

## ICTS Seminar (Bangalore Probability Seminar)

**Title** : Almost-Optimal Best Restless Markov Arm Identification with Fixed Confidence

**Speaker** : P. N. Karthik (National University of Singapore)

**Date** : Monday, 14<sup>th</sup> August, 2023

**Time** : 02:00 PM to 03:00 PM (IST)

**Abstract** : In this talk, I will describe some recent results on the problem of identifying the best arm in a restless multi-armed bandit with fixed confidence. Formally, the setting comprises a multi-armed bandit with finitely many arms, in which each arm is a homogenous and discrete-time Markov chain taking values in a common, finite state space. The state transitions on any Markov chain are governed by an ergodic transition probability matrix (TPM) that is parameterised by an unknown, real-valued parameter. Given a reward function defined on the common state space of the arms, the best arm is the arm with the largest stationary reward. The goal is to find the best arm by minimising the expected stopping time, subject to an upper bound on the error probability (fixed-confidence regime). For this problem, our results are in the form of (a) an asymptotic lower bound on the growth rate of the expected stopping time is, where the asymptotics is as the error probability vanishes, and (b) a policy for best arm identification whose expected stopping time satisfies an asymptotic growth rate that matches with the lower bound and is hence asymptotically optimal. We use results from best policy identification in MDPs to establish asymptotic optimality. Prior works deal with independent observations from the arms, rested Markov arms, and restless Markov arms with known arm TPMs. Our work is the first to study best arm identification in restless bandits with unknown arm TPMs.

This is joint work with Vincent Tan (NUS), Ali Tajer (RPI), and Arpan Mukherjee (RPI).

**Venue** : **Offline:** Emmy Noether Seminar Room (ICTS)

**Online:** Please click the below link to join the seminar.

<https://icts-res-in.zoom.us/j/83701102480?pwd=eHpjUHJiT3BYRXlnb2ErK09rWXBWQT09>

Meeting ID: 837 0110 2480

Passcode: 141415