# Ritvik Pandey

+91-7478006888 | ritvik.pandey03@gmail.com | LinkedIn | Github

## Education

**Indian Institute of Technology, Kharagpur** 8.29/10
*Dual Degree in Mechanical Engineering, specialization in System Design* *Aug. 2016 – May 2021*

**Gyan Ganga International Academy** 88.9/100
*Senior School, Central Board of Secondary Education (CBSE)* *Aug. 2014 – May 2016*

**Jawaharlal Nehru School** 9.8/10
*High School, Central Board of Secondary Education (CBSE)* *Aug. 2012 – May 2014*

## Academic Achievement

- Scored top 1 percentile marks in Madhya Pradesh in National Standard Examination in Physics **(NSEP)** 2016
- Qualified Kishore Vaigyanik Protsahan Yojana **(KVPY)** for two consecutive years (2014-15) with best **AIR 305**
- Achieved **1st Position** in Madhya Pradesh among 70,000 students in National Student's Talent Search Examination
- Cleared Regional Mathematics Olympiad **(RMO)** to qualify for Indian National Mathematics Olympiad **(INMO)**

## Competitions

**MapMyIndia Challenge** | *Ksitij Techical Fest, IIT Kharagpur* | ***Winner*** January 2020
- Developed sales plan by solving multiple vehicle routing problem under constraints using **Genetic Algorithm**
- Performed geo-location based **DBScan** clustering and applied **Silhouette method** for minimizing region overlap

**Digital Healthcare Design Competition** | *Johns Hopkings University, USA* | ***Finalists*** April 2020
- Developed an AI-based android app trained over medical images to prognose **30+** types of skin diseases
- Constructed a sustainable business model through comprehensive Competitive and **Porter's 5 Forces** Analysis

## Experience

**Software Development Engineer 2** July 2021 – Present
*Honeywell Technology Solutions | Bangalore, India*
- Responsible for Research & Development of kernel level firmware for Distributed Controller System **(DCS)** devices
- Implemented high-frequency compute functionality on customer requests for with **20 milliseconds** cycle time
- Developed state of the art redundant safety alert and notification system to be used in petrochemical refineries
- Awarded best fresher performer in bug-fix marathon with target achievement of over **94%** in India division

**Navigation Systems Engineering Intern** June 2020 – July 2020
*Honeywell Technology Solutions | Bangalore, India*
- Worked on alternate navigation technologies **(SLAM)** to augment and overcome inefficiencies of GPS systems
- Implemented **Graph Optimization** to achieve Drift and Euler errors of less than **4.2%** and **1%** respectively
- Built and integrated trajectory API using SITL over ROS and tested with AirSim simulator to obtain **7.6%** RMSE
- Incorporated flexibility for wide variety of sensor arrangements, primarily tested over Visual and Inertial Sensors

**Artificial Intelligence Research Intern** May. 2019 – July 2019
*Course5 Intelligence | Bangalore, India*
- Implemented **Active Learning** to reduce the labelling cost for Single Shot Detection models like RetinaNet
- Devised a segmentation map based evaluation metric to selectively label most diverse underperforming data points
- Achieved a margin of **3%** error with respect to fully labelled accuracy while using only **60%** of total data
- Applied the classification and segmentation metric over Imagenet dataset to save **9000+** man hours in labeling

**Mechatronics Lead** Dec 2017 – June 2018
*Autonomous Ground Vehicle Project (AGV) | IIT Kharagpur, India*
- Headed Mechatronics team to secure **2nd** position in International Ground Vehicle Competition **(IGVC)**
- Enabled autonomous driving mode to electric vehicles using Controller Area Network guided by path-planners

- Led a team of 60 undergraduate student to natively develop autonomous shuttle for in-campus transport
- Supervised mechanical team to get promoted to **2nd** stage of Mahindra Rise Challenge 2020, winning test vehicle

