

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

Surat, India
2016 - 2020

PUBLICATIONS

Kalwar S*, **Patel D***, Aanegola A, Konda KR, Garg S, Krishna KM, "GDIP: Gated Differentiable Image Processing for Object Detection in Adverse Conditions", Submitted to **ICRA 2023**. [\[WebPage\]](#) [\[Code\]](#) [\[Paper\]](#)

Srivastava K*, **Patel D***, Jha AK, Jha MK, Singh J, Sarvadevabhatla RK, Ramacharla PK, Kandath H, Krishna KM, "UAV-based Visual Remote Sensing for Automated Building Inspection (UVRsABI)", presented at the CVCIE Workshop, **ECCV 2022**. [\[WebPage\]](#) [\[Code\]](#) [\[Paper\]](#)

Patel D*, Jain A*, Bawkar S, Khorasiya M, Prajapati K, Upla K, Raja K, Ramachandra R, Busch C, "SRTGAN: Triplet Loss based Generative Adversarial Network for Real-World Super-Resolution", presented at the 7th International Conference on Computer Vision & Image Processing (CVIP) 2022. [\[WebPage\]](#) [\[Code\]](#) [\[Paper\]](#)

Patel D*, ShankaraNarayanan H. *, Gandhi M* & Darji A, "Design of an Autonomous Agriculture Robot for Real Time Weed Detection using CNN", presented at the AVES 2021 conference. [\[Code\]](#) [\[Paper\]](#)

EXPERIENCE

Robotics Research Centre, IIIT Hyderabad
Research Associate

July 2021 - Present
Hyderabad, India

- **Scene Understanding for Autonomous Driving** *Advisors: Prof. Madhava Krishna & Dr. Sourav Garg*
 - Working with the ZF Friedrichshafen (ZF) group and QUT Centre for Robotics, Queensland University on improving scene understanding for adverse weather conditions.
 - Proposed Gated Differentiable Image Processing (GDIP) framework for object detection, which significantly improves over the current state-of-the-art (SOTA) by 5.84 and 16 mAP on real-world foggy and dark conditions, respectively. Can operate at ~3x speed over SOTA. (Submitted to **ICRA 2023**).
 - Currently working on video object detection by modeling motion and appearance. Also, exploring Probabilistic Graphical Models (PGM) for learning weather-agnostic features for object detection.
- **DodgeDrone - Visual Servoing for UAVs** [\[WebPage\]](#) *Advisor: Prof. Madhava Krishna*
 - Devising a high-level control strategy using vision, Imitation Learning (IL), and Reinforcement Learning (RL) for obstacle avoidance.
- **UAV-based Assessment of Civil Structures** [\[Website\]](#)
 - Worked on building a vision pipeline for estimating critical seismic structural parameters.
 - Leveraged concepts like Structure-from-motion, 2D-3D registration, and State estimation in conjunction with visual inspection algorithms based on classical Computer Vision and Deep Learning to achieve robustness.
 - Developed an open-source software library (UVRsABI) for the community. Collaborating with the Central Road Research Institute (CRRI), Govt. of India, for its real-world deployment.

Amdocs

Associate Software Engineer

Aug 2020 – June 2021
Pune, India

- Worked on full-stack software development - developing backend APIs (Java), user-friendly frontend UI (ReactJS) and writing SQL scripts for managing large-scale production databases.
- Conducted knowledge transfer sessions of various internal applications and followed programming practices.

Swaayatt Robots

Research Intern, advised by Founder Mr. Sanjeev Sharma

April 2020 – July 2020
Bhopal, India

- Worked on improving individual algorithms in the traditional Visual Odometry (VO) and SLAM pipelines for Level-5 Autonomous Driving task.
- Proposed a semantic variant of the Iterative Closest Point (ICP) algorithm incorporating a class-specific loss function in the least squares optimization. It outperformed vanilla ICP, improving the matching loss and convergence time by 97% and 50%, respectively, on the Semantic KITTI dataset. [\[Report\]](#) [\[Appreciation Letter\]](#)

*equal contribution

SVNIT

May 2019 – July 2019

Summer Research Intern, advised by Dr. K.P. Upla

Surat, India

- Built a Face Recognition system using Deep Learning by implementing an NN4 variant of the inception network.
- Validated the system on a custom-made facial image dataset of 25 students.

PROJECTS AND EXTRA-CURRICULAR

UG Project- Autonomous Agricultural Robot (TEQIP III Funded) [\[Code\]](#)

Oct 2019 – June 2020

[Funded by TEQIP-III](#), [Featured in ROS Agriculture Community](#)

- Developed the software stack for autonomous navigation and teleoperation of a 4-wheel skid-steer drive using RGB camera, GPS and IMU.
- Implemented a light-weight encoder-decoder architecture, having 100x lesser parameters than UNet, for crop-weed classification task. 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 the Bonn dataset. Low latency of ~2.5 fps (on Nvidia 940MX).
- Contributed to the structural design of the robot using URDF and SDF modeling.
- Prepared a seminar report on the robotic vision system design, primarily focusing on semantic segmentation and classification algorithms for the crop weed classification problem.

National Robotics Contest - Robocon [\[WebPage\]](#)

Aug 2017 - June 2019

- Represented SVNIT at Robocon 2018 & 2019, a robotic contest organized by Asia-Pacific Broadcasting Union.
- Developed the autonomous motion of holonomic drives using line following and odometry through feedback from line sensor, Gyroscope, IMU and Encoders.
- Built the software stack on Atmel AVR and ARM microcontrollers and also designed hardware circuitry using General Circuit Boards.
- As a senior member of a 15-person team, oversaw technical and managerial aspects in building 2 robots: a 4-wheel Holonomic Drive and Quadruped Robot in Robocon 2019.

Drishti - Tech Club SVNIT [\[Website\]](#)

July 2017 - June 2019

- As a core member, organized project exhibitions like INSIGHT 1.0 (2019), where 500+ people, including students, professors, and L&T executives, visited and interacted with the team.
- Organized workshops related to Embedded systems, Computer Vision and Robotics, and mentored projects ([RFID-based Identification system](#), [Wireless control of mobile Robot](#), etc.), at institute-level for junior students.
- Represented SVNIT at National Robotics Contest Robocon 2018 & 2019.

COURSES AND CERTIFICATIONS

Deep Learning Specialization, Coursera

Deep Learning & Applications, MeitY, Govt. of India

[\[certificate\]](#)

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

Score: 93%

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

Score: 98.98%

Attended the 6th CVIT Summer School on AI

[\[certificate\]](#)

Linear Algebra, MIT OCW, Prof. Gilbert Strang

Reinforcement Learning, UCL, David Silver

AWARDS AND ACHIEVEMENTS

- *UVRsABI* was selected for spotlight presentation at the CVCIE Workshop at ECCV 2022 and would be deployed by the CRRI, Govt. of India, in Telangana state.
- Recognized as one of the top-performing employees at Amdocs by manager Mr. Ben Shasha.
- *AGRIBOT* was well-acclaimed by the Govt. of India for validating POC.
- Secured 13th rank in the final round of Robocon 2019 nationals and 12th rank in Robocon 2018 nationals among over 100+ participating universities.
- Best Working Model - Stirling Engine at the National Science Day Celebrations, Physical Research Laboratory (PRL) during 12th grade.

TECHNICAL SKILLS

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

Tools & Frameworks: Git, Robot Operating System (ROS), Spring, Jenkins

Libraries: Matlab, PyTorch, TensorFlow, Pandas, NumPy, SciPy, Matplotlib, OpenCV, Point Cloud Library (PCL)