PARTH PATIL

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EDUCATIONAL QUALIFICATIONS

IIT Bombay	B.Tech in Electrical Engineering with Honors	2021	7.8 / 10
Pace Junior science college	Intermediate	2016	85.38 %
J.V.M's New English School Kalwa	Matriculation	2014	92.40 %

PROFESSIONAL EXPERIENCE

ROBOTICS ENGINEER (LEVEL 2) | *UDAAN (B2B MARKETPLACE APP)* [JULY'21-PRESENT]

- Coordinated 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.
- Devised **multi-robot path planning** algorithm based on **A* and node reservation**, yielding zero collision paths.
- Worked on a **closed-looped controller** from Springer Handbook for **robot rotation** centred on a QR marker, which reduced the drifting from the marker to less than 2mm and achieved the angle setpoint within 2°.
- Designed and implemented 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, which ran on embedded electronics for **faster communication**.

RESEARCH INTERN | *SAMSUNG RESEARCH INSTITUTE BANGALORE (SRIB)* [MAY'20-JULY'20]

- Worked with the **IoT RnD** team at SRIB, which works on next-generation **IoT devices**.
- Aided in migration of Cloud-based Device Heath monitoring to the Local Hub-based system saving millions.
- Implemented the **Device state machine models** for the Local Device Watch using C, RUST and groovy.

KEY PROJECTS

AUV (AUTONOMOUS UNDERWATER VEHICLE) | *PROF. LEENA VACHHANI, PROF. HEMENDRA ARYA* [SEP'17-JUNE'21]

- Designed and developed Autonomous Underwater Vehicle named MATSYA, with an overall budget of **5 million INR** capable of localizing itself, performing **realistic naval missions** using visuals form two cameras, intelligent planner, acoustics, depth sensor, underwater communication (UWC), thrusters, and pneumatics.
- **Winner** at SAVe Competition 2016 & **Joint Winner** in 2018 hosted by the National Institute of Ocean Technology, Chennai. The **only team** in the history of the competition to complete all tasks in the race.
- **Semi-finalist**, among 54 teams, in **RoboSub 2019**, organized by AUVSI & US Office of Naval Research.

Software Subdivision Lead [JULY'19-JUNE'20]

- **Represented IIT Bombay** at International AUVSI Robosub, San Diego, in 2019.
- Designed **Minimal Mission planner,** which 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.
- Developed **ML-Tool** for marking bounding boxes in a video, used as an **input for a YOLO V2** neural network.
- Implemented a **sensor-fusion** algorithm using an **Extended Kalman Filter** technique for position estimation.
- Reverse Engineered National Instrument's **NI-DAQ** driver to work in ubuntu using a **replay attack** method.

UNDERWATER REMOTELY OPERATED VEHICLE (ROV) | *LARSEN & TOUBRO DEFENCE* | *PROF. LEENA VACHHANI* [JULY'19-JUNE'21]

- Designing an **ROV** deployable in seawater for **scanning ship** hulls & for **surveillance** in port/ocean conditions.
- Joint effort by IIT Bombay and **Larsen & Toubro Pvt. Ltd**. under the IMPRINT II.C initiative of **MHRD**.
- Designing an **industrial interface to control** the vehicle and view the output of different camera feeds.

GOOGLE SUMMER OF CODE | *DJANGO SOFTWARE FOUNDATION (DSF)* [MAY'19-AUG'19]

- Amongst the **only 2** students shortlisted by Django Software Foundation, out of **16.8%** accepted students.
- Enhanced **FormSet** and similar classes, through improving the inheritance by introducing checks for child classes using **metaprogramming** in Python, thus increasing productivity and ease of use.
- Prevented **Injection attacks** and creation of new entries in the **database** by introducing an 'edit only' mode in ModelFormSet, thus strengthening the **security** of the process of amending the Model data.

Other Projects

Anomalous Human Activity Detection | *Prof. Rajbabu Velmurugan* | *B.Tech Technical Project* [Jan'21-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.

Universal Style Transfer | *Prof. Biplab Banerjee* | *Course Project* [Aug'19-Nov'19]

- Reviewed and Implemented **NIPS'17 paper** titled "Universal Style Transfer via Feature Transforms".
- Generalized the model for unseen styles **without losing visual quality** as compared to neutral style transfer.

Gradient Class Activation Map (Grad-CAM) | *Prof. Biplab Banerjee* | *Course Project* [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-trained on the ImageNet dataset.

Augmented Reality Glasses | *Institute Technical Summer Project* [Apr'18-July'18]

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

Scholastic Achievements

- Secured of **98.85** percentile in JEE Advanced 2017 & Amongst Top **1.3%** student 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.

Software and Skills

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

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 and trained 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, EE IITB* [July'20-June'21]

- Mentoring **six 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.
- Convenor for Electronic and Robotics Club (ERC) and Web and Coding Club (WnCC) in 2018-19.