

Dhruv Patel

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EDUCATION

Sardar Vallabhbhai National Institute of Technology(SVNIT)
Bachelor's of Technology, Electronics and Communication; CGPA: 8.39/10

Aug. 2016 – Jul 2020

Surat, India

Relevant Coursework

- Fundamentals of Computer Programming
- Image Processing and Computer Vision
- Embedded Systems
- Control Systems

EXPERIENCE

Project Associate - Robotics Research Centre, IIIT Hyderabad

July 2021 - Present

UAVs, Computer Vision, Deep Learning, 3D Reconstruction, Building/Facade Assessment *Hyderabad, India*

- Advisors: [Prof. Madhava Krishna](#) and [Dr. H. Kandath](#) - The project - "Identification of salient structural elements in buildings" aims to extracting salient structural elements from facades using UAVs - plan shape and area, no. of windows/storeys, storey heights etc. using Computer Vision and Deep Learning algorithms.
- Storey and window parameters are calculated using CNN-based window detector, Structure from Motion(SFM) models and multi-view geometry. Currently working on plan shape/area estimation using deep learning-based semantic segmentation approaches. We plan to publish our work at the **2022 International Conference on Unmanned Aircraft systems**. [\[GitHub\]](#)

Associate Software Engineer - Amdocs

Aug 2020 – June 2021

Java, SQL, ReactJS, Object-oriented Programming, Microservices, Jenkins, Maven, Spring *Pune, India*

- Wrote production-level software by contributing in developing and enhancing Backend APIs and creating user-friendly front-end UI. Was also responsible for writing SQL scripts for adding/updating large chunks of data in the production database.
- In addition, helped the upcoming freshers with the knowledge transfer of various internal Amdocs applications and followed programming practices. Received direct appreciation from the manager **Ben Shasha** for my consistent exceptional performance among the batch mates.

Research Intern - Swayatt Robots

April 2020 – July 2020

C++, Mathematical Optimization, Point Cloud Library(PCL), SLAM, LiDARs

Bhopal, India

- Proposed a variant of ICP (Iterative Closest Point) algorithm for incrementally building maps using semantic information from point cloud data (LiDAR) for Autonomous Driving task. It was tested on Semantic KITTI Dataset and achieved real-time latency of approx. 4 scans/sec.
- The semantic variant outperformed vanilla ICP in terms of both accuracy and speed - improving the point cloud matching accuracy and reducing the convergence time by 97% and 50% respectively.
- Received special appreciation from [Mr. Sanjeev Sharma](#) (Director, CEO CTO, Swayatt Robots) for the research work done during the internship. [\[Swayatt Robots Report\]](#) [\[Appreciation Letter\]](#)

Summer Research Intern - SVNIT

May 2019 – July 2019

Python, Keras, Tensorflow, Face Recognition, Deep Learning

Surat, India

- Advisor: [Dr. K.P. Upla](#) – The project aimed to build a Face Recognition system using Deep Learning.
- Implemented an inception network trained and validated on a custom-made facial image dataset of 25 students and worked on different modules like Face Detection, Alignment and Recognition. [\[Face Recognition Report\]](#).

RESEARCH WORKS

Dhruv Patel¹, ShankarNarayanan H.¹, Meet Gandhi¹ & Anand Darji, "Design of an Autonomous Agriculture Robot for Real Time Weed Detection using CNN", presented at the AVES 2021 conference. [\[GitHub\]](#) [\[Paper\]](#) [\[credential\]](#)

Dhruv Patel¹, Shivani Chepuri, Sarvesh Thakur, H. Kandath, Ravi Kiran S & K. Madhava Krishna, "Identifying and estimating salient parameters of a building using UAV based remote sensing", submitted at the International Conference on Unmanned Aircraft Systems(ICUAS) 2022. [\[GitHub\]](#)

¹equal contribution

Dhruv Patel¹, Abhinav Jain¹, Simran Bawkar, Manav Khorasiya, Kalpesh Prajapati, Kishor Upla, Kiran Raja, Raghavendra Ramachandra, Christoph Busch. (Submission in progress - International Conference on Information Fusion 2022) "SRTGAN: Triplet Loss based Generative Adversarial Network for Real-World Super-Resolution" [\[GitHub\]](#) [\[PDF\]](#)

PROJECTS AND EXTRA-CURRICULAR

UG Project- Autonomous Agricultural Robot (TEQIP III Sponsored)

