# VIPUL RAMTEKKAR

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## Interests

- **Computer Vision, Machine Learning, Deep Learning, Robotics**
- **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**: 8.64/10.0
- **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*

- Created an ML model to **annotate** the transposable elements using Support Vector Machine with cosine similarity on the input & k-merized the variable length string inputs by converting them to fixed length int vectors with **60% accuracy**
- Implemented algorithms for faster string search and created complex visualisation 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*

- Awarded the Mahindra E2o car amongst the top 11 teams out of 289 for the Mahindra Rise Driverless Car Challenge
- Implementing various Convolutional Neural Network architectures like linknet and d-linknet for the lane detection
- Implemented multiple encoder-decoder based CNN to achieve autonomous driving by detecting drivable paths and road

**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]

**Autonomous Strawberry Harvester** — *Autumn 2018-Winter 2018*
*Inter-IIT Technical Meet* — *IIT Bombay*

- Implemented **yolo (single shot detector)** research paper for strawberry detection training the model using Fruits-360 dataset and applied various Computer Vision Methods like masking and morphological methods to preprocess the image
- Implemented multi-level pySerial communication between raspberry pi and arduino for the motion of different parts of the device and for further **path planning algorithms** and implemented inverse kinematics for arm's plucking mechanism

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

- Computed the shortest distance to the stains and trash using monocular vision and ultrasonic sensor and detected them using image processing while reducing the distortion by applying multiple layers of the filter to the image obtained
- Built a **Haar Cascade Classifier** to locate the toilet and applied structuring element kernel to complete broken contours
- Implemented **communication** between raspberry pi & Arduino using pySerial to control the motor drivers and control the 1-DOF arm to clean the stains present on the inner surface of the toilet

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

- Created and analyzed models for ants in open and periodic boundary conditions by varying different parameters
- 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**
- **Bronze Medal** in the Tata Center for Technology and Design Challenge at the 7th Inter IIT Technical Meet, 2018

## Course Projects

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

- Created a chatbot using Recurrent Neural Network with LSTM nodes that learns to conversate like the user trained on his/her data from various social media accounts like Facebook, WhatsApp, LinkedIn, etc
- Tuned various hyperparameters to achieve the accuracy like number of LSTMs, choice of optimiser, training cycles etc

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

- Created an LSTM model with an added feature of the sentiment value of the market for closing price prediction
- Carried out the sentiment analysis of the tweets related to the company acquired from twitter using Tweepy API and categorised them into positive, negative and neutral using VADER library and normalised overall tweets of the day

## Technical Skills

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

## Courses Undertaken

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|---|---|
| **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*
  - Selected as one of the **22** mentors out of **99** applicants as a part of Student Mentorship Program(SMP) team based on academic performance, mentoring aptitude and communication skills
  - **Mentoring four 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
- Achieved **2nd Position in Science Computation Blitz Competition** participated by students institute-wide
- Achieved **1st Position in Stock Market Game** 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
- Volunteered for managing the **56th Convocation Ceremony**, IIT Bombay with a footfall of 30,000
- Completed Squash and Lawn Tennis Summer School of Sports conducted by IITB Sports
- Completed the **certified** boot camp for Android App Development by Career Cell, IITB

**Couldn't attend due to clashing college schedule
*Courses taken in Spring 2019