SABYASACHI SHIVKUMAR | EE12B135

INDIAN INSTITUTE OF TECHNOLOGY MADRAS

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EDUCATION

Program	Institution	%/CGPA	Year of completion
B.Tech in Electrical Engineering and M.Tech in Applied Mechanics with specialization in Bio-Medical Engineering	Indian Institute of Technology Madras, Chennai	8.86*	2017
XII	National Public School Rajaji Nagar, Bangalore	94.80	2012
X	Delhi Public School,Bangalore North	9.8	2010

*-After Four Semesters

THEORY COURSES

- Analog and Digital Signal Processing
- Networks and Systems
- Introduction to Machine Learning*
- Probability,Statistics and Stochastic Processes
- Control Engineering*
- Introduction to Bioinformatics and Computational Biology*
- Digital Circuits and Systems
- Computer Organization and Architecture
- Graph Theory
- Electrical And Magnetic Circuits
- Analog Circuits*
- Machine Learning(Online on Coursera)

LABORATORY COURSES

- CAD Lab(Numerical Computation)
- Digital Circuits Lab
- Microprocessors Lab*
- Electrical Machines Lab*

*- Ongoing Courses

INTERNSHIPS

- HEALTHCARE TECHNOLOGY INNOVATION CENTRE(HTIC) (MAY-JUL 2014)
  - Worked on the reduction of motion artifact from Photoplethysmogram(PPG) signals for a wearable health monitor. Generated a dynamic noise model and used Least Mean Square Adaptive filters to remove the in band noise
  - Developed a tap detection and basic gesture control algorithm for the wristwatch and tested it on real time data using Labview
  - Implemented various heart rate detection algorithms and evaluated their performance using real-time data.
  - Implemented the reconstruction and heart rate calculation in C using the ARM CMSIS library. Implemented the dynamic filter model using a novel pseudo-filtering technique
- DHVANI RESEARCH-IITM RESEARCH PARK (DEC 2013)
  - Extracted the contour points from a fluoroscent illuminated crack in an image and used ray-tracing to get the corresponding 3D points
  - Developed a curve fitting model and algorithms to determine the length and width of the crack
  - Developed a code to convert a rotation-translation matrix to view matrix used in OpenGL

Skills

- Coding in C, C++,Python and Android application development using Java.
- Numerical Computation using Matlab,Octave and Numerical Python
- Image Processing using OpenCV and Matlab.
- Web Development using HTML,CSS,Javascript etc.
- Basic Sound Processing using libsndfile and Matlab.
- Verilog, HDL and Arduino Coding

Projects

- **Image Based Augmented Reality using Opencv** (Feb-April 2013)
  - Developed an application that detects known pattern in live video feed and replaces it with another pattern.
  - Implemented rotation and scale invariant detection.
- **Air Hockey Playing Robot** (as part of Young Innovator's Program Centre for Innovation(CFI), IIT Madras) (May-August 2013)
  - Designed an air hockey playing robot. The prototype robot consisted of a two arm-four bar mechanism.
  - The image processing from the overhead camera was done using opencv and the optimum angles for the arm were determined mathematically.
  - The data was then passed through the serial stream to the Arduino Uno which controls the movement.
- **Circuit Analyser- Computer Vision Project** Ongoing - From April 2014
  - Developing a mobile application that takes in an image of a circuit, detects elements, reconstructs the circuit and solves it
  - Implementing Machine Learning algorithms for classification of circuit elements
  - Developed a circuit solver to solve circuits using Modified Nodal Analysis
- **Webcam based heart rate detection** (June 2014)
  - Acquired Photoplethysmogram(PPG) signals from finger kept on top of webcam
  - Calculated Heart rate from the acquired signals
- **Virtual Lab - Project under Professor Nitin Chandrachoodan** Ongoing - From May 2014
  - Developing a web application that constructs and simulates circuits with digital and analog ICs
  - Implemented an interactive frontend model, where the user can drag and drop the various element imitating an actual circuit as close as possible
  - Implementing transistor modeling of ICs to account for non-ideal behavior
- **Pushpin art generator** (February 2014)
  - Generates a pushpin art of a given image. Program takes the image as an input and returns a csv file containing the positions and colour of the pins.
- **Portable EEG machine (ongoing project)** Ongoing - From March 2014
  - A long term project aimed at building a portable EEG machine and using the data todevelop a brain computer interface
  - Configured a data acquisition system using ADS1298 and processing signals
- **Digit Recognition** (Mini Project as part of Machine Learning Course on Coursera) 2014 August
  - Trained a single hidden layer neural network with each pixel value of a 20X20 grayscale image taken as features
  - Built a module that takes in an image of a number, filters the image and predicts the output with 95% accuracy

International Competitions

- **Member Of Team Sahas* (Image Processing)** — Ongoing-From Nov 2013
  - Built an user interface for automatic calibration of colors to filter the received video feed
  - Worked on a Virtual Lighting System to make the lighting uniform
  - Developing artificial intelligence strategies to make robots play soccer effectively

* Sahas is a 15-member team representing IIT Madras in Mirosot,an international Robot Soccer contest to be held in Beijing organised by FIRA.

Scholastic Achievments

- Ranked 4203 in IITJEE 2012 examination(Top 1% of the country)
- Nominated to receive INSPIRE Scholarship for top 0.1 percentile in AISSCE and school topper in Computer Science subject in class 12th AISSCE
- Having a CGPA of 10 in all Core Lab Courses
- Centre Topper(Team) in MIMAMSA 2014 (Science Quiz by IISER Pune)

Positions of Responsibility

- **Student-in-charge of Electrical Engineering Assosiation** — May 2014-Present
  - Electrical Engineering Assosiation is a student body that organizes various activities like Hackathon, Webinars and Lecture series for Electrical Engineering students with faculty support
- **Technical Affairs Volunteer Narmada Hostel** (2013)
- **Cube Open Volunteer Shaastra 2013 and Newsletter Volunteer Saarang 2013** (2013)
- **Editor Chennai36, The Alumni Blog of IIT Madras** (Jan 2014 onwards)
- **Exhibitions coordinator (Evolve) Shaastra 2014** (2014)

Co-Curricular and Extra-Curricular Activities

- Winner of Puzzle Champ in Shaastra 2013
- Winner of Annual Electrical Engineering Hackathon 2014 - Developed a user interface for circuit solver
- Winner of Puzzle Champ in Shaastra 2014
- Music
  - Playing the keyboard for 10 years with 3 years of formal training.
  - Learnt Hindustani music for 2 years. Was part of the school choir.
- Cooking-Cook a variety of cuisines and working on a cookbook
- NSS volunteer as a part of English For Communication group