Oct 2019 – June 2020

Python, ROS, Semantic segmentation, Deep Learning, Sensor fusion, Autonomous Navigation, Nvidia Jetson Nano

- Advisor: [Dr. A.D. Darji](#) - The project aimed to build a Robot that can autonomously navigate through the fields and is able to perform Crop Weed classification. Collaborated in a team of 3 to complete this project.
- Implemented 2 segmentation models: UNet and Bonnet for Crop Weed Classification task. Bonnet Model performed better class-wise prediction on CWFID & Bonn datasets and has 100x lesser parameters than UNet. It achieved 96.48% accuracy and 0.0168 units loss on CWFID whereas 99.471% mean accuracy, 98.035% mean IoU and loss of 0.0035 units on Bonn dataset. Model's Low real-time latency of avg. 2.5 fps on i7 + NVIDIA 940MX makes it possible to deploy for real-case scenarios. Our work is published at **AVES2021** conference.
- Were invited by **Mr. Matt Droter** (Founder, ROS Agriculture) to present our project at ROS Agriculture community meet. [\[GitHub Repo\]](#) [\[Link to community meet\]](#)

UG Seminar/Thesis - Computer Vision for Farm Robot

Image Segmentation/Classification, Computer Vision, Deep Learning, Robotics, Agriculture

- Advisor: [Dr. A.D. Darji](#). The seminar focuses on the robotic vision system design and several classification and segmentation algorithms such as one-shot and semantic segmentation for Crop Weed classification problem [\[Seminar Report\]](#) [\[Seminar Presentation\]](#)

Drishti - Tech Club SVNIT

July 2017 - June 2019

- Worked & mentored several mini projects - [RFID-based Identification system](#), [Wireless control of mobile Robot](#). Conducted workshops on Embedded C, Sensor Interfacing, and Computer Vision for fellow juniors.
- Represented NIT Surat at National Robotics Contest Robocon 2018 & 2019.

National Robotics Contest - Robocon

Aug 2017 - June 2019

C/C++, Embedded & Control Systems, Odometry, Path Planning, RaspberryPi, Arduino, AVR, Image Processing, Team Work

- Robocon is a robotic contest organized by Asia-Pacific Broadcasting Union(ABU) [\[GitHub Project Page\]](#)
- **Robocon 2018** [Video:(Blue Team) [YouTube Video](#)]
 - Worked in a team of 20 and primarily contributed in developing autonomous motion using Line Following on a 3-wheel omni-drive through feedback from sensors like LSA line sensor, Gyroscope, IMU and Encoders.
 - Also developed manual control of the omni-drive using a remote playstation controller and prepared hardware circuitry using GCB (General Circuit Boards).
 - Secured 12th rank in the nationals at MIT Pune out of 120 participating universities.
- **Robocon 2019** [\[YouTube Video\]](#)
 - As a Senior member of a 15-man team, oversaw tech aspects as well as managerial aspects in building 2 robots: 4-wheel omni-drive and 4-legged robot.
 - Primarily developed the autonomous motion of the omni-drive using Line Following while secondarily contributing to odometry module using wheel Encoders. Developed the vision system based on colour detection for legged robot with 2 cameras interfaced and parallelly threaded on Raspberry Pi 3B.
 - Secured 13th rank in the nationals at IIT Delhi in the final round clearing Design Details & Video Submission round among over 100+ participating universities.

CERTIFICATIONS AND AWARDS

Deep Learning Specialization, Coursera

- Course 1: [Neural Networks and Deep Learning](#)
- Course 2: [Improving Deep Neural Networks](#)
- Course 3: [Structuring Machine Learning projects](#)
- Course 4: [Convolutional Neural Networks](#)
- [Introduction to Tensorflow](#)
- [CNNs in Tensorflow](#)

Academic & Business Writing, UC Berkeley, EdX [\[certificate\]](#)

Score: 93%

Fundamentals of Reinforcement Learning, Uni. of Alberta, Coursera [\[certificate\]](#)

Score: 98.98%

Deep Learning & Applications, Webinar, MeitY, Govt. of India

[\[certificate\]](#)

Best Model, National Science Day Celebrations, Physical Research Laboratory(PRL) Ahmedabad, India

- Awarded Best Working Model - Stirling Engine at the PRL during 12th grade. [\[credential\]](#)

TECHNICAL SKILLS

Languages: C, C++, Java, Python, Embedded C, SQL

Tools & Frameworks: git, Spring, PyTorch, TensorFlow, Keras

Libraries: pandas, NumPy, Matplotlib, OpenCV