PMRF-ISSS Teaching Programme

Prime Minister Research Fellowship students' teaching requirement facilitated by the Institute of Smart Structures and Systems

Module PMRF-ISSS089/2024

Modulation Techniques for High-Mobility Communications in 6G and Beyond

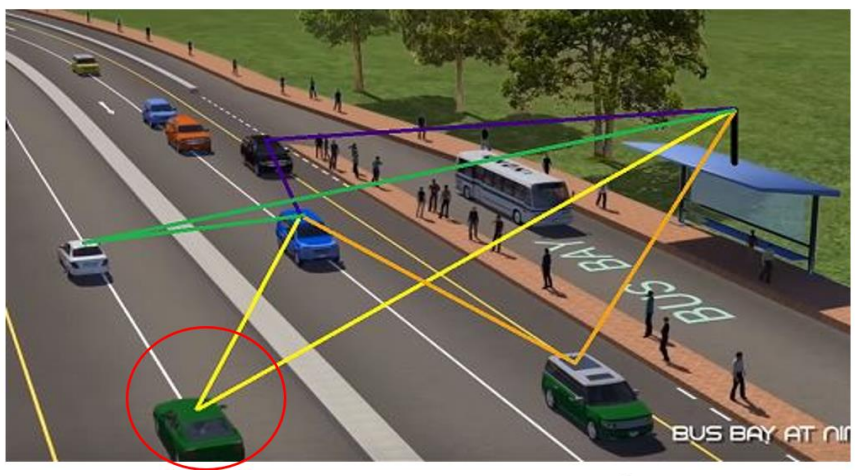
Name of the PMRF student

Niladri Halder, IISc Bangalore

Required background of the students taught

Electronics and Communications Engineering, Telecommunication Engineering

time $t = t_0$



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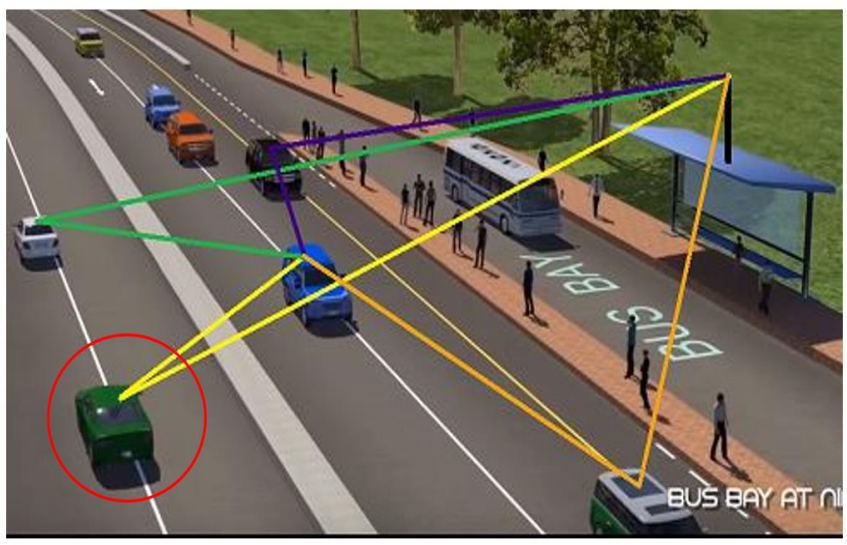

Source: eecs webpage, IISc

Details of the content of the module

1. Introduction: High-mobility wireless channels (HMWC), Modulations for HMWC

2. Review of OFDM: Basics of OFDM, OFDM in HMWC.

3. Delay-Doppler (DD) communication: Channel representations, input-output relations for OTFS modulation

4. Application of the Zak transform: Definition and properties , delay-Doppler basis functions, The discrete Zak transform (DZT), DD communications via the DZT

5. Signal detection methods: 1-tap equalizer, linear minimum mean-square error detection, message-passing detection, maximum-ratio combining detection, performance and complexity

6. Channel estimation (CE) methods: Embedded pilot-based CE in DD domain, CE in time domain

7. OTFS for MIMO and multi-user systems: MIMO OTFS system model, signal detection

8. Other related research problems

Schedule of the module

Start date: June 15, 2024

End date: August 18, 2024 (Tentative)

Class timing: Saturday, Sunday- 5 PM-8 PM

Recorded lectures will be uploaded regularly.

Total lecture hours: 60 hours

Meeting link : Will be shared later

Link

Contact email ID: isss.forum@gmail.com

Registration link: here

https://forms.gle/x36nipxkbN32ECiy7