MANAS VASHISTHA

Mail ◇ *LinkedIn* ◇ *Github* ◇ *Webpage*[1]

EDUCATION

Indian Institute of Technology Bombay, *Mumbai, India* July '17 - Present
Dual Degree in Electrical Engineering with *M.Tech* in Microelectronics
Minor in Center of Studies in Resources Engineering

EXPERIENCE

University of Cambridge, *Cambridge, UK* *May '19 - Present*
Research student under Cecilia Mascolo and, Jagmohan Chauhan
Incremental Learning on Resource Constrained Devices

- Optimized various incremental learning algorithms and implemented them with machine learning classifiers
- Trained & tested these algorithms on UCI-HAR and Opportunity datasets to classify certain activities
- Compared and analysed different incremental learning classifiers to justify the variations in the accuracies
- Deploying these models on resource constrained devices by restricting the memory usage and latency
- Exploring techniques to decrease the power consumption by the model so as to make it more efficient

PROJECTS

Object Detection & Classification in Satellite Images *Winter '18*
Computer Vision *Self Project*

- Developed a Faster R-CNN model to detect objects in Satellite images & form bounding boxes
- Classified the objects detected in an image into different classes like airplanes, trees, buildings etc
- Observed the changes in the land features of a chosen locality over a certain period of time

Automatic Text Summarizer *Fall '18*
Natural Language Processing *Self Project*

- Implemented an interatcive text summarizer which automatically produces a summary of a document
- Integrated an approximate summarization model to the original model to guarantee interactive speeds even for large text collections of multiple topic-related documents so that the user is kept engaged in the process
- Text summary is computed at every iteration by taking the document and user feedback into account. Also for each iteration the user feedback of all the previous iterations is taken into account along with document

ChordIt — Chord Sequence Extraction from Music *Spring '19*
Machine Learning under Biplab Banerjee *CSRE, IIT Bombay*

- Processed the audio files to retrieve $\mathbb{R}^{12}$ dimensional Pitch Class Profile vectors.
- Achieved 95% train, 86% test accuracy with *Radial Basis Function* kernel and *SVM Classifier*
- Incorporated mini-batches method in SGD Optimizer for Online Learning on real-time data
- Used Butterworth filter for creating a band pass filter to smoothen the function for better sampling.

Face Detection *Fall '18*
Computer Vision *Self Project*

- Exploited Viola Jones algorithm for fast detection of a human face in a picture
- Utilised AdaBoost to improve the performance of machine learning algorithm
- Implemented the algorithm using Haar Cascades and *Integral images*
- Achieved an accuracy of *87%* over the testing dataset

Multi-Cycle (RISC) Processor *Spring '19*
Processor Design under Virendra Singh *Electrical Engineering, IIT Bombay*

- Developed the architecture of a basic computer which follows a predefined set of instruction
- Created FSM (for implementation of the developed architecture) by assigning specific tasks to each state
- Tested the design on a new sequence of instructions by looping over all the instructions in the set
- Implemented the architecture & the testing part in VHDL and verified outputs using an instruction sequence

Maze Solver *Spring '18*
Robotics under Electronics & Robotics Club *IIT Bombay*

- Implemented *optimal algorithms* and techniques to obtain the *solution path* for the maze
- Analysed and mapped the maze using Ultrasonic ranging module and stored maze path data

[1]Use URL www.manasv09.github.io in case hyperlinks don't work

Line Follower *Spring '18*

Robotics under Electronics & Robotics Club *IIT Bombay*

· Assembled a sensor array using IR Tx-Rx pair to detect white line on black background
· Utilised *optimal threshold* value for sensors to calculate distance of the line from the center
· Employed Proportional Integral Derivative controller to ensure smooth motion in correct direction

Grab Circuit *Spring '18*

Digital Logic Design under Subhananda Chakrabarti *Electrical Engineering, IIT Bombay*

· Devised a quiz buzzer system ascertaining the player with the *fastest reaction time* and the *reaction time*
· Implemented and interfaced the buzzer circuit with the timer circuit using D flip-flops and latches

Heart Rate Monitor *Fall '18*

Analog Circuit Design under Siddharth Tallur *Electrical Engineering, IIT Bombay*

· Implemented reflective Photoplethysmography to measure the heart beat
· Utilised IR LED-phototransistor pair TCRT5000 to detect the PPG signal
· Employed op-amp for *amplification* of signal and active filters for *noise removal*
· Analysed the heartbeat wave-form to measure *systolic & diastolic* heart-rate

SCHOLASTIC ACHIEVEMENTS

- Secured **All India Rank 270** in JEE Advanced' 17 among 200,000 candidates
- Awarded the **AP Grade** (Top 1% out of 470 students) in Chemistry Laboratory
- Achieved 99.7 percentile in JEE Main' 17 among 1.2 million candidates
- Bagged State Rank 59 in UP State Entrance Exam' 17 among 142,000 candidates

TECHNICAL SKILLS

- **Programming Languages** - Python, C/C++, Java, MATLAB, VHDL
- **Libraries** - PyTorch, DL4J, Tensorflow, Keras, OpenCV, SciPy
- **Softwares** - Git, GitHub, GNU Octave, Eagle, SPICE, LaTeX, AutoCAD, Android Studio
- **Robotics** - Arduino, Raspberry Pi, Robot Operating System

POSITIONS OF RESPONSIBILITY

- **Volunteer** — Abhyuday *January '18*

  Social Fest, Creating awareness about Human Rights *IIT Bombay*

  · Maintained and organized the database of lecturers, performers and visitors at IIT Bombay during the Annual Social Fest 2018 as a part of a team consisting of 7 student volunteers

- **Organizer** — Techfest *December '17*

  Asia's Largest College Science & Technology Festival *IIT Bombay*

  · Planned, organized, and executed events along with a team of 20 student volunteers
  · Attended to guests and dignitaries during events, lectures, and workshops

RELEVANT COURSES

- **Machine Learning** - Digital Image Processing, Machine Learning for Remote Sensing, Remote Sensing & Image Processing, CS 231n (Stanford), Machine Learning (Andrew Ng)
- **Electrical Engineering** - Probability & Random Processes , Data Analysis & Interpretation, Network Theory, Signals & Systems, Microprocessors, Fundamentals of VLSI CAD Design
- **Mathematics & CSE** - Multivariable & Vector Calculus, Linear Algebra, Differential Equations I & II, Complex Analysis, Computer Programming & Utilisation
- **Other Courses** - Basics of Electricity & Magnetism, Quantum Physics & Application, Economics

EXTRACURRICULAR ACTIVITIES

- Successfully completed 1 year of training under National Cadet Corps (NCC) IIT Bombay
- Attended the 10 day Annual Training Camp at IIT Bombay organized by *NCC IIT Bombay* during November-December 2017 and paricipated in various sports and cultural events
- Participated in the *Annual Republic Day Parade* held at IIT Bombay on 26th Jan 2018

[2]Courses taken in Fall 2019