

# Wireless Communication and Networks Lab (WCN)

## Overview: About WCN

The Wireless Communication and Networks Lab was established by the Department of Electronics and Communication Engineering to conduct research in Wireless Communications and Networks, as well as to serve as an academic laboratory for conducting experiments and implementing Mini/Major projects. This lab is equipped with various network simulators and computing facilities to carry-out research in the field of Advanced Wireless Communication, 5G, Internet of Things (IoT), Wireless Sensor Network (WSN), Optical Communication, Underwater Sensor Network, Mobile Ad-hoc Network (MANET), Computer Networks and Data Communication Networks and TCP/IP protocols. In addition to facilitating Ph.D./M.Tech./B.Tech. research, the lab is also used to conduct experiments for undergraduate and post graduate students (B.Tech. and M.Tech.) using MATLAB, NS-3, OMNET++ as well as various hardware trainer kits for 'Wireless and Mobile Communication' and 'Data Communication & Networking'.

**Faculty-in-Charge:** Dr. Pathipati Srihari and Dr. Prabu K

**Lab-in-charge:** Mr. Vishwanath Pratap Singh

## Network Simulation and Computing Facilities

Work-stations/Desktop with following Simulation tools and Network Simulators with Windows / Linux OS environment:

- MATLAB
- NS2
- NS3
- OMNeT++
- SSFNet
- J-Sim

## Some Experiments for M. Tech. Students

1. **Experiments using CST Microwave Studio (Demonstration Experiments)**
  - Design and analyse a single band rectangular patch antenna using microstrip line feeding technique.
  - Design and analyse a Metamaterial Absorber
  - Design and analyse a Microwave Diplexer
  - Design and analyse a Slotted antenna that provides circular polarization and has multiband operation.
2. **Simulation Experiments (Using Scilab/Matlab/Simulink)**
  - BER performance of M-ary PSK system
  - BER performance of M-ary QAM system
  - BER performance of OFDM system
  - BER performance of Multiple Input Multiple Output (MIMO) System
  - BER performance of MIMO-OFDM system.
3. **Demonstration of Experiments**

- Fabrication and demonstration of a single band rectangular patch antenna using microstrip line feeding technique.
- Video Demonstration through video an underwater communications practical set up.
- Video Demonstration of a FSO system using Light Pointe FSO Transceiver practical set up.

#### **4. Experiments using C / NS2/3 / MATLAB**

- Error detection/correction using Hamming code using C
- Implementation of link state routing algorithm using C
- Implementation of distance vector routing algorithm using C
- Implementation of Dijkstra's routing algorithm using C
- Implementation of Leaky Bucket Algorithm using C
- Study of network simulator (ns2) and simulation.
  - Sample wired simulation using ns2
  - Simulate the transmission of ping messages over a network topology consisting of 6 nodes and find the number of packets dropped due to congestion.
  - Simulation of ethernet LAN with TCL script and simulate using ns2.
  - Simulation of a Wireless Network using ns2
  - Implement and study the performance of GSM or CDMA on ns2/ns3 (using MAC layer ns2/ns3 or equivalent environment).

