **Intern as Cloud Automation Engineer** *(Work from Home)* ***Apr'20-May'20***

- Executed **FreeRTOS wifi-provisioning, MQTT** with core cloud service, utilized IoT shadow service for monitoring devices
- Improved **QoE** for face recognition & detection algorithms with **R-Pi** camera by increasing fps using multithreading

**Scientech Technologies Pvt. Ltd.** | **Intern in R&D Department** ***May'18-Jun'18***

- Received a **Letter of Recommendation** for attaining excellent results, exhibiting good teamwork & communication skill
- Deployed an **IoT** node with **Bluetooth** communication using **Raspberry-Pi, Arduino Uno** for growth in agricultural sector
- Deployed **contingency alert** plan during drastic data change which is updated in **SQL** cloud database using **SQLite library**

## PROJECTS

**Master's Thesis**

**Autonomous UAV landing using Visual-SLAM** | **Guide: Prof. Hemendra Arya** ***Jul'20 – Present***

- Building a **map** of unknown environment using **visual simultaneous localization & mapping (SLAM)** algo.
- Optimizing generated map using **bundle adjustment, visual vocabulary** & selecting an optimal landing site
- Estimated camera pose using **perspective n point (PnP)** transformation & **triangulated 3D points** using **SIFT** features extracted, further refined the pose by **minimizing** the **reprojection error**
- Analyzed **ORB-SLAM**, **LSD-SLAM**, **SVO methods**, feature detection & extraction techniques **ORB, SIFT**

**Bachelor's Thesis**

**Arduino based Quadcopter** | **Guide: Prof. R.S. Gamad** ***Jul'18-Mar'19***

- Worked in a team of 5, **assembled** a **cost-efficient quadcopter** by utilizing **Arduino Uno** as **flight controller**
- Computed **accurate UAV position** using **MPU6050,** which communicated with Arduino using **$I^2C$** protocol
- Controlled **vibrations** of propellers by balancing weights & BLDC motors using **electronic speed control**

**Control Design**

**Attitude control for Quadrotor using MPC scheme** | **Prof. Sachin Patwardhan** ***Jul'20-Present***

- Design & simulation of **model predictive controller** for attitude control of unmanned quadrotor, subjected to atmospheric disturbances, **Kalman Filter** is being used for disturbance & states estimation of system
- MPC implementation is being carried out using **piecewise affine** model representation of the dynamics

**Attitude Control of Quadcopter** | **Course Project** | **Prof. Arnab Maity** ***Feb'20-Mar'20***

- Utilized **lyapunov 2nd method** to deduce stability of quadcopter dynamics, by computing the eigenvalues
- Designed 2 **cascaded PD controllers** using **phase** & **gain margin** concept, with filter coefficient in **Simulink**

**Level Control of Quadruple Tank** | **Course Project** | **Prof. Leena Vachhani** ***Oct'19-Nov'19***

- Computed **relative gain array** for deciding the **best input-output** pairing of the **multivariable system**
- Implemented manually tuned **decentralized PI** controller for minimum & non-minimum phase dynamics
- Designed a **feedforward decoupler** & **PID controller** by **lambda** tuning for minimum phase tank dynamics

**Machine Learning**

**Feets Apart – Maintaining Social Distancing** | **Covid-2.0 Tinkerer Lab Project** ***Jul'20-Aug'20***

- Applied object detection algorithm **Yolov3** to **detect, count** the number of people in the region of interest
- Utilized **perspective transform** to calculate **distance**, assign colour to person **violating social distancing**
- Simulated automatic door maneuver using **Arduino UNO** & two **ultrasonic sensors** in **Tinkercad**

**Multi-Class Image Classification** | **Course Project** | **Prof. Biplab Banerjee** ***Apr'20-Jun'20***

- Visualized the **intel image** dataset using **NumPy, Seaborn & Matplotlib** libraries in Jupyter Notebook
- Developed classification algorithm **RF, DT, kNN, SVM** (using **PCA**), **NN, CNN** using sklearn, TensorFlow
- Achieved **86%** accuracy using **VGG16 convolutional** network & **Naïve Bayes** took **least time to classify**

**Robotics**

**Underwater Remotely Operated Vehicle for inspection & surveillance** | **AUV-IITB** ***Nov'19-Present***

- Key member of a team working under Prof. Leena Vachhani to develop **class-1 remotely operated vehicle**
- The project is a joint effort by **IIT Bombay** and **Larsen & Toubro Pvt. Ltd.** under the IMPRINT II.C scheme
- Currently in **design phase**; ROV is aimed to be deployed in **sea waters** for **scanning & maintenance**

