VIPUL RAMTEKKAR

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Interests

- **Computer Vision, Machine Learning, Deep Learning, Robotics**
- **Key Courses**: Machine Learning, Deep Learning and Practices, Neural Networks & Deep Learning(MOOC), Operating Systems, Data System and Security, Data Structure and Algorithms, Computer Programming

Education

Indian Institute of Technology Bombay — Mumbai, India
Bachelor of Technology, Department of Chemical Engineering — *July 2016 - Present*

- **GPA**: 8.76/10.0
- **Minor Degree**: Computer Science and Engineering

Research Internship & Projects

Visiting Summer Research Intern at University of Tokyo, Japan — *Summer 2018*
Prof. Shinichi Morishita, Computational Biology Dept — *UTokyo, Japan*

- Proposed a model to identify transposable elements by training a Support Vector Machine classifier with cosine similarity kernel. Achieving a **1.2x better** accuracy and **10x better** training time
- Implemented algorithms for sequence alignment and created data visualisations using JavaScript and D3 library
- Showcased the research project in the IIT Bombay's Research and Technology Symposium, ResTech 2018

SeDriCa, Self Driving Car | UMIC IIT Bombay — *Autumn 2018 - Present*
Prof. Amit Sethi, Electrical Engineering Dept — *IIT Bombay*

- Leading a team of sophomores as the **Computer Vision Head** and working towards attaining level 4 autonomy
- Awarded the Mahindra E2o Car amongst the top 11 teams out of 289 for the Mahindra Rise Driverless Car Challenge
- Designed, implemented (in tensorflow) and analyzed D-linknet, a encoder-decoder based CNN architecture with dilated convolutions to achieve, pixel-level lane detection trained on apollo and mapillary datasets
- Developed a python based tool to re-annotate the incorrect lane markings and remove bad instances in the lane datasets
- Designed, implemented (in tensorflow) and analysed a multi encoder-decoder based CNN architecture to perform instance-level lane detection, observed via experimentation that the semantic information *enhances* on increasing the number of encoder-decoders, but the spatial information & the ability to pinpoint a location *decreases*

Matsya, Autonomous Underwater Vehicle (AUV) — *Autumn 2016 - Spring 2018*
Prof. Leena Vachhani, Prof. Hemendra Arya — *RoboSub, AUVSI & US Office of Naval Research*

- Designed and developed a state-of-the-art unmanned **Autonomous Underwater Vehicle (AUV)** that localises itself and performs realistic missions based on feedback from visual, inertial, acoustic and depth sensor using thrusters/propellers.
- Achieved **2nd position in the world** in **Robosub 2016** amongst 44 teams from 10 different countries and **National Winner** of Student AUV Competition, **SAVe 2017**, conducted by the National Institute of Ocean Technology (NIOT).
- Optimised and implemented design of pneumatically driven 2-DOF gripper picking a wide range of geometrical objects and enhanced the torpedo's design to create a locking mechanism for better pressure buildup
- Represented the team in various tech and research expositions and conducted interviews for the team recruitment [video]

Tata Center for Technology and Design Challenge — *Autumn 2018-Winter 2018*
Inter-IIT Technical Meet — *IIT Bombay*

- Developed a prototype of an **autonomous strawberry plucking bot**, after conducting field surveys to identify automation solutions to reduce intensive labour in farming. The bot costs **84%** lower than the total labour costs and can pluck strawberry **6x faster** when compared to plucking them manually
- Retrained a tiny yolo classifier with **transfer learning** to detect strawberries using Fruit-360 dataset and performed image augmentation using various computer vision methods like histogram equalization and linear transformations

User Mimicking ChatBot — *Autumn 2018*
Prof. P Balamurugan, IEOR Dept — *IIT Bombay*

- Created a chatbot by training a Sequence to Sequence Model that learns to conversate like the user on his/her data from various social media accounts like Facebook, WhatsApp, LinkedIn, etc
- Retrained the model by incorporating larger datasets to improve the conversations and make them more realistic, fined tuned the hyperparameters and improvised the training by using adaptive optimizers

