

Milind Kumar Vaddiraju

Curriculum Vitae

ee16b025@smail.iitm.ac.in | milindkumarvaddiraju@gmail.com

EDUCATION			
Program	Institution	%/CGPA	Completion
B.Tech: Electrical Engg.	Indian Institute of Technology Madras	9.85/10	2020
Class XII (State)	V.V.S Sardar Patel P.U. College, Bangalore	97.6%	2016
Class X (CBSE)	Vidyaniketan Public School, Bangalore	10/10	2014
SCHOLASTIC ACHIEVEMENTS			

- Awarded the **S. N. Bose scholarship (top 1.5% in India)** in 2019 to pursue a research internship in the United States.
- Selected for the **Caltech LIGO SURF Program** (1 of 4 from India) in 2019 to pursue research at Caltech.
- **Department rank 2 out of 127 students** in the Department of Electrical Engineering at the end of 8 semesters.
- Awarded the **Sri S Subramanian Prize** in 2017 by IITM for the highest CGPA among all 1st year students of the batch.
- Awarded the **Sarasvidya Scholarship** in 2017 for the highest CGPA among all students after the first year.
- Awarded the **O.P. Jindal Engineering and Management Scholarship** in **2017** and **2018**.
- Awarded **K.V.P.Y. fellowship** in 2014. Ranked **189** out of **1.3 Million** contenders in **JEE Advanced Examination**.

COURSEWORK	
<ul style="list-style-type: none">• Digital Signal Processing• Applied Linear Algebra for Electrical Engineers• Probability Foundations for Electrical Engineers• Nonlinear Optimisation: Theory and Algorithms• Deep Learning	<ul style="list-style-type: none">• Principles of Neuroscience• Communication Systems• Digital Communication Systems• Introduction to Wireless and Cellular Communication• Advanced Topics in Communications
PROJECTS AND INTERSHIPS	

Bachelor's Thesis

November 2019 - Present

Indigenous 5G Testbed, IIT Madras

Advisor: Prof. Radhakrishna Ganti

- Designed and implemented a bits to bits communication system according to 5G NR specifications in MATLAB.
- Evaluated the performance of multiple channel estimation and equalization algorithms in the single user, SISO case for AWGN and multipath fading channel.
- Presented the obtained results in a talk titled *"Receiver design and implementation for the Indigenous 5G Testbed"*.
- Currently simulating a receiver for multi-user MIMO in the case of a multipath fading channel.

Laser Beam Position Tracking for LIGO Interferometers

May 2019 - July 2019

40 Meter Prototype Interferometer Laboratory, Caltech

[Technical Report](#)

Advisor: Prof. Rana Adhikari

- Assisted in the installation of a Gigabit Ethernet camera at the viewport of the MC2 optic of the mode cleaner cavity of the 40m interferometer. Developed software using pypylon to interact with the installed camera.
- Evaluated the performance and suitability of image processing algorithms employing thresholding, contour detection and centroid calculation for tracking position of laser beam spot on the suspended mirror.
- Used convolutional and LSTM networks for laser beam tracking and successfully detected motion of amplitude 3mm with maximum error under 20%.
- Presented this work in a talk titled *"Laser beam position tracking for LIGO interferometers"* at Caltech.

Source Separation

Speech Lab, IIT Madras

Dec 2018 - May 2019

[Technical Report](#)

[Github Repository](#)

Advisor: Prof. C. S. Ramalingam

- Implemented multiple algorithms for Non-negative Matrix Factorization (NMF) in Python and evaluated their performance in comparison to the implementations in scikit-learn library.
- Implemented the paper “*Monoaural Sound Source Separation by Nonnegative Matrix Factorization With Temporal Continuity and Sparseness Criteria*” and compared the performance of the proposed algorithm with that of plain NMF. Created a [YouTube tutorial](#) for the same.
- Experimented extensively to determine the effect of temporal continuity and sparseness terms on the SNR.
- Compared the performance of Hann, Hamming, Blackman-Harris and Chebyshev windows on the separation task.

Music Mood Annotation

Fraunhofer IDMT

June - August 2018

[Technical Report](#)

Advisor: Prof. Karlheinz Brandenburg

- Built a deep learning system for automatic tagging of music with both discrete emotional labels and dimensional valence-arousal values for music classification and retrieval from large datasets.
- Compiled a database of 80 hours of music with valence-arousal ratings equivalent to 28 emotion labels.
- Used mel spectrograms and a musically motivated frequency domain representation for the audio.
- Evaluated the performance of 3 CNN architectures for mood labeling based on MIREX 2016 submissions and obtained a classification accuracy of 70% on the high and low valence and arousal classification tasks.

Half-duplex System Design using USRP N321

Indigenous 5G Testbed, IIT Madras

December 2019 - May 2020

Advisor: Prof. Radhakrishna Ganti

- Set up and designed a user manual for USRP N321 at the Indigenous 5G Testbed.
- Implemented a transmitter and receiver operating at 122.88 MSPS on the USRP using GNU Radio.
- Tested functionality by transmitting and receiving 1 frame of 5G NR data using the USRP and Keysight VSA and VSG.

MIMO Channel Estimation using PDSCH DMRS

Course Project, IIT Madras

April 2020 - June 2020

Advisor: Prof. Radhakrishna Ganti

[Github Repository](#)

- Generated PDSCH DMRS symbols according to TS 38.211 using MATLAB.
- Implemented channel estimation algorithms for the single user MIMO case.
- Studied the effect of SNR on channel estimation in the case of a multipath fading channel.

EXTRACURRICULAR ACTIVITIES

Student Mentor, CoEdu India, 2020

- Organized classes for schoolchildren from class 8 to class 12 to fill in for lack of in person teaching due to Covid-19.
- Designed accessible content to introduce schoolchildren to AI and Deep Learning and their applications.

Head, Lectures and Demonstrations team, Evolve, Shaastra 2019 (Technical Festival, IITM)

- Headed a team of 15 to organize IIT Madras’ annual lecture series with a budget of over 7 Lakh INR.
- Organized 15 lectures including those of stalwarts such as **Viswanathan Anand, Dr. Venkatraman Ramakrishnan and Dr. Juergen Schmidhuber**.
- Organized a blockchain themed TEDx style event for professionals across the city of Chennai.

Coordinator, Lectures and Demonstrations team, Evolve, Shaastra 2018 (Technical Festival, IITM)

- Organized **13 lectures** in a **team of 10** catering to a live audience of **over 3600** and over **12000** on social media.
- Personally coordinated lectures of **Prof. Karlheinz Brandenburg, Dr. Geoffrey Hinton, Dr. Ada Yonath and Dr. Vilayanur Ramachandran**.
- Conducted Shaastra’s **first TEDx style event, ShaastraX**, catering to over **400 schoolchildren** from all over Chennai.