OM RAJENDRA KATHALKAR

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EDUCATION

Master of Science in Electronics and Communication Engineering,
International Institute Information Technology(IIIT-H) - Hyderabad
CGPA: 8.0/10.0 2023-Present

Bachelor of Engineering in Electronics and Telecommunication Engineering,
St. Vincent Pallotti College of Engineering and Technology - Nagpur
CGPA: 8.83/10.0 2019-2023

SKILLS

Areas of Interest	Computer Vision, Deep Learning, Natural Language Processing
Programming	Intermediate in Python, C++, Matlab, HTML
Hardware	Jetson Xavier NX, Raspberry Pi, Arduino and Esp-Series Micro-controllers.
Tools	Pytorch, Tensorflow, OpenCV, Cuda, Django, Scikit-learn, LaTeX

PUBLICATIONS

[1] K.S. Viswanadh, **Om Kathalkar**, Sachin Chaudhari et al. "**CV and IoT-based Remote Triggered Labs: Use Case of Conservation of Mechanical Energy**" at **FiCloud 2022, Rome, Italy**: This paper discusses the use of Computer Vision (CV) in Remote Labs (RTL), which are useful for virtual laboratory experiments. The Conservation of Mechanical Energy experiment is used as a case study, where a CV-based approach is used to estimate an object's velocity. The CV-based implementation is found to be more accurate, with a mean-squared error (MSE) nearly 10 times better than the IR-based implementation, and can be helpful for distance learning and during pandemics.

[2] Spanddhana Sara, Andrew Rebeiro-Hargrave, **Om Kathalkar**, Sachin Chaudhari et al., "**Protocol for Hunting PM2.5 Emission Hot Spots in Cities**", **1st International Workshop on Advances in Environmental Sensing Systems for Smart Cities (EnvSys '23), Helsinki, Finland**: This paper discusses the development of a mobile-based protocol utilizing search agents to locate PM2.5 emission hot spots in cities, enhancing knowledge of air pollution's health effects. Leveraged IoT devices and image processing to analyze variations in pollution levels, identifying industrial areas and busy roads as prominent sources.

[3] **Om Kathalkar**, Sachin Chaudhari et al., "**TRAQID - Traffic-Related Air Quality Image Dataset**", **The 35th British Machine Vision Conference, Glasgow, UK**: This paper discusses the limitations of sensor-based methods in air quality estimation and introduces TRAQID - a novel image dataset for traffic-related air quality analysis. With over 27,000 multi-view images captured in Hyderabad, India, TRAQID addresses the scarcity of diverse datasets in this field. It offers insights into various environmental factors affecting air quality, aiding the development of more accurate estimation techniques.

PATENTS

[1] US20240078641A1 - Published US Provisional Patent of **SYSTEM AND METHOD FOR IMPLEMENTING AN EXPERIMENT REMOTELY AND DETERMINING AN OUTPUT USING A COMPUTER VISION MODEL** - March 2023.

[2] 202441043706 - Filed a Provisional Patent on **SYSTEM AND METHOD FOR GENERATING TRAFFIC-RELATED AIR QUALITY IMAGE DATASETS** - May 2024.

[3] MY269127S - Filed a Provisional Patent on **SYSTEM AND METHOD FOR GENERATING MULTI-MODAL SENSOR DATASET FOR TRAFFIC RELATED POLLUTION** - May 2024.

RESEARCH EXPERIENCE

Research Assistant Aug 2021 - Present
Signal Processing and Communications Research Centre, IIIT-H

- Pursuing research under **Prof. Sachin Chaudhari** on the application of Machine Learning and Computer Vision towards smarter Internet of Things.
- Integrated Computer-Vision algorithms on edge devices like Raspberry Pi to replace sensors in the experiments. Filed a US Patent and published a Research Paper on "Computer Vision Technique for Performing an Experiment Remotely" [1]. The experiments are hosted on the campus of IIIT-H, that are currently being used by an NGO (Agastya), which educates underprivileged students in rural India
- Working on development of an Air Quality Monitoring System in Hyderabad. The work involves deploying computer vision based devices for real-time estimation of Air Quality Index (AQI) in the city. Our aim is to enhance the accuracy and timeliness of air quality data collection and analysis, enabling better monitoring and understanding of the air pollution levels in Hyderabad.

Summer Intern May 2020 - August 2021
e-Yantra Labs, IIT-Bombay

Worked with Prof. Rohan Vaidya for introducing the Warning System For Vehicles To Avoid Drowning In Waterlogged Roads, a solution to the problem of misjudging water levels during rainfall in cities. Designed for low-lying areas prone to waterlogging, such as underpasses and divided roads, the System utilizes advanced sensors and intuitive displays to provide real-time and precise water level measurements.

RESEARCH PROJECTS

Remote Triggered Labs for the Conservation of Energy Setup

`Remote Labs, IIIT-Hyderabad` `March 2022`

Developed Remote Triggered Lab, which enables students to remotely access hardware setups and experiment with them by tuning various parameters and observing their live outputs. For this, a use-case of the Conservation of Mechanical Energy experiment is considered. A CV-based approach is used to estimate an object's velocity whose setup primarily consists of a microprocessor, a camera and infrared (IR) sensors. The experiment is recorded, and various CV techniques are employed to estimate the object's velocity.

IoT-based AQI Estimation using Image Processing and Learning Methods

`SPCRC, IIIT-Hyderabad` `Aug 2022 - Present`

Contributed to the ongoing research project, *"IoT enabled smart cities: Pollution, Health, and Governance"* at IIIT Hyderabad, integrating IoT and computer vision techniques. Developed an IoT network for air pollution monitoring, combining data from low-cost sensors and weather parameters with geo-visualization for urban scenarios. Worked on dynamic web-based platforms for real-time visualization and analysis of spatial data, aiding citizen advisory and governance. Implemented robust, in-house-designed devices to ensure continuous data collection, with offline caching and bulk data offloading to mitigate power and connection outages. Focused on integrating environmental data with computer vision techniques, applied to real-world urban monitoring in Hyderabad, representing fast-growing cities.

AWARDS AND HONORS

Winner at the International Environmental Sensing Project Competition held by the University of Helsinki, Finland (December 2022).

Awarded the **Best Demo Award** at IIIT-H's R&D Showcase 2022.

Awarded the **AIR-1 Gold Award** at the e-Yantra Ideas Competition held by IIT Bombay.

Best Student of the Year of the batch 2023 at SVPCET, Nagpur.

Best Project Award for the undergraduate final year project.

Best Student of the Department of ETC Department, SVPCET, Nagpur.