



भारतीय प्रौद्योगिकी संस्थान दिल्ली  
Indian Institute of Technology Delhi

# STUDENT PROFILES

**CENTRE FOR APPLIED RESEARCH  
IN ELECTRONICS(CARE),  
IIT DELHI**

**M.TECH IN**

**RADIO FREQUENCY DESIGN AND  
TECHNOLOGY(RFDT)**

**SESSION 2019-20**

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## Areas of Interest

- Digital VLSI Design
- Analog IC Design
- CMOS RF IC Design
- Hardware Modelling using Verilog

## Projects:

- **M.Tech Project**- Low latency orientation estimation algorithms for VR applications.
- Design of 8-bit booth multiplier using cadence virtuoso.
- IoT project- Impact Detection during Logistics in E-commerce.
- Generation of real time accurate down-converted signal by mixing an externally generated passband signal with local oscillator signal synthesized in DSP.
- Design, implementation and fabrication of LPF, branched line coupler and Wilkinson Power divider.
- Design of LNA using cadence virtuoso.

## Tools/Software:

- EDA Tool- Cadence Virtuoso
- Hardware Modelling- Verilog
- MATLAB
- Embedded C
- C Programming
- Serenade
- IntelliCAD
- Assembly language for TMS320C5510 DSP

# Manish Kumar Singh

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## Areas of Interest

- CMOS RFIC Design
- MOS VLSI and Analog IC Design
- Semiconductor Memory Design
- Hardware modelling using Verilog
- CAD of RF and Microwave Circuits
- Microwave Active Circuits
- Antenna Design and Measurements

## Projects:

- **M.Tech Project-** GAN Based Power Amplifier @28GHz.
- Voltage Controlled Oscillator-Design Specifications of VCO- 1176.45 MHz, 1575.42, MHz, and 2492.028 MHz using CMOS 180nm Technology.
- 10W power amplifier design at 1.2 GHz using CGH40010.
- Design, fabrication and analysis of RF devices (Wilkinson Power divider, 3dB Branch Line Coupler and RF Low Pass Filter).
- Generation of Real-time Down-converted signal by mixing an externally generated RF signal with LO signal synthesized using TMS320C55x DSP Kit.
- Scattering of EM-wave from 3D Objects.

## Tools/Software:

- Cadence Virtuoso
- ADS & Serenade
- Verilog
- CST Microwave Studio
- MATLAB
- Assembly language for TMS320C5510 DSP

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## Areas of Interest

- Machine Learning and Deep Learning
- Statistical Signal Processing
- Architectures and Algorithms of DSP
- Human/Machine Speech Communication
- Digital VLSI Design
- Hardware Modeling using Verilog

## Projects:

- **M.Tech Project**- Deep Learning Architecture for Spatial Environment and Motion Activity Classification.
- Real-time Background Subtraction and Face Recognition using Machine Learning techniques.
- Synthesis of LO signal and Real-time Implementation of Mixer using TMS320C55x DSP processor.
- IOT based Paralysis Patient Health Care system using STEVAL MKI196V3 and STSW-MKI109W.

## Tools/Software:

- MATLAB
- C
- C++
- Python
- Verilog
- EDA Tool - Cadence Virtuoso
- Assembly language for TMS320C5510 DSP



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## Areas of Interest

- MOS VLSI & Analog IC Design
- Semiconductor Memory Design
- CMOS RFIC Design
- Antenna Design & Measurements
- Hardware Modelling using Verilog
- RF & Microwave Active and Passive Circuits

## Projects:

- **M.Tech Project**- Design Considerations and Implementation of Passive PCB SIW structures like Filters, Couplers, Mixers, Phase Shifter & Diplexer in KA Band & V Band on Tachyon 100G and Megtron6.
- Design of Voltage Controlled Oscillator @ 1176.45 MHz, 1575.42, MHz, and 2492.028 MHz using CMOS 180nm Technology.
- Design and Fabrication of Low Noise Amplifier @ 3 GHz using NE3512S02 Hetro Junction FET.
- Design, fabrication and analysis of RF devices (Wilkinson Power divider, 3dB Branch Line Coupler and RF Low Pass Filter).
- Generation of Real-time Down-converted signal by mixing an externally generated RF signal with LO signal synthesized using TMS320C55x DSP Kit.
- Scattering of EM-wave from 3D Objects.

## Tools/Software:

- Cadence Virtuoso
- Advanced Design System
- Verilog
- CST Microwave Studio
- MATLAB
- KiCAD
- Sernade & Intellicad
- Assembly language for TMS320C55x DSP Kit

# Nitin Bhardwaj

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## Areas of Interest

- Digital VLSI Design
- Analog IC Design
- CMOS RF IC Design
- MEMS Design, Integration & Packaging
- Semiconductor Devices and Physics

## Projects:

- **M.Tech Project**- Simulation of MEMS based infrared BOLOMETER using COMSOL.
- Design of VCO using cadence virtuoso.
- Design of 8-bit booth multiplier using cadence virtuoso.
- Generation of real time accurate down-converted signal by mixing an externally generated passband signal with local oscillator signal synthesized in DSP.