#### **Hardware Communication Systems and Trainer Kits**

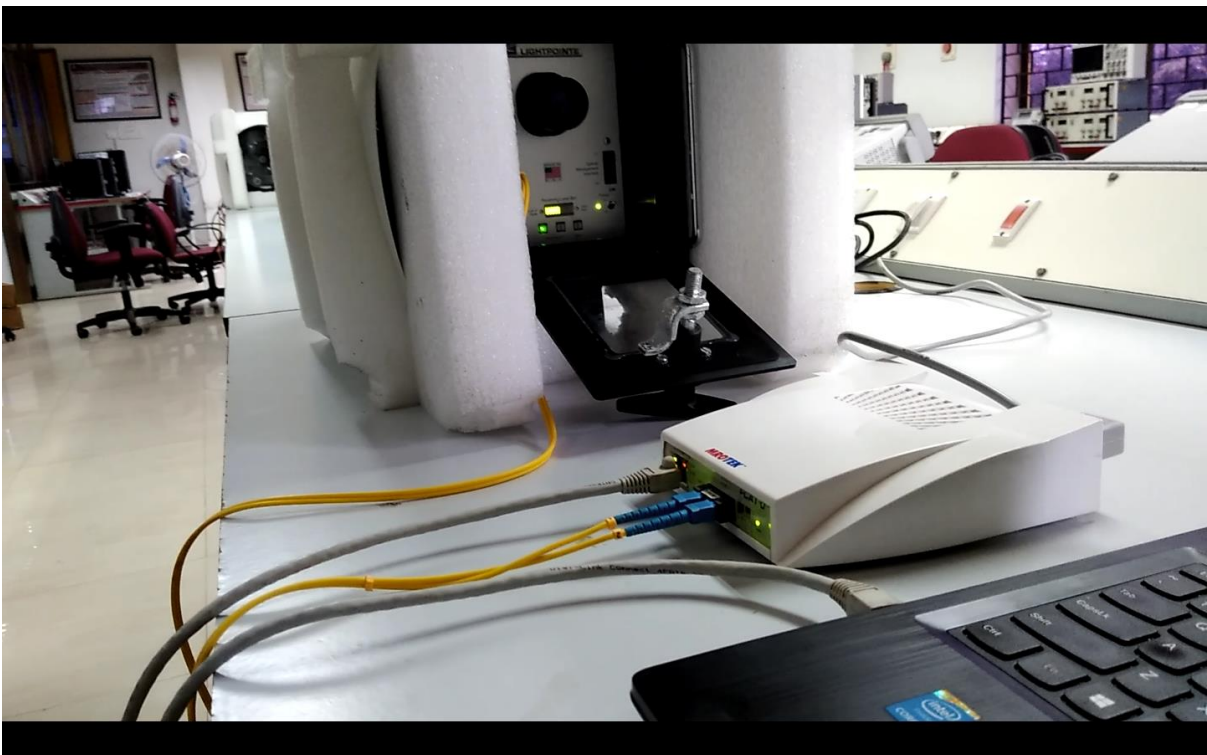
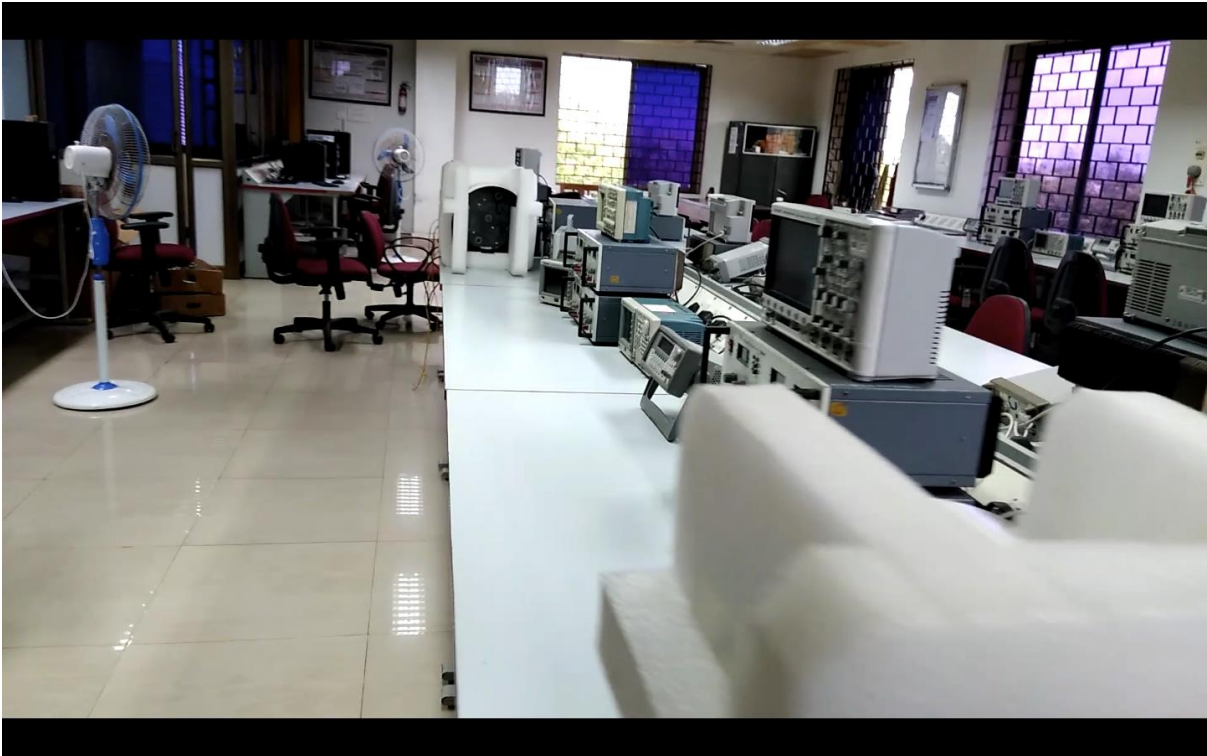
- Light Runner Kit
- SDR Kits
- Microwave Test Benches

