Anshul Paigwar

CONTACT

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https://anshulpaigwar.github.io/

ACADEMICS

2017–2018

Master's in Graphics, Vision, and Robotics

ENSIMAG - University of Grenoble Alpes, France
Class Rank – 2nd
Courses:
Fundamentals of machine learning, Pattern Recognition & object detection, Computer vision & multi-view geometry, Autonomous Robotics - SLAM

2012–2016

Bachelor's in Mechanical Engineering

Visvesvaraya National Institute of Technology (VNIT), Nagpur, India
Courses:
Machine Vision, Industrial Robotics, Computer programming, Advance Mechanisms, Entrepreneurship

SKILLS

Programming
Python | C++ | CUDA

Software
ROS | Gazebo | MoveIt | Navigation Stack
PyTorch | TensorFlow | Keras
OpenCV | PCL | Scikit-learn
Git | Latex | Numpy
MS Office | Linux | VS code
SolidWorks, OnShape, Eagle

Language
English | Hindi | French

Others
Literature review | Academic writing

LEADERSHIP

Nov 2020 – Nov 2021 | Inria, Grenoble, France

Délice Robotics, founder

https://delicerobotics.com (incubated at Inria Startup Studio)
At Délice we built Robotic and AI systems to automate food preparation and vending. The aim was to make quality food more affordable and available to everyone. I worked on multiple facets including project ideation, fundraising (100K euros), team building, prototyping, business model, customer need understanding, product demos & presentation.

2013 – 2016 | VNIT, Nagpur, India

IvLabs, Cofounder

www.ivlabs.in
I helped kickstart IvLabs, a student's robotics and AI lab at VNIT. IvLabs has grown to be among the top robotics labs in India with over 100 active members. I regularly mentor and manage student projects at IvLabs as my responsibility to impart knowledge and give back to the community.

WORK EXPERIENCES

Oct 2018 – Present | Grenoble, France

INRIA, Research Engineer

Team CHROMA, under the supervision of Prof. Christian Laugier

- I worked on the intersection of learning-based and statistical approaches for **computer vision** and **perception** in the field of **Autonomous Vehicles**.
- I specialize in building **deep architecture** for **sensor fusion** mainly using LIDAR, RGB, and Event-Based Cameras:
- **Frustum-PointPillars: 3D object detection** in point cloud. **Ranked top 5** for BEV pedestrian detection on KITTI dataset, published in **ICCV'21** workshop paper| video
- **GndNet** for fast ground plane estimation and **point cloud segmentation**. Published in **IROS'20**, current SOTA in terms of runtime paper | code
- Robust object detection using RGB and Event-based Camera, accepted in **ICRA'22**
- My other work includes reachability space estimation, **validation of collision risk estimation** using SMC and Formal methods, **simulation in CARLA**.
- Currently working on **Occupancy Grid prediction** using Spatio-Temporal networks, **Semantic Grid generation**, and **Motion Forecasting** using Transformers.
- I manage 2 Interns, 2 engineers, help Ph.D. students and brainstorm with Postdocs.

Feb - Sept 2018 | Grenoble, France

INRIA, Master Thesis

Under the supervision of Prof. Christian Laugier and Prof. Christian Wolf

- Proposed new deep architecture **Attentional-PointNet** which uses **Spatial Transformer Network** and **Recurrent Visual Attention Mechanism** in 3D space to attend to relevant regions in the cluttered environment thus saving the computational efforts and achieving real-time performance. Accepted in **CVPR'19** workshop. code | paper | thesis.

May - Dec 2016 | Grenoble, France

INRIA, Bachelor Thesis

Under the supervision of Prof Christian Laugier and Victor Romero Cano

- Developed an algorithm for **ground plane estimation in the 3D point cloud**, and segmentation of ground points. paper | video
- The ground plane was modeled as **Conditional Random Field** and **Expectation-Maximization** was used for parameter estimation.

ACTIVITIES

2016

Invited by the President of India

I represented VNIT in the 'Meeting of Innovators' organized by the President of India, Shri Pranab Mukherjee.