## Tools/Software:

- EDA Tool- Cadence Virtuoso
- Hardware Modelling- Verilog
- COMSOL multiphysics
- C Programming
- Assembly Language for TMS320C5510 DSP
- Serenade
- IntelliCAD



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## Areas of Interest

- Spectral Analysis of Signals and DOA Estimation
- Statistical Signal Processing
- MOS VLSI Design and Digital IC Design
- Hardware modelling using Verilog
- VLSI Design and Fabrication
- CAD of RF and Microwave Circuits

## Projects:

- **M.Tech Project**- Doppler Radar based Vital Sign Detection.
- IoT Project- Path Retracing by Counting the Change in Direction of Steps using AlgoBuilder and STM-32 Nucleo-64 board and X Nucleo board (ST Microelectronics kits).
- Design and Fabrication of RF Microwave Devices (Branch Line Coupler, Power Divider, Low Pass Filter).
- Generation of real time accurate down-converted signal by mixing an externally generated passband signal with local oscillator signal synthesized in DSP.

## Tools/Software:

- EDA Tool- Cadence Virtuoso
- Hardware Modelling- Verilog
- MATLAB
- C Programming
- Serenade Microwave Simulation Tool
- IntelliCAD
- Assembly Language for TMS320C5510 DSP

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## Areas of Interest

- Digital VLSI Design (RTL, Physical Design)
- Analog/Mixed Signal IC Design
- Semiconductor Memory Design
- CMOS RF IC Design
- Front End and Back End VLSI Design
- Hardware modelling using Verilog
- CAD of RF and Microwave Circuits (Passive)
- Wireless Communication

## Projects:

- **M.Tech Project**- 3D image reconstruction/processing from acoustic.
- Digital VLSI Design- Design and Layout of digital circuits consisting of sequential and combinational circuits from schematic to MOS Transistor layout level (CMOS 65nm Technology).
- Voltage Controlled Oscillator (VCO)- Design Specifications of VCO-phase noise at 100 kHz offset < 80 dBc/Hz, Oscillation frequencies 1.117645 GHz, 1.57442GHz, 2.49202GHz (CMOS 180nm Technology).
- Phase Locked Loop (PLL)- Design Specifications of PLL-steps of 2MHz reference at 26MHz.
- Design, fabrication and analysis of RF devices (Wilkinson Power divider, 3dB Branch Line Coupler and RF Low Pass Filter).

## Tools/Software:

- EDA Tool- Cadence Virtuoso
- Hardware Modelling- Xilinx ISE (Verilog)
- MATLAB
- C Programming
- Assembly language for TMS320C5510 DSP
- ADS and Serenade
- HFSS



# Rishi Vij

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## Areas of Interest

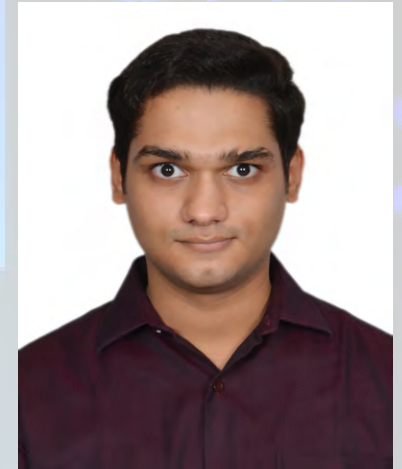
- Machine Learning and Deep Learning
- Human/Machine Speech Communication
- Statistical Signal Processing
- Architectures and Algorithm of DSP
- Digital VLSI Design

## Projects:

- M.Tech Project**- Speech Enhancement and Voice Activity Detection using Machine Learning Techniques.
- Real-Time Background Subtraction Using Gaussian Mixture Model.
- Face Recognition Using Eigenfaces and Fisherfaces.
- Implementation of mixer on real time generated sinusoidal wave using TI DSP Kit.
- IoT Project- Dance Movement Classification (Arm Wave) using MK109V3, MK196V1.

## Tools/Software:

- MATLAB
- C and Python Programming
- EDA Tool- Cadence Virtuoso
- Hardware Modelling- Verilog
- Assembly language for TMS320C5510 DSP
- ADS and Serenade



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## Areas of Interest

- MOS VLSI Design and Digital IC design
- Analog IC Design
- CMOS RFIC
- Semiconductor Memory Design
- RF semiconductor devices and physics
- Hardware modelling using Verilog
- CAD of RF and Microwave devices
- Fabrication techniques of RF and solid state devices

## Projects:

- **M.Tech Project-** InP Nanowire based Terahertz Detector.
- Design of 8 bit low power ALU using Wallace Tree Multiplier on Virtuoso.
- Phase Locked Loop(PLL)- High Frequency Synthesizer PLL circuit using Virtuoso.
- Generation of Real time accurate down converted signal by mixing an externally generated passband signal with local oscillator signal synthesized in DSP.
- Design, fabrication and analysis of RF devices (Wilkinson Power divider, 3dB Branch Line Coupler and RF Low Pass Filter).

## Tools/Software:

- EDA Tool- Cadence Virtuoso
- SENTAURUS TCAD
- FDTD
- Xilinx ISE
- Assembly language for TMS320C5510 DSP
- Serenade



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## Areas of Interest

- Digital and Analog IC Design
- VLSI Design and Fabrication
- Semiconductor Memory Design
- RF Semiconductor Devices and Physics
- CMOS RF IC Design
- Hardware modelling using Verilog
- MEMS Design, Integration & Packaging
- Microwave Passive Circuits

## Projects:

- **M.Tech Project-** MEMS switch design for RF signal manipulation on CPW line.
- Design of 8 bit low Power ALU using Wallace Tree Multiplier on Cadence Virtuoso.
- Phase Locked Loop(PLL)- High Frequency synthesizer PLL circuit design @ 1176.45 MHz, 1575.42, MHz, and 2492.028 MHz using CMOS 180nm Technology.
- Design, fabrication and analysis of RF devices (Wilkinson Power divider, 3dB Branch Line Coupler and RF Low Pass Filter).
- Generation of real time accurate down-converted signal by mixing an externally generated passband signal with local oscillator signal synthesized in DSP.

## Tools/Software:

- EDA Tool- Cadence Virtuoso
- Xilinx ISE- Verilog
- HFSS
- COMSOL Multi physics
- Assembly Language for TMS320C5510 DSP
- Serenade Microwave Simulation Tools
- IntelliCAD

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## Areas of Interest

- CMOS RFIC Design
- MOS VLSI
- Hardware modelling using VHDL
- CAD of RF and Microwave Circuits
- Microwave Active Circuits
- Antenna Design and Measurements

## Projects:

- **M.Tech Project**- GaAs Based Load Modulated Balanced Power Amplifier @28GHz for 5G technology.
- Voltage Controlled Oscillator -CMOS 180nm Technology.
- MATLAB implementation of surface scattering of EM wave.
- MIC Design of Passive RF devices: Power dividers, Branch Line Couplers and RF Filter.
- MIC Design of Active RF devices : Low Noise Amplifier@ 2.4Ghz, Power Amplifier @1.2GHz.
- Implementation of Real-time mixer in C language using TMS320C55x DSP Kit.

## Tools/Software:

- Cadence Virtuoso
- ADS & AWR
- VHDL (Xilinx ISE)
- MATLAB
- C/C++
- Java
- HTML/CSS
- HFSS

# Ummang

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## Areas of Interest

- Wireless Sensor Network Communication
- Cellular Communication
- Machine Learning
- MOS VLSI
- Analog IC design
- Semiconductor Memory Design
- CAD of RF and Microwave devices

## Projects:

- **M.Tech Project**- MAC Layer Design for Underwater Wireless Sensor Network.
- Mixer implementation on real time input using C55 TI DSP Processor.
- Face Recognition using eigenface and fisherface techniques.
- Background Segmentation using Gaussian Mixture Model Technique.
- Iot Project : Handwriting Recognition using Accelerometer and Gyrometer.
- **Industrial Project** -LTE : Driveless Tuning , Small Cell Design , KPI troubleshooting and optimization.  
-GSM : Frequency Planning for network cluster.

## Tools/Software:

- MATLAB
- Python
- C++
- Network Simulator (NS3)
- Verilog
- EDA Tool- Cadence Virtuoso
- Serenade and IntelliCAD



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## Areas of Interest

- Machine Learning
- Optimization Theory
- Digital VLSI Design
- Frequency Estimation & Sensor Array Signal Processing
- Hardware modelling using Verilog.

## Projects:

- **M.Tech Project**- Enhance Sequence Design using optimization techniques.
- Background Segmentation using Gaussian Mixture Model.
- IoT Project: Human Activity Detection using LSM6DSOX ST Kit.
- Face Recognition using PCA and Fischer Linear Discriminant.
- Generation of real time accurate down-converted signal by mixing an externally generated passband signal with local oscillator signal synthesized in DSP.

## Tools/Software:

- MATLAB
- Cadence Virtuoso
- Verilog
- C Programming
- Assembly language for TMS320C5510 DSP
- Serenade
- IntelliCAD

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## Areas of Interest

- Machine Learning
- Deep Learning
- Data Mining
- Digital IC design

## Projects:

- **M.Tech Project-** Keyword spotting from speech.
- Face Recognition using PCA and Fischer Linear Discriminant.
- Signal with local oscillator signal synthesized in DSP.
- Background Segmentation using Gaussian Mixture Model.
- Sign language interpreter using single accelerometer and gyroscope.
- Implementation of Real-time mixer using TMS320C55x DSP Kit.
- **Industrial Project-** Web application for e commerce company and workflow based web applications on local and cloud servers.
  - Web application and web services for logistics tracking.
- **B Tech. Project-** Audio Video processor.

## Tools/Software:

- MATLAB
- Python
- Java/ J2EE
- Cadence Virtuoso
- Verilog
- Embedded C
- C
- HTML
- CSS
- JavaScript
- jQuery
- Appscript
- Apache Tomcat server
- Wildfly server and JBoss server