Saumya Shah

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Education

2016–Present **Bachelor of Technology**, *Indian Institute of Technology*, Kanpur, *CPI – 9.7/10*.
Major - Electrical Engineering

2016 **Grade XII**, *The New Tulip International School*, Ahmedabad, *Result – 94.4%*.
CBSE

2014 **Grade X**, *Delhi Public School*, Ahmedabad, *CGPA – 10/10*.
CBSE

Research Interests

Robotics, Machine Learning

Research Projects

May'18 - Present **Multiple Sensors Dataset Repository**.
Summer Project, Prof. Ketan Rajawat, IIT Kanpur
Github
- Collaborated to **record and benchmark** a new dataset comprising of multiple sensors for research in short and long term SLAM
- Developed a **ROS Node** in **Python** to calibrate LIDAR and odometry parameters for this dataset by implementing CSM and calibration packages developed by Andrea Censi
  - Developed a **Bash + Python** script to automate the entire laborious process
- Implemented and compared the results of Google Cartographer, Hector-SLAM and open-karto
- Modified and implemented Google Cartographer to **retrieve backend data** for the above dataset in the form of raw nodes and edges before being published as visual marker arrays
- Implemented the solvers **Toro and g2o** on this retrieved backend data
- Compared error metrics for these solvers on the Manhattan3500 and city10000 datasets

Sep'18-Nov'18 **Explainable Machine Learning**.
Course Project for Introduction to Machine Learning (CS771), under Prof. Piyush Rai
Report
- Developed a web application to explain the prediction of any classifier on the user's dataset using LIME
- Implemented feature visualisation using matrix factorisation by generating adverserial examples using BFGS method
- Explored state of the art techniques for visualising CNNs using Lucid and neuron group methods

Other Projects

Feb'18-May'18 **Quantitative Trading Strategy Development** .
Data Science Internship, Auquan Inc., IIT Kanpur
Github
- Designed, back-tested and optimized a data driven quantitative trading strategy on real world data.
- Developed predictive models for stock prices using the **Python libraries Pandas and Numpy**
- Implemented an Autoregressive Integrated Moving Average **(ARIMA)** model to **forecast stock prices**
- Identified stocks expected to give $>$**30% Return on Capital(RoC)** by using Hurst values

Nov'17- Dec'17 **Analysis of Analog Signals from Atlas Scientific Sensors**.
Winter Internship, Prof. Ketan Rajawat, Kritsnam Technologies
Github
- **Integrated sensors with Particle Electron** Embedded Platform via mobile data(2G) to retrieve data for Temperature, DO, pH and Electrical Conductivity using Atlas Scientific EZO Circuits
- Utilised this data to propose a **regression technique** that **reverse engineers** EZO circuits by establishing a relationship between the analog signals received from the sensors and the respective physical quantities
- Explored the working and physical principles of Atlas Scientific pH, EC, DO and Temperature sensors

Oct'17- Nov'17 **Da Vinci's Odometer**.
Course Project for Manufacturing Processes-II (TA202), under Prof. J.R. Ramkumar
- Designed a prototype of the odometer using Autodesk Fusion 360
- Manufactured a working model of the odometer using various in-house manufacturing processes and techniques such as drilling, milling and turning
  - Used various gear mechanisms including bevel gears and worm and worm wheel
- Measured medium to long distances with a reasonable accuracy of ± 4 cm

Feb'18- Mar'18 **Steam Engine Locomotive**.
Course Project for Manufacturing Processes-I (TA201), under Prof. Shobhit Omar
- Designed a prototype of Locomotive that uses crank shaft mechanism, in Autodesk Fusion 360
- Manufactured a working model of this Locomotive using various in-house manufacturing processes and techniques such as welding, casting and brazing

Academic Achievements

2016, 2017 Received the **Academic Excellence Award** twice, awarded to Top 10% students in IIT Kanpur

2016 Ranked in **National Top 1%** (amongst 1,200,000 candidates) in JEE Main

2016 Ranked in **National Top 4%** (amongst 150,000 candidates) in JEE Advanced (IIT-JEE)

2016-Present Awarded **A*** in 4 courses (**for outstanding performance**) including **Complex Analysis**

2015 Received Pradeeptam Award for securing 2nd position in academics in class XI

Technical Skills

Languages PYTHON, C, C++, Shell(bash), MATLAB

Frameworks Pytorch, ROS, Particle Electron

Software Autodesk Fusion 360, Adobe Premier Pro

Other Git, Octave, LaTeX

Relevant Coursework

Mathematics **Probability and Statistics**, **Linear Algebra**, Ordinary Differential Equations, Partial Differential Equations, Complex Analysis(A*), Real Analysis

Computer Science **Machine Learning Techniques, Probabilistic Modeling and Inference^, Visual Recognition^, Computer Organisation^, Data Structures and Algorithms, Fundamentals of Programming**

Electrical and Electronics **Control Systems Analysis**, Communication Systems^, Principles of Communication, Power Systems, Digital Electronics, Signals and Systems, Fundamentals of Electronics, Microelectronics-I, Microelectronics-II^, Electromagnetic Theory^, Introduction to Electrical Engineering

^ To be completed by Apr'19
A - Exceptional Grade*

Voluntary Work

May'18 - Present **Head, Relations, *Outreach Cell*, IIT Kanpur**.
- Conducted various events like Tips from the Top, Alumni Hangouts and Buddy Program
- Contacted and maintained good relations with alumni and paired them up with freshers
- Actively participated in the Future Students Team for mentoring the incoming students

Extracurriculars

2017 Represented IIT Kanpur Table Tennis Team in Udghosh - The annual sports fest of IIT Kanpur

2017 Awarded Player of Summer Camp for exceptional performance in Table Tennis

2013 Secured 2nd position in the City Finals (Ahmedabad) of HDFC Life Spell Bee 2013