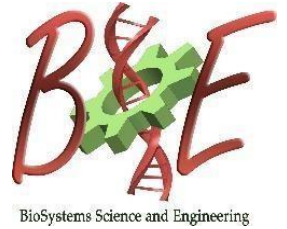




**Indian Institute of Science**  
**Centre for BioSystems Science and Engineering**  
**BSSE Seminar**



29 December 2020, 04:00 p.m., Virtual

**Moving beyond the canonical dichotomy of drivers and passengers in cancer**

**Dr. Sushant Kumar,**  
Associate Research Scientist,  
Yale University

**About the speaker:**

Dr. Sushant Kumar received his Bachelor's in Bioinformatics from the Vellore Institute of Technology. Subsequently, he completed his Ph.D. in Bioinformatics and Genomics from the Pennsylvania State University under the guidance of Dr. William Noid, where he studied coupled folding and binding using biomolecular modeling and coarse-grained simulations. After completing his Ph.D., Sushant worked in the lab of Professor Mark Gerstein at Yale University as a Post-Doctoral Associate and subsequently as Associate Research Scientist. In the Gerstein lab, Sushant has developed various integrative methods to analyze large-scale genomic data for various diseases, including Pan-Cancer Analysis of Whole Genome Project, Genome sequencing Program, Center for Mendelian Genetics, and Human Genome Structural Variation Projects.

**Abstract:**

I will present our work on extending the canonical dichotomy of classifying cancer mutations as drivers and passengers. In this context, I will first present our work on identifying cancer drivers by integrating protein structure, protein motion, and cancer genomics data. Following this, I will present our work on the characterization of the non-driver ("passenger") mutational landscape in thousands of cancer genomes. Here, we integrated genomic annotations and predicted functional impact scores to quantify the overall burdening of various elements in cancer genomes. We also showed how the overall functional burdening of different genomic elements correlates with patient survival time and tumor clonality. Finally, we observed statistical signals consistent with the notion that aggregated subsets of passenger variants - particularly those we predict to be functionally impactful- might confer weak selective effects.