PARTH VINOD PATIL

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Professional Experience

Software Engineer 2 | Drivetrain AI Technologies [Jan' 23 - Present]

- Upgraded website-wide search with **ElasticSearch** leveraging synonyms and integrated **Java client** in the backend, boosting hit rate by **3x** and delivering faster and more accurate search results.
- Built a query-based transform framework that eliminated the use of DBT & cut down on deployment time.

Robotics Engineer (Level 2) | Udaan (B2B Marketplace App) [July' 21 – Jan'23]

- Led the development of a **warehouse automation system** that is a swarm of Automated Guided Vehicles (AGVs) called Mushak, capable of lifting racks of 500kgs and navigating the layout, avoiding obstacles
- Deployed **multi-robot path planning** algorithm based on **A* & node reservation**, yielding zero collision paths.
- Worked on a **closed-looped controller** from Springer Handbook for **robot rotation** cantered on a QR marker, which curtailed the drifting from the marker to less than 2mm and achieved the angle setpoint within 2°.
- Architected the **Fleet Management Service**, responsible for optimal task allocation, path planning, and Warehouse Management System (WMS) integration; capable of **managing any fleet** of robots.
- Engineered a ROS-like alternative using ZMQ, for **faster networking** up to 1000 Hz on embedded electronics.

Research Intern | Samsung Research Institute Bangalore (SRIB) [May 20 – July 20]

- Collaborated on the development of **Samsung SmartThings Hub 3** with the IoT R&D team at SRIB.
- Migrated device health monitoring from the cloud to a local Hub-based system **saving millions in cloud costs**.

Education

Bachelor of Technology in **Electrical Engineering** with honours [Aug'17-Jun'21]
Indian Institute of Technology – Bombay

Key Courses Machine Learning for Remote Sensing, Advanced Topics in Machine Learning, Fundamentals of Digital Image Processing, Control Systems, Data Analysis, and Interpretation, Differential Equations, Introduction to Number Theory, Probability and Random Processes

Projects And Industry Experience

Autonomous Underwater Vehicle (AUV) | Prof. Leena Vachhani, Prof. Hemendra Arya [Sep 17 – June 21]

- Fabricated MATSYA, an autonomous underwater vehicle with a 5 million INR budget, which is equipped with visual, acoustic, and depth sensors and underwater communication systems for realistic naval missions.
- Secured **1st place** in the NIOT SAVe 2018 & 2020 competition with a 100% task completion rate.
- **Semi-finalist**, among 54 teams, in **RoboSub 2019**, organized by AUVSI & US Office of Naval Research.

Software Subdivision Lead [July 19 – June 20]

- Orchestrated **YOLO V2 integration** for vision, significantly increasing detection accuracy of abstract objects
- Devised a **Minimal Mission planner** that requires **80% fewer parameters** than the existing planner.

Software Engineer [Sep 17 – June 19]

- Developed a **web-based interface** using Django & ROS that enables non-Linux users to control the vehicle.
- Implemented **Extended Kalman Filter** based **sensor-fusion** estimation that reduced position drifting by 90%.
- Reverse Engineered National Instrument's **NI-DAQ** driver to work in Ubuntu, reducing its failure rate to zero.

Google Summer of Code | Django Software Foundation [May 19 – Aug 19]

- Amongst the **only 2** students shortlisted by the Django Software Foundation, out of **16.8%** accepted students.
- Optimized **FormSet** and similar classes to use declarative syntax, boosting user-friendliness and productivity.
- Created an 'edit only' mode in ModelFormSet to prevent injection attacks, improving overall security.

Underwater Remotely Operated Vehicle (ROV) | Larsen & Toubro Defence [July 19 – June 21]

- Conceptualized an **ROV** deployable in seawater for **scanning ship** hulls & for **surveillance** in pots and ocean.
- Joint effort by IIT Bombay and **Larsen & Toubro Pvt. Ltd**. under the IMPRINT initiative of **MHRD**.

Other Projects

Anomalous Human Activity Detection |B.Tech Thesis | Prof. Rajbabu Velmurugan [Aug 20 – Apr 21]

- Worked on a novel framework for **Anomaly Detection in CCTV videos**, using only a few frames, which were processed through a **Prototypical CNN**, capable of detecting robbery, accidents, cyclists on a footpath, etc.
- Used **Meta-Training**, which helps adapt to new CCTV scenes swiftly using trained models on a different scene.
- Compared various traditional human anomaly detection models based on future frame prediction with the few-shot learning model mentioned above and found our model was **more accurate and 20% faster** to train.

Gradient Class Activation Map (GRAD-CAM) |Course Project | Prof. Biplab Banerjee [Jan 19 – Apr 19]

- Implemented Grad-CAM on the **UC Merced** dataset to visualize the parts in the image that caused the activations in a particular targeted class for the image having multiple objects of different classes.
- Designed and trained **dense layer for a VGG16** model pre-taught on the ImageNet dataset.

Augmented Reality Glasses |Institute Technical Summer Project [Apr 18 – July 18]

- Built a **heads-up display** (similar to google glass) in a team of 4, enabled with **face recognition**.
- Convinced 'Vufine' **to fund the project** by providing their state-of-the-art wearable display.

Scholastic Achievements

- Secured **98.85** percentile in JEE Advanced 2017 & Among the top **1.3%** of students in JEE Mains 2017.
- Recipient of scholarship in **Maharashtra Talent Search Examination,** securing a district **Rank 1** in 2011.
- Awarded "**Thane Vishesh Gaurav**" for exceptional performance in the SSC board exam by Govt. of India.
- Awarded State government scholarship for high school students by securing **100 percentile** rank.

Skills and Experience

Languages	C++, Python, Java, Kotlin, Bash, C, Groovy, Rust, Ruby, Golang, Assembly, VHDL
Web	HTML, CSS, JS, TS, Django, REST, Angular, Node, React, Jekyll, Flask, Jinja, AWS-Amplify
Frameworks	ROS, Pygames, OpenCV, PyTorch, Pandas, Flutter, AutoCAD, SolidWorks, Matlab, Blender
Electrical	Arduino, Raspberry Pi, Tinker-Board, NodeMCU, Crypton FPGA, STM, Beaglebone

Position Of Responsibility

Manager |Developer's Community (DevCom) [Apr 19 – Apr 20]

- Assisted in **founding** 'DevCom', which aims to unify all the technical projects inside Institute-level teams.
- Spearheaded a team of sophomores & freshmen students who oversee the development of **InstiApp**, an Android app of the institute which has more than **10,000 downloads** on the Play Store.

Department Academic Mentor |DAMP, Electrical IITB [July 20 – June 20]

- Mentoring **6 sophomores** from the Electrical Engineering Department on a one-to-one basis on various aspects of their life, including their **academic** and **extra-curricular** pursuits in the institute.

Extra-curricular Activities

- Completed one year in NSO (National Sports Organization) in Swimming, 2017-18.
- Won a consolation prize for two years in National Abacus Competition.
- Instructed Technical Summer School (TSS) for Web Development hosted by the academic council.
- Mentored juniors in various high-reach events like XLR8, Line-follower, Maze-solver, ITSP.