



Dear Friends,

Greetings from IIT Bombay!

Hope you are healthy and safe.

Nature seems to have spared us her wallop this time - the cyclone has side-stepped the city and passed on. Except for some branches falling and an odd tree getting uprooted here and there, the campus has been mostly unaffected. Current scenario in the Institute is unquestionably not one of an archetypical June. The hardest hit were the final year students who were cooling their heels in the hope of being able to spend their last few months in the Institute. The Institute is using its best endeavors to cope up with the unprecedented situation. I take this opportunity then, to update you of the current situation on the campus as well as to showcase some of the most brilliant pieces of research being conducted in the Institute.

A committee chaired by Prof. A. K Suresh (Deputy Director AIA) has been set up to look into current circumstances. They are sparing no effort to come up with sustainable solutions in various areas ranging from required infrastructure change to academics. After much effort and help from Prof. Wangikar as well as the Deshmukh couple (Mrs. Deshmukh is an Institute employee, and Mr. Deshmukh works with the BMC), our hospital has now obtained permission to start an 18-bed isolation ward (in which mild cases can be treated as per ICMR guidelines), plus a 6-bed facility for suspected COVID cases. This increases our ability to provide immediate attention to Covid-19 cases on campus. The campus has now seen a total of 5 cases among its residents and (permanent and contractual) staff. Two of them have recovered, two are on their way to recovery, and there has been one unfortunate death.

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Faculty Research at IIT Bombay

Space Time, Supercomputer at IIT Bombay will open up many possibilities

Dr. Raghavan B. Sunoj, Professor, Department of Chemistry, IIT Bombay was bestowed with the 2019 Shanti Swarup Bhatnagar Prize by Council of Scientific and Industrial Research (CSIR). This award is one of the highest research honors. The award recognizes Prof. Sunoj's outstanding contributions in providing molecular-level insights on organic reaction mechanisms and how catalysis happens. We take immense pleasure to extend our heartiest congratulations to him for this achievement.

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Student Research activities at IIT Bombay



Designing Neural Networks with scalable deep learning & lossless model compression

Name: Sumit Jain | **Guide:** Balamurugan Palaniappan |
Department: Industrial Engineering & Operations Research (M. Tech.)

As we seek to deploy machine learning systems not only on virtual domains, but also in real systems, it becomes critical that we examine not only whether the systems don't simply work "most of the time", but which are truly robust and reliable.

Robustness to such perturbations is imperative for deployable machine learning in real systems. Imagine a self-driving car crashing into another car because it ignores a stop sign. Someone places a picture over the sign, which looks like dirt for a human but can be "read" as parking prohibited by a self-driving car's computer vision system.

My thesis concentrates on designing neural networks that are robust to these perturbations and are not easily fooled.

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Extract Pitch Contour



VaPar Synth



Violin Melody

VaPar Synth - A Variational Parametric Model for Audio Synthesis

Name: Krishna Subramani | **Guide:** Prof. Preeti Rao |
Department: Electrical Engineering (B. Tech.)

When you hear about Audio or Music Synthesis, one of the classic synthesizers by Yamaha or Casio must be coming to mind. Indeed, audio synthesis is 'synthesizing' music by controlling parameters like the pitch (the notes being played), the loudness and the timbre (the instrument being played). Classical methods of audio synthesis use Physical Modeling. These setup a physical system to model the instrument physics involved in sound generation.

Recently, with the advent of data-driven statistical modeling, and the availability of abundant computing power with GPUs, researchers have begun using Deep Learning for audio synthesis. These models primarily rely on the ability of neural networks to extract musically relevant information from tons of available recordings.

As opposed to modeling the complicated instrument physics, neural networks can implicitly learn the complex factors underlying the sound. Thus, natural sounds can be generated by the model when trained on a dataset consisting of isolated musical notes being played with different styles and loudness. Specific challenges in the context of Indian music are the continuous nature of musical attributes. For example, the Violin in Carnatic Music from South India produces melodies with continuously varying pitch and loudness dynamics.

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Innovations at IIT Bombay for **COVID-19**



In response to the COVID-19 global pandemic emergencies, which has generated an outpouring of concern and financial support from IIT Bombay alumni community, the Institute has created several options for people to help address this public health crisis. It includes providing equipment, space, expertise and other resources to the health care facilities. It will also support the work of manufacturing the PPE (Personal Protective Equipment). Contributions also help in other aspects of fighting the pandemic like vaccine development, portable ventilators, AI solutions, and improved protective equipment.

We would greatly appreciate if you could contribute for this cause and help us go the extra mile towards a safer world.

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