

# Damodar Datta Kancharla

damodardatta@gmail.com

www.github.com/damodardatta  
linkedin.com/in/damodar-datta-kancharla-745919129

## EDUCATION

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### SRM Institute of Science and Technology, Kattankulathur

B.Tech: Mechatronics Engineering (First Class with Distinction, top 15% )

76.29 %

Jun 2016 - May 2020

## RESEARCH EXPERIENCE

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### Robotics Research Center (RRC), IIIT-H

Research Assistant under the guidance of Dr. Harikumar Kandath

Hyderabad, India

Jul 2022 - May 2023

- **Identification of Salient Structural Elements in Buildings:**

- \* Created Datasets of Building pipes and cracks using a Custom Drone and DJI Mavic, for validating the automation of civil structure assessment on drone collected real-world data.
- \* Built a Custom drone with Jetson Nano, ToF sensor and ZED stereo camera for data collection.
- \* Implemented real-time pipe detection using LEDNet and utilized colour processing for achieved 88% accuracy.
- \* Researched methods for visual transformer based crack segmentation and built an unsupervised domain adaption strategy for segmenting building cracks from the data collected by drones.
- \* Developed an open-source software library (UVRSAI) for the community. Collaborating with the Central Road Research Institute (CRRI), Govt. of India, for its real-world deployment.

- **UWB-based indoor navigation of drones inside closed surfaces (*sponsored by Airbus Group*):**

- \* Benchmarked stability of different drones with inertial odometry under GPS-denied navigation using Motion Capture.
- \* Created ROS package for navigation using UWB-based localization and used it for UWB-based navigation of Line Of Sight (LOS) and Non-Line Of Sight (NLOS) scenarios.
- \* Conducted experiments to validate the usage of NLOS UWB-based localization in closed spaces and also tried sensor fusion with IMU for better localization.
- \* The project was completed within 4 months, and the results were presented at Airbus Group India, Bangalore.

- **Control Barrier Function based Predictive strategy for Close Proximity operation of UAVs inside a Tunnel:**

- \* Researched aerodynamic effects due to navigation in close proximity and modelled a few of the effects.
- \* Proposed Model Predictive Control (MPC) framework with constraints based on Control Barrier Function (CBF) for close proximity navigation.
- \* The strategy was tested for different trajectories and against a realistic model of the aerodynamic effects disturbances seen due to close proximity navigation in simulation.

### Corporate Technology Center, Tubes Investment of India Ltd

Engineering Intern

Chennai, India

Jun 2019 - Jun 2019

- **Fatigue Testing of orbital welded tubes:**

- \* Designed a resonant fatigue testing setup for ERW steel tubes(SAE 1010).
- \* Conducted experiments on the changes in fatigue due to variations of Tungsten inert gas (TIG) welding parameters like voltage, current, filler material diameter and flux material.

## PROFESSIONAL EXPERIENCE

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### Hero MotoCorp Ltd

Assistant Manager - Maintenance Department

Madanapalem, India

Aug 2020 - Apr 2022

- **Machine Shop - Shift Incharge:**

- \* Worked on breakdown and preventive maintenance of Fanuc CNC machining centres, Manipulators, and Special purpose machines.

- **Paint and Weld Shop - Line Incharge:**

- \* Worked on breakdown and preventive maintenance of Paint and Weld shop equipment. Machines like Manipulators, Paint kitchen and treatment equipment, Welding stations, Fine boring and brazing station.
- \* Handled the planning of annual maintenance activities and spare management for the Weld shop for the Fuel tank and Frame body Lines.
- \* As a green field plant, prepared all the documents required for ISO certification of Weld shop maintenance.

- **Department Representative/ Auditor for ISO standards certification:**

- \* Coordinated documentation of machine maintenance for the whole plant.
- \* Handled department's efforts for successful certification in safety, operation and environmental management standards(ISO45001:2018, ISO9001:2015 and ISO14001:2015).

- \* Internal ISO auditor for earlier mention standards, and Process Approach Concept, Aspect Impact Analysis and Hazard Identification and Risk Assessment methodologies.