2018 - Present

Active reviewer in international conferences

ICRA (5), IROS (4), ITSC (2), IV (2), ITS Transactions (1), CIS-RAM (2)

2013 - 2016

Member of IEEE Student's Chapter VNIT

I have conducted numerous workshops, teaching concepts of robotics, CAD Modelling, Circuit Designing, and Programming to 200 students of VNIT.

2014 - Present

Mentoring Robotics & AI Projects

I constantly engage with the students at Ivlabs, VNIT, brainstorming and mentoring various innovative projects.

INTERESTS

Traveling | Hiking | Photography | Poetry | Skiing | Music | Movies & TV series | Sketching | Cooking | Pep Talks

REFERENCES

Prof. Christian Laugier

Research Director | Emeritus
INRIA Grenoble Rhône-Alpes, France

Prof. Christian Wolf

Principal Scientist
Naver Labs Europe, Grenoble, France

Dr. Hervé Lebret

Co- Director
Inria Startup Studio, France

INTERNSHIPS

May - Aug 2017 | Delhi, India

Hitech Robotics Systems, Research Internship

Under the supervision of Pradyot Kvn, Team–AIV Autonomous Indoor Vehicle

- Developed an Algorithm for **Dynamic obstacle detection and tracking in 3D** point cloud generated from Intel RealSense stereo camera. video
- The algorithm involves **Octree-based 3D spatial change detection** for classification of static and dynamic objects, **Kalman filter**-based tracking of dynamic objects, and their state prediction. code

May - Aug 2015 | Singapore

Institute of Infocomm Research | NTU, Research Internship

Autonomous vehicle project by A-STAR and Land Transport Authority

- Designed and implemented an **Extended Kalman filter**-based **sensor fusion system** for **localization** of the Autonomous vehicle. video
- 3D Lidar based **road boundary detection** and **tracking**. video
- Designed an RGB camera-based perception system for **Visual Road Recognition** and **Horizon Detection** using Artificial Neural Networks. video

PROJECTS

list of all projects: link

Mar 2020 – Sept 2020 | VNIT, Nagpur, India

Sahayak, an autonomous COVID Aid-Bot

- 'Sahayak' (Helper in Hindi) is an **autonomous mobile robot** that is aimed to facilitate the healthcare workers by enabling contactless communication & delivery of utilities in hospital environments. I led a team of students at VNIT for the development of Hardware & Software Stack. Link | paper

Sept 2015 - Mar 2016 | Ivlabs, VNIT, Nagpur, India

OSMOS, Omni-directional Spherical MOdular Snake robot

- Developed a **snake robot** consisting of 3 mechanically connected **spherical bots**. This new design eliminates the problems with existing snakes to handle lateral motions and complex **gait analysis** by leveraging the Omni-directional motion capabilities of spherical bots. paper1 | paper2 | video

RECENT PUBLICATIONS

More than 15 Publications in International conferences, full list on Google Scholar

Abhishek Tomy**, Anshul Paigwar**, Khushdeep Singh Mann, Alessandro Renzaglia, Christian Laugier. **Fusing Event-based and RGB camera for Robust Object Detection in Adverse Conditions**. IEEE International conference on Robotics and Automation, **ICRA 2022**, Ph, USA.

Anshul Paigwar, David Sierra-Gonzalez, Özgür Erkent, Christian Laugier. **Frustum-PointPillars: A Multi-Stage Approach for 3D Object Detection using RGB Camera and LiDAR**. AVVision Workshop - **ICCV 2021**.

Anshul Paigwar, Ozgur Erkent, David Sierra Gonzalez, Christian Laugier, "**GndNet: Fast Ground Plane Estimation and Point Cloud Segmentation for Autonomous Vehicles**", IEEE International conference on Robotics and Systems, **IROS 2020**, Las Vegas, USA. link

Anshul Paigwar, Ozgur Erkent, Christian Wolf, Christian Laugier, "**Attentional PointNet for 3D Object Detection in Point Clouds**", **CVPR 2019** workshop on Autonomous Driving, Long Beach California. link