DEVESH DATWANI

GRADUATE STUDENT, ROBOTICS ENGINEERING
WORCESTER POLYTECHNIC INSTITUTE, MA, UNITED STATES

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PROGRAMMING LANGUAGES

- C++ / C
- Python
- MATLAB

SOFTWARE STACK

- ROS 1 & 2
- TensorFlow, Py Torch & Scikit Learn
- OpenCV
- Linux & Git
- Django, Flask & AWS

EDUCATION

MS IN ROBOTICS ENGINEERING

WORCESTER POLYTECHNIC INSTITUTE
WORCESTER, MA | AUG 2021 - MAY 2023
Key Courses: Machine Learning • Robot Dynamics • Capstone Experience • Computer Vision • Autonomous Aerial Vehicles • Human Robot Interaction • Artificial Intelligence • Robot Control

BE IN MECHANICAL ENGINEERING

APSIT MUMBAI UNIVERSITY
MUMBAI, INDIA | AUG 2014 - MAY 2018
Notable Achievement: Received the "Young Innovator" award for research on Plasma Actuators at ICASTe, India

CAPSTONE EXPERIENCE

FIRE SAFETY ASSISTANT ROBOT [GITHUB]

AUG 2022 - DEC 2022 | WPI & Worcester - Capstone Project

- Engaged with stakeholders for problem statement identification to build a robot tailored for end user
- Brainstormed firefighting solutions in robotics domain with the Chief of Worcester Fire Department, MA, USA
- Developed a scalable mobile robot solution with a novel approach to evaluate real time fire safety of buildings
- Integrated a navigation stack for autonomous motion planning & validated localization with particle filtering
- Constructed a fire safety scoring metric with informed RRT* planning on 2D maps generated from LiDAR scans
- Implemented a remote sensing obstacle localization algorithm on cloud point data with PCA & K Means
- Built a finite state machine to automate robot task scheduling & transitioning from resting, mapping & scoring

LAB EXPERIENCE

SPACE GOAT

SEP 2021 - JAN 2022 | Popovic Labs WPI

- Represented WPI in a team of 15 at the NASA Big Idea Challenge 2022
- Brainstormed terrain challenges on the Martian surface with the team & designed a legged robot for
- Fabricated a One-To-Many power distribution mechanism aided by capstone clutch to reduce robot weight
- Integrated imu & ultrasonic sensors with the robot & wrote complementary filter in C++ for attitude estimation

PLASMA ACTUATORS [DOC]

2017 - 2018 | A.P.S.I.T. Mumbai University & Indian Institute of Technology, Bombay
Patent App No. 201921038313

- Designed a research project on plasma actuators for airflow induction without using any conventional devices
- Constructed a novel actuator design for airflow induction inside pipes with PVC as the dielectric medium
- Conducted experiments at the Propulsion Lab of the Aerospace Department of Indian Institute of Technology
- Experimented with different dielectric mediums & recorded maximum volumetric flow of ~ 9000 litres / hour

ACADEMIC PROJECTS

VISION BASED ROBOT TELEOPERATION STUDY [GITHUB]
SEP 2022 - NOV 2022 | WPI - Human Robot Interaction

- Conducted user studies & analyzed data on hand gesture & joystick-based teleoperation in Gazebo & ROS 1
- Implemented an ML pipeline for real time hand pose estimation with MediaPipe's multi-view bootstrapping
- Mapped key point estimates with Twist commands to control a Turtle Bot through hand gestures
- Built an intuitive human robot interface & experimented with feedback displays for high latency teleoperation
- Created ROS system to run test studies for teleoperation tasks in a custom-built obstacle world in Gazebo

TRAFFIC SIGN DETECTION WITH MASK R-CNN [GITHUB]
SEP 2021 - DEC 2021 | WPI - Machine Learning

- Experimented with the Mask R-CNN model to analyse its performance to detect traffic signs in harsh weather
- Built a pipeline to train the Mask R-CNN model on a non-English traffic sign dataset with TensorFlow & Python
- Augmented the Tsinghua-Tencent traffic sign dataset to synthetize motion blur & harsh weather effects
- Implemented sample redistribution, sample weighting & region pass through adaptations on to the model
- Observed an increase in mAP score of the adapted model by ~50% after training on the synthetic dataset

AERIAL VEHICLE NAVIGATION [GITHUB]
MAR 2022 - MAY 2022 | WPI – Autonomous Aerial Vehicles

- Built navigation stack components for small unmanned aerial vehicle autonomy in MATLAB
- Implemented an extended Kalman filter for numerically robust attitude estimation with quaternions
- Optimized path planning & tracking with heading reference for Dubins & parametric curves

IMAGE STITCHING & BOUNDARY DETECTION [GITHUB]
SEP 2021 - DEC 2021 | WPI – Computer Vision

- Developed Gabor, Gaussian, DoG, Laplacian filter banks to implement pb-lite paper for boundary detection
- Built a pipeline for multi-image stitching with Harris corner detection, RANSAC & warping in Python
- Implemented Spatial Transformer Network blocks & validated HomographyNet to create seamless stitching

WORK EXPERIENCE

BUSINESS SCHOOL WPI | GRADUATE ASSISTANT
MAY 2022 – PRESENT | WPI, Worcester

- Graduate assistant to Sandra Wellinghoff; director of MBA program at Worcester Polytechnic Institute
- Helping & consulting small businesses in Central Massachusetts in digitization to help grow their business
- Building small business initiative dashboard for seamless data access & analytics with Microsoft office stack

ADMATAZZ | DATA ANALYST
DEC 2019 - DEC 2020 | Mumbai

- Worked in the data specialist team to improve marketing strategies through data acquisition & interpretation
- Built web applications for business lead generation using the Django framework hosted on AWS EC2 server
- Built a Twitter trends visualizer to easily access real time news & trends through an interactive web application
- Deployed clustering & regression algorithms for customer segmentation & prediction for targeted advertising
- Built web crawling tools for real time lead acquisition from social media platforms like Reddit & Product Hunt

ENGINEERING PROJECT

AERIAL VEHICLE AUTONOMY [DOC]
2011 - 2019 | Mumbai, India

- Designed fabricated& flight tested scaled fixed wing aircraft &quad copters to satiate passion for aviation
- Constructed fixed wing aircraft powered by one of the smallest internal combustion engines in production
- Implemented PD controller in C++ & Arduino to enable cruise control autonomy
- Built airframes with carbon fibre, composites materials, balsa wood & 3D printed parts
- Gained hands on experience in building aerial vehicles through assessing failures and successful flights