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M.Tech in Radio Frequency Design & Technology (RFDT)
About Us

The Centre for Applied Research in Electronics (CARE) was established in 1971 with the main objective of providing focus to coordinated research and training in specialized areas in Electronics. The scope of R&D was soon broadened to encompass the areas of Signal Processing, Microwaves, and Microelectronics.

- **Microelectronics**  
- **Microwave**  
- **Signal Processing**

The Centre boasts of unique state of the art facilities like RF components fabrication and testing facilities, underwater test facility, DSP platforms, speech and audio processing facilities, non-destructive characterization of systems apart form high end industry standard softwares. The Centre consists of distinguished faculty members in these areas, renowned for their contribution through papers published in reputed journals, book publications and guest lecturers in various universities and conferences worldwide. They have also been recipients of national and international awards. Since 1982, over 30 technology transfers have taken place from the Centre which underscores the importance of the center at the national level.

About M.Tech Programme:

The M.Tech program in RFDT enrols the brightest minds from across the country thus ensuring the competitiveness of the program. Students are shortlisted on the basis of scores obtained in GATE conducted by IITs and IISc and are interviewed subsequently by the center’s faculty. Typical GATE cut-offs for the admission interview have been greater than 98.5 percentile. The completion of the above process leads to a miscellany of handpicked talent that is groomed at the institute in due course of the program. CARE has developed well-equipped state-of-the-art laboratory facilities due to the emphasis on advanced and contemporary experimental research and technology development work. The Centre also participates in the inter-disciplinary M.Tech program VLSI Design Tools & Technology (VDTT). This is joint program of CARE, Computer Science and Engineering department and Electrical Engineering department. Students at CARE, are exposed to the major emerging VLSI and Communication technologies and are adequately skilled in these domains through the diverse and broad spectrum of courses offered.

Courses

**Microelectronics**
- Fabrication Techniques for RF and Microwave Devices
- Introduction to Quantum Electronic Devices
- RF MEMS Design and Technology
- RF and Microwave Solid State Devices
- Technology of RF ad Microwave Solid State Devices

**Signal Processing**
- Basic Information Theory
- Statistical Signal Processing
- Digital Communication
- Wireless Communications
- Sensor Array Signal Processing
- Basics of Statistical Signal Analysis
- Introduction to Machine Learning
- Advanced Digital Signal Processing
- Detection and Estimation Theory
- Human and Machine Speech Communication

**Microwave**
- Radiating Systems for RF Communication
- RF and Microwave Active Circuits
- CAD of RF and Microwave devices
- Sensors and Transducers
- RF and Microwave Measurement System Techniques

**Microelectronics**
- CMOS RFIC Design
- MOS VLSI Design
- Semiconductor Memory Design
- CAD of RF and Microwave Circuits
- RF and Microwave Measurements

**Signal Processing**
- Analog IC Design
- Mixed Signal Circuit Design
- Architectures & Algorithms for DSP System
Microelectronics

Microelectronics is one of the most sought after specializations at CARE attracting many candidates nationwide. This group majorly focuses on Silicon Micromachining, MEMS Sensors, SAW Devices, Nano Structured Materials, Quantum Dot Devices, Photonic and Memory Devices.

Lab Facilities:
- IC Fabrication and Testing facility for 3-micron technology
- RF/DC Sputtering System
- Thermal Evaporation System
- Reactive Ion Etching
- Diffusion and Oxidation Furnaces
- Photolithography Chamber
- Mask making and Mask Aligner Facility
- Surface Profiler for thickness measurement equipment

- Stress Measurement
- Alpha Step Measurement system
- Lab equipped with TCAD for device simulations.
- Thermal, Acoustics, Optical and Magnetic systems for Non-Destructive Characterization
- Clean Bench / Chemical Bench Facility
- Sheet Resistance Measurement system

Signal Processing

The signal processing specialization offers a wide variety of courses including speech processing, under-water communication, Deep Learning, Virtual Reality, Multi sensor data fusion and IoT applications. The projects delivered by this group are nationally as well as internationally recognised.

Lab Facilities:
- TI’s DSP, OMAP Processor and FPGA kits with multi core processors
- Full acoustic anechoic chamber for speech and audio applications
- Studio quality recording facility for Speech and audio signals
- NI’s High speed Multi channel simultaneous data acquisition system.

- DSP lab equipped with software tools such as MATLAB, Comsol, Code Composer Studio, LabView.
- 3D printing facility for rapid prototype development.
- Underwater tank for underwater acoustic signal processing.
The Microwave specialization is an integral part of CARE at IIT Delhi which offers highly specialized research facility which is one of it’s kind in the country. It’s focus areas are MMIC & RFIC Design, RF MEMS, Microwave antennas & RF power amplifier.