**Computer Vision Intern** Dec 2017 – June 2018

*DeWinter Opticals Inc | New Delhi, India*

- Created a real-time planar **Panorama** software using Scalar Invariant Feature Transformation **(SIFT)**
- Developed MFC based application for graphite flake classification using AlexNet achieving **93%** accuracy
- Designed a motion tracking module using **ConvLSTM** network to monitor evolution of spacio-temporal features
- Built a weld image analysis tool for inspection of various welding strengths and crack detection for industrial usage

## Research Projects

**Data-Driven Computation Fluid Dynamics** March 2018 – Present

*Prof. Rajaram Lakkaraju | IIT Kharagpur*

- Applied **Physics-informed** Deep Neural Network to recreate continuous flow dynamics from scattered data points
- Formulated Navier-Stokes based cost to reduce the discrepancy between predicted and actual simulations to **6.1%**
- Modeled active control on attack angle of aerofoil using Reinforcement Learning for **23%** reduction in drag forces
- Incorporated flexibility for wide variety of sensor arrangements, primarily tested over Visual and Inertial Sensors

**Rehabilitation Robotics Project** December 2017 – August 2018

*Prof. Dilip Kumar Pratihar | IIT Kharagpur*

- Achieved 3D point-cloud reconstruction using depth perception through stereo-vision for motion and path planning
- Implemented **PoseNet** to retrieve joint positions for mapping and mimicking the gait cycle using inverse dynamics
- Planned pelvic and knee control cycles for repetition and autonomous movements in walking and stairs climbing

## Open-Source Projects

**Aerial Search and Rescue** | *PyTorch, Python* January 2022

- Implemented and improved upon **SOTA** paper "Deep Learning based searches for aerial imagery in SAR missions"
- Applied saliency based dynamic tiling with spatial augmentations for region filtering and features enhancement
- Trained **FasterRCNN** with as little as 2.5k images obtaining average Precision and Recall of **92%** and **86%** resp

**3D-Shape-GAN** | *Tensorflow, Python* March 2021

- Implemented the paper "Shape Generation using Spatially Partitioned Point Clouds" using Tensorflow-2.0
- Used KD-tree partitioning followed by PCA shuffling to create a lower dimension representation of 3D data
- Incorporated intermediate-layer features distribution based Generative Adversarial Network **(GAN)** loss function

**Planogram Detection** | *Python, Flask, OpenCV, Jupyter, Keras* August 2020

- Developed a full-stack web application using with Flask for planogram detection from store shelves and warehouses
- Implemented Siamese One-shot learning to accurately identify similar objects with just one training sample
- It serves as a clustering, count and localization tool for in-store and warehouse databases

**hEleven** | *Android Studio, Java, Kotlin, Firebase* November 2019

- Created an android task scheduler app for maximizing outputs within constraints for Code-Fun-Do challenge
- Added the functionality of automatic daily task updates and notification and web support with Firebase back-end

## Positions of Responsibility

**Technology Team Head** August 2017 – July 2018

Space Technology Students' Society (spAts)

- Led a team of 60 students for developing IIT KGP's Miniature Satellites (CanSat & NanoSat) funded by ISRO
- Conducted sky-gazing sessions, space-technology awareness camps (STACs) and seminars in **34+** institutes
- Conducted in-house telescope handling, robotics and rocket modelling sessions for 10,000+ fresher students

**Captain | Hardware Modelling** January 2019 – January 2020

Meghnad Saha Hall of Residence | IIT Kharagpur

- Headed team of 20 students for developing autonomous crack detection robot for concrete and steel bridges
- Incharge of developing vision and sonar based detection module for regular inspection and monitoring of defects

## Technical Skills

**Languages/OS**: Python, C/C++, SQL, Java, HTML/CSS, Kotlin, Dart, Ubuntu, Arch Linux, Windows, Android
**Frameworks/Libraries**: OpenCV, Tensorflow, Keras, pandas, NumPy, SymPy, MatplotLib, Latex, PyTorch, Caffe
**Developer Tools**: Android Studio, Git, Docker, Google Cloud Platform, Amazon web services, Anaconda, Flutter
**Electronics**: Arduino, Raspberry Pi, BeagleBone, Jetson, Controller Area Network, Robot Operating System (ROS)