## Master Trainer Program, IIIT-Hyderabad (MeitY Sponsored)

Trainer and Volunteer

Hyderabad, India  
30th Jan - 3rd Feb, 2023

### • Trainer and Volunteer:

- \* Conducted session on OpenCV for using image processing techniques like filters(Gaussian, Sobel, etc..), Dilation, etc.
- \* Took a session on ROS basics like architecture and usage and showed examples.
- \* Handled for registration and organisation for 30+ participants. Coordinated training sessions and other activities.

## TECHNICAL SKILLS

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**Languages:** C,C++, Python, MATLAB, PLC ladder logic(Mitsubishi and Siemens)

**Frameworks:** ROS, PyTorch, Tensorflow, OpenCV, PX4, NumPy

**Tools:** GIT, Simulink, L<sup>A</sup>T<sub>E</sub>X, VS Code, SolidWorks, Gazebo, Airsim

**Hardware:** Manipulators (ABB, Fanuc, OTC, Durr, Panasonic), Pixhawk, SBC (Raspberry Pi, Jetson Nano), Actuators, Pneumatics, Hydraulics, Motion Capture System(optitrack), 3-D Printing(Ultimaker, Flashforge)

## PROJECTS

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### PID based Motor position control

*Jul 2022 - Aug 2022*

- \* Designed a compact housing for holding the motor and encoder together. Used a sleeve coupler for coupling the shafts (designed in SolidWorks).
- \* Implemented the control program (PID) on Raspberry Pi and provided logging for power shutdown fail case. (Python)
- \* Deployed PID-based motor position control experiment over the cloud for Remote Triggered Labs (Using blynk).

**Keywords :** Control

### Machine learning based vision servoing of a quadrotor aerial vehicle (Bachelor Thesis) *Oct 2019 - Apr 2020*

- \* Designed a Person Detection pipeline using deep learning inferences(SSD MobileNet).
- \* Implemented Visual servoing using Centroid tracking of the inference
- \* Simulated drone's response to live camera feed using Gazebo.
- \* Test Two-controller Strategy (Pixhawk and Jetson Nano), for SITL testing and HIL testing.

**Keywords :** Deep Learning, Computer Vision, Drone

### Deepchem

*Nov 2017 - Feb 2018*

- \* Designed a method for predicting chemical properties given chemical structure. Using singular-value decomposition (SVD) and piece approximation for some features whose values can't be measured physically.
- \* Contribution: Data collection and web scrapping(used BeautifulSoup in python) for chemical compound structures. Used various APIs like ChemSpider, Pubchem, ncib and DrugBank for chemical compounds data.

**Keywords :** Machine Learning

## PUBLICATION

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Vedant Mundheda, **Damodar Datta K**, and Harikumar Kandath. "Control Barrier Function-based Predictive Control for Close Proximity operation of UAVs inside a tunnel". *arXiv preprint arXiv:2212.16177*, 2023 (**Under review at CASE 2023**)

## EXTRACURRICULAR EXPERIENCE

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- **Student Volunteer:** Volunteer in **Nation Social Services (NSS)** and conducted social campaigns and blood donation camps. *From Jan 2017 till May 2017.*
- **Undergraduate Researcher** at a students run lab, Next Tech Lab as part of the Minsky team worked on using CNNs for panoptic scene segmentation. Participated in Hackathons and competitions. *From Sep 2017 till Jan 2019*
- **Coordinator** for **Impressionz'15 Cultural Event**. Handled the planning of events and support activities. *Jul 2015*

## ACHIEVEMENTS AND AWARDS

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- **UVRSABI** was selected for **spotlight presentation** for 25 years anniversary at RnD showcase 2023, IIIT-H and was inaugurated by Dr. S. Velmurugan (Chief Scientist, CRRRI) to deploy in Telangana (India) in *Jan 2023*
- Awarded **First Class with Distinction** in Bachelor's degree, given to **top 15% of the student** for academic performance in *Jun 2020*
- Appreciated for **leadership skills** displayed **Impressionz'15 Cultural Event** Organizing, in *Jul 2015*
- Appreciated for **Commendable attitude** showcased during **Impressionz'15 Cultural Event**, in *Jul 2015*