**Voice Controlled Robot** | **Course Project** | **Prof. Virendra Verma** ***Jan'18-Feb'18***

- Built a robot, interfaced with **Bluetooth**, controlled wirelessly using voice signal received from android app
- Established **serial communication** b/w Bluetooth & **Atmega328,** which provided desired signals to motors
- Designed & fabricated **PCB** involving connection b/w **Atmega328, HC-05, L298N** motor driver in **Eagle**

**E-Yantra Robotics -Transporter Bot** | **IIT Bombay & Ministry of Education, India** ***Nov'17-Feb'18***

- Worked in a team of 4, **Optimized** the **path** traversed by a truck while delivering goods at different places
- Created a game in **Blender** containing farm, market, truck & farmer, used for **real time simulation**
- Synchronized actions between **Firebird V** Robot, **Blender** Interface, rotating structure using **XBEE**
- Fabricated a **robotic arm** for picking & dropping block at the desired location on the rotating structure

## POSITIONS OF RESPONSIBILITY

**Teaching Assistant** | **Control Theory** | **IIT Bombay** ***Aug'20-Present***

- Assisted in **course material preparation**, **grading policy formulation** for smooth online conduction of the course
- Working with **5** other **TA's** to organize quizzes, conduct tutorials sessions to help **90+ bachelors & masters students**

**Academic Unit Representative for Academic Affairs** | **PGAC** | **IIT Bombay** ***Jul'20-Present***

- Working with **departmental stakeholders** to bring out **policy related changes** at the institute and department level
- Addressed **student grievances** in consultation with faculty, organized workshops, webinar to enhance student skill set
- Handled **registration** of new entrants; Key member of placement sub-committee that resolves **placement related issues**

**Student Companion** | **ISCP** | **IIT Bombay** ***Apr'20-Present***

- Mentoring **6 students** throughout the year helping them on academic & non-academic fronts during **Covid-19 pandemic**
- Trained by **Student Wellness Centre, Gender Cell** towards better mentoring & helped the DC in conducting **e-orientation**

**Teaching Assistant** | **Aerospace Measurement Laboratory** | **IIT Bombay** ***Jan'20-Mar'20***

- Tutored **60+ B.Tech** students for smooth conduction of their **lab experiments**, ensured working of instruments required
- Worked on **Time of Arrival** & **Time Difference of Arrival** based **localization** using **DWM1000 module, ESP32 & ESP8266**

**Chief Operational Officer** | **SGSITS Robotics Club** | **SGSITS, Indore** ***May'17-Jun'18***

- Directed & administered workshops, competitions like **robo-war, robo-race, line-follower** organized by the club

## SKILLS

**Programming:** Java, Python, C, C++ (Basic), SQL (Basic), Assembly language (8051)
**Software:** MATLAB, Eagle Arduino IDE, ESP-IDF, NetBeans, Blender, MS-Office, Latex, kiel µVision
**Tools:** Simulink, ROS, FreeRTOS, Gazebo, PCB Wizard | **Development Boards:** Raspberry Pi, ESP32, ESP8266

## KEY COURSES

| | | | |
|---|---|---|---|
| Advanced Process Control | Adaptive & Learning Control Systems | VLSI Design | Signals & Systems |
| Automation & Feedback Control | Microcontroller & Embedded Systems | Digital Electronics | Aircraft flight Dynamics |
| Analog & Digital Communication | System Modelling, Dynamics & Control | Analog Electronics | Digital Signal Processing |

## WORKSHOPS / CERTIFIED COURSES

- Attended workshop on **Robot Operating System** conducted by Electronics and Robotics Club, IIT Bombay
- Introduction to the **Internet of Things and Embedded System** by University of California, Irvine on Coursera
- **State Estimation** and **Localization** for Self-Driving Cars by University of Toronto on Coursera
- Robotics: **Perception**, Robotics: **Aerial Robotics** by University of Pennsylvania on Coursera
- **Deep Learning** by deeplearning.ai, **Machine Learning** by Stanford**, Machine Learning with Python** by IBM on Coursera
- **Python A-Z™**: Python For Data Science With Real Exercises on Udemy**, Java Programming** by Cuboid Educations Pvt. Ltd.

## ACHIEVEMENTS & EXTRACURRICULAR ACTIVITIES

- **Secured AIR-82** in GATE-2019 Instrumentation Engineering, Currently **ranked 2nd** in Dynamics and Control specialization
- **Three times national chess player** with **I**nternational Chess Federation **(FIDE) Rating 1577** in standard format
- Worked in team of 8, bagged **1st place** in **Glider design** for **maximum Range** which hit the target with no **lateral deviation**
- Coordinated with a team of **250+ members** for interviews of **1600+ students**, assisted in conducting tests for 15+ firms