Predicting Stock Market using Sentiment Analysis *Spring 2018*
Prof. Preethi Jyothi, CSE Dept *IIT Bombay*

- Proposed a method to predict the closing price of a stock by training a LSTM Model incorporating the sentiment value
- Evaluated the sentiment value of the market, by carrying out sentiment analysis of the tweets related to the company extracted from twitter using Tweepy API, and categorised them into positive, negative and neutral

Autonomous Sanitation and Cleanliness Bot *Autumn 2017-Winter 2017*
Inter-IIT Technical Meet *IIT Madras*

- Designed a state of the art, light weight & compact toilet cleaning bot with 1-DOF arm to clean stains and a rotation flap to pick trash. Minimized the cost by **57%** and improved the cleaning time by **2.5x** against manual controlled machines
- Trained a **Haar Cascade Classifier** to detect the toilet, and detected the stains and trash using edge detection and colour thresholding, implemented communication between arduino & raspberry pi using pySerial to establish arm control

Modelling of Biological Phenomenon | Student Undergraduate Research Program *Summer 2017*
Prof. Ambarish Kunwar, BSBE Dept *IIT Bombay*

- Simulated motor proteins and achieved **90%** accuracy when detachment rate was compared to the simulated rate
- Implemented Monte-Carlo Simulations and Gillespie algorithm achieving **35%** reduction in time for simulation

Scholastic Achievements

- Selected for HPAIR'19 conference at Havard University in Cambridge, Massachusetts from a pool of 10,000 applicants**
- Awarded an **AP grade** (Top 1% of class) for performing exceptionally well in *Solid Mechanics*
- Awarded the **UTSIP Scholarship** to pursue research in UTokyo amongst **30 students across the world**
- Awarded the **Institute Technical Color** for exceptional contribution towards the growth of tech in the Institute
- **Bronze Medal** in the Tata Center for Technology and Design Challenge at the 7th Inter IIT Technical Meet, 2018

Technical Skills

Programming	C++, Python, JavaScript, Java, HTML
Tools	keras, OpenCV, Tensorflow, Matlab, Gnuplot, LaTeX, Git, ROS, Solidworks, Android Studio, Ansys, Autocad

Courses Undertaken

Chemical	Computational Biology, Product Research and Development, Process Control, Chemical Processes, Thermodynamics I & II, Transport Phenomena, Heat Transfer, Fluid Dynamics, Mass Transfer I & II, Chemical Reaction Engineering, Solid Mechanics
Maths & Statistics	Calculus, Linear Algebra, Differential Equations I & II, Numerical Analysis, Data Analysis
Miscellaneous	Introduction to Electrical and Electronics Circuits, Operations Analysis, Accounting and finance, Psychology, Organic, Inorganic and Physical Chemistry, Biology, Basics of electricity and Magnetism, Quantum Physics

Positions of Responsibility

- **Academic Mentor | Department Academic Mentorship Program** *Spring 2018 - Present*
  - *Mentoring sophomores* and helping them with their academic choices out of the plethora of options like honours, minors, electives & helping them to cope up with their academic difficulties and dealing with peer pressure
- **Coordinator** in **Informals**, **Mood Indigo 2017** *Spring 2017-Winter 2017*
  Asia's Largest College Cultural Festival
  - Led a team of organizers and ideated, developed and conducted the flagship event KingsRoad, a virtual war game between groups involving strategic trade & development planning which saw a participation of over **70 teams**
  - Executed various events that cater to an incoming audience of **0.15 million people** over the span of 4 days

Extracurriculars

- Gave a **talk** on understanding machine learning and its application in different areas of engineering and sciences
- Devised a solution to verify and authenticate driver's license, monitoring driving style, track the car's location and penalise it on breaking rules & regulations in a Hackathon conducted by Texas Instruments
- Achieved **2nd position** in Science Computation Blitz Competition participated by students across the institute
- Achieved **1st Position** in Stock Market Simulation conducted by E-Cell in which more than 50 teams participated
- Completed one year of Social Service under NSS which involved social awareness drives regarding demonetization and conducting events for underprivileged children, teaching them about science and demonstrating experiments in NGOs

**Couldn't attend due to clashing college schedule