We are happy to announce the next lecture of the Rajaraman Lecture Series in the Department of Computer Science and Engineering. Our speakers in this series are considered masters of their domains in computer science — outstanding and passionate researchers who also have the ability to explain difficult concepts in an easy, engaging manner.

The aim of each lecture will be to address one or more of the following aspects of research in computer science.

(1) An elegant solution to a research problem

(2) The impact of research in the real world

(3) Recent research trends in a specific domain of computer science

The next lecture in this series will focus on AI for Software Engineering. The speaker will be Dr. Satish Chandra from Meta.

It will be held at 5:15 PM on Thursday, 5th November. The venue will be RM101.

Below are the title & abstract of the lecture, along with a brief bio of the speaker.

Title: The Mathematics of Prompting: From Conditional Probability to AI Coding Agents

Abstract: For the better part of a century, programming was considered a quintessentially human act of creation, a pursuit demanding intellectual rigor coupled with a sense of aesthetics. This has changed precipitously over the last few years. Today, substantial amounts of software can be written by simply "prompting" an AI coding agent, making programming increasingly accessible to everyone.

How can a few words of instruction cause a machine to generate, understand, and even repair computer programs?

In this talk, I will trace the development of this remarkable technology from first principles, assuming only freshman-level mathematics. We will explore the now-ubiquitous large language models (LLMs), the surprising power of prompting, and the

coding agents that purport to be a programmer's willing and sometimes telepathic assistants. I will also outline some of the open technical challenges that researchers are working to address.

Brief Bio:

Dr. Satish Chandra is a research scientist at Meta, where he applies machine learning techniques to improve developer productivity.

His work has spanned many areas of programming languages and software engineering, including program analysis, type systems, software synthesis, bug finding and repair, software testing, and, of course, application of AI to software development. His research has been widely published in leading conferences in his field. He obtained a PhD from the University of Wisconsin-Madison and a B.Tech from the Indian Institute of Technology Kanpur, both in computer science. He is an ACM Fellow and a Distinguished Alumnus of IIT Kanpur.

If you've ever wondered whether "prompting" is magic or mathematics, this talk is for you.