Lab Facilities:
- VNAs up to 1000GHz
- Spectrum Analyzers up to 40 GHz.
- Microwave Signal Source up to 20 GHz.
- Mask making facility with computer controlled coordinatograph
- MIC fabrication facility
- 200 mm Probing system for submicron probing
- On-chip Antenna Measurement Facility
- Quasi-Optical table with 67 GHZ VNA for Dielectric Constant Measurement
- Advanced RF, MEMS and EM simulation Tools viz. Ansoft HFSS, Agilent ADS, CST Microwave Studio
- Anechoic chamber with automatic platform controller for antenna testing and characterization
- Photolithography facility for MIC & Metal deposition using RF sputtering/vacuum evaporation

Ongoing Projects

Microelectronics:
- Oscillator Circuit design for Ultra low-power Applications
- RF Energy Harvesting Circuit Design
- Gate-All-Around Transistor based Strain Sensor
- Piezo-Phototronics based MEMS Pressure Sensor
- Analog Circuit for Oxygen Conserving Systems
- Design of area efficient SOT memory
- MEMS Switch for RADAR Beam Steering
- Piezoelectric MEMS Switch for Zero Standby Power Applications
- Piezo-MEMS Transducer for Underwater Sensing
- THz Metamaterials for Efficient Detectors
- Design of Germanium Junction-less Phototransistor

Microwave:
- mmWave Antennas for 5G mobile terminal and base station
- GaN Power Amplifier
- Thin Film Filter Design
- 280-Ghz Heterodyne imager based on 40n CMOS Technology
- Power amplifier design for broadband application
- Design of SIW components in millimeter waves
- High Sensitivity Bolometer Design at THz frequency range

Signal Processing:
- Keyword spotting in Speech and Speaker Identification
- Speech Enhancement and Voice Activity Detection using Machine Learning on IOT devices
- Active noise Cancellation using Acoustic Beamforming
- Processing of data from Array of sensors and enhanced sequence design
- Underwater Acoustic Sensor Networks
- Image Reconstruction / processing from acoustics
- Mobile Phone Position detection
- High Quality Digital Voice Communication using 3G UWACS
- Deep Learning Architecture for Spatial environment and
- Motion classification
Placement Statistics

Placement Figures for 2020-2022 Batch

- Avg. CTC in LPA: 28
- Highest CTC in LPA: 43.72

Past Recruiters

- Intel
- Analog Devices
- Qualcomm
- Texas Instruments
- Maxim
- AMD
- Beceem
- Micron
- Global Foundries
- Cadence
- Silicon Labs
- TSMC
- MathWorks
- Bosch
- Samsung
- Marvell
- MediaTek
- Oski Technology
- Mavenir
- Applied Materials
- Cypress
- Sasken
- Fujikura
Collaborations

**International**
- Keysight Technologies, USA
- Agilent Technologies
- Applied Nanostructures, USA
- Femto CNRS France
- Lockheed Martin USA
- Maxim Semiconductors, USA
- MEMS Cap, USA
- Mitsubishi, Japan
- NXP Semiconductors, Netherlands
- ST Microelectronics, USA
- University of Tokyo
- University of Bath, UK
- Continental Automotive, Germany
- Westminster University

**National**
- Astra Microwave
- BEL
- Cadence
- CEL
- DRDO (DEAL, LRDE, RCI, NPOL, NSTL, SASE, CABS)
- GAETECH Hyderabad
- Honeywell Bangalore
- Indian Navy
- NPMASS
- Space Application Centre (SAC-ISRO), Ahmedabad
- Tektronix
- Vehant Technologies

Faculty Profiles

<table>
<thead>
<tr>
<th><strong>Prof Arun Kumar (HOD)</strong></th>
<th>Digital signal processing, Underwater and air acoustics, Human and machine speech communication technologies</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Prof Ananjan Basu</strong></td>
<td>Microwave &amp; mm wave engineering</td>
</tr>
<tr>
<td><strong>Prof Monika Aggarwal</strong></td>
<td>Signal Processing and Application</td>
</tr>
<tr>
<td><strong>Prof Mahesh P Abegaonkar</strong></td>
<td>Microwave &amp; mm wave engineering</td>
</tr>
<tr>
<td><strong>Prof Samaresh Das</strong></td>
<td>Nanoelectronics and Optoelectronics</td>
</tr>
<tr>
<td><strong>Prof Prabhu Babu</strong></td>
<td>Signal processing and communication, Machine learning, Big Data Analysis</td>
</tr>
<tr>
<td><strong>Prof Pushparaj Singh</strong></td>
<td>MEMS Sensors and Microelectronics</td>
</tr>
<tr>
<td><strong>Prof Ankur Gupta</strong></td>
<td>RF Microelectronics, Nanotechnology, