

Ritvik Pandey

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EDUCATION

Indian Institute of Technology, Kharagpur	8.01/10
<i>Dual Degree in Mechanical Engineering, specialization in System Design</i>	<i>Aug. 2016 – May 2021</i>
Gyan Ganga International Academy	88.9/100
<i>Senior School, Central Board of Secondary Education (CBSE)</i>	<i>Aug. 2014 – May 2016</i>
Jawaharlal Nehru School	9.8/10
<i>High School, Central Board of Secondary Education (CBSE)</i>	<i>Aug. 2012 – May 2014</i>

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 <i>Ksitij Technical Fest, IIT Kharagpur</i> Winner	January 2020
<ul style="list-style-type: none">• 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 <i>Johns Hopkings University, USA</i> Finalists	April 2020
<ul style="list-style-type: none">• 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

Control Systems Engineering Intern	June 2020 – July 2020
<i>Honeywell Technology Solutions Bangalore, India</i>	
<ul style="list-style-type: none">• 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
<i>Course5 Intelligence Bangalore, India</i>	
<ul style="list-style-type: none">• 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
<i>Autonomous Ground Vehicle Project (AGV) IIT Kharagpur, India</i>	
<ul style="list-style-type: none">• 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
<i>DeWinter Opticals Inc New Delhi, India</i>	
<ul style="list-style-type: none">• 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

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

I am a Firefighter | *PyGame, Python, C++, Git*

November 2019

- Worked on creating personalized Virtual Reality game for dealing with fire hazards in familiar places
- Developed a PyGame based adaptive playground for fire-safety and precaution tutorials in custom maps

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

Website & App Development Head | Events co-ordination Head

August 2017 – July 2018

National Students' Space Challenge (NSSC 2018)

- Managed and judged robotic events contested by **3000+** participants in over 600 teams in two annual revisions
- Created information, result and payment portal for **7000+** participants for online as well as offline registration
- Created message delivery framework through automatic mailing and app notifications to suitable participants

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)

COURSEWORK INFORMATION

Department Courses: Dynamics, Kinematics of Machines, Computational Fluid Dynamics, Intelligent Machines and Systems, Knowledge based systems in engineering, Heat transfer, Transform Calculus, Partial Differential Equations
Additional Courses: Probability and Stochastics, Image Processing, Machine Learning, Deep Learning, Blockchain, Cryptography, Systems and Controls, Programming and Data structures, Algorithm Design, Reinforcement Learning