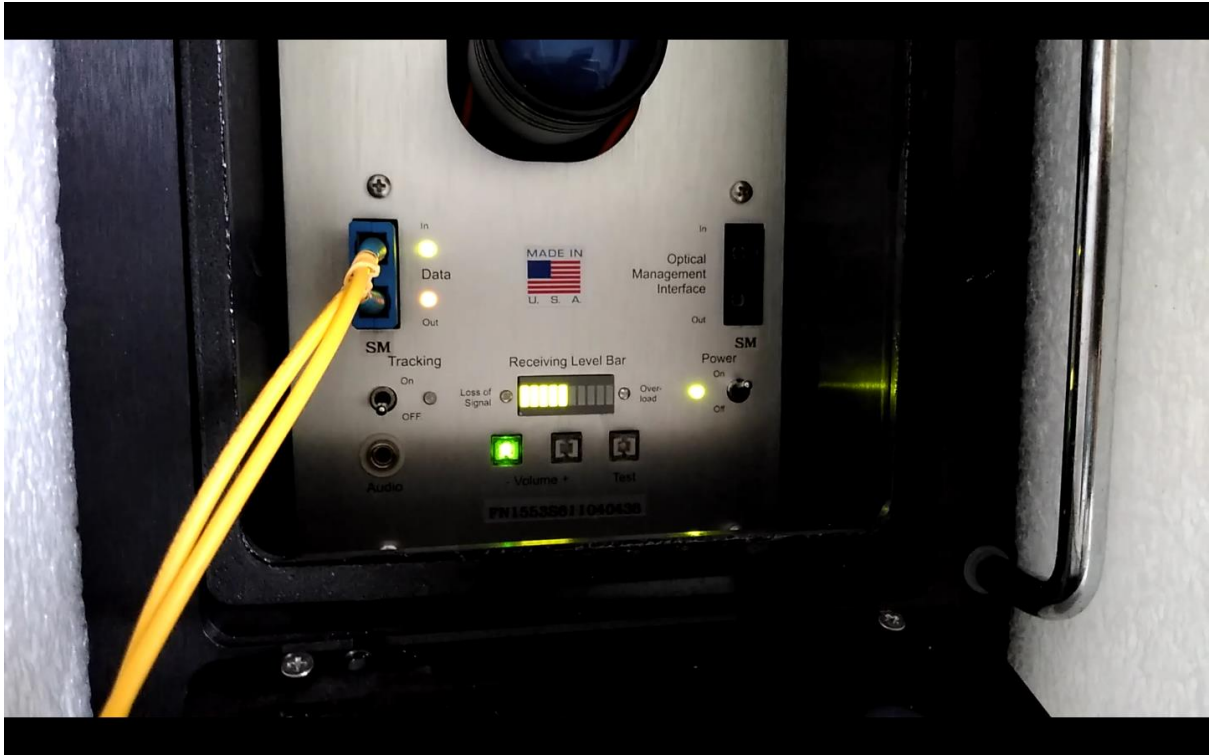
#### **The Major Research Areas**

- 5G and 5GB
- IoT
- Software Defined Radio (SDR)
- IRS
- Wireless Optical Communication (FSO, VLC, UWOC)
- Radar
- ML/DL for Communication
- Error Control Coding Techniques

#### **Photos**

**FSO Setup for Demo:**





**UWOC Setup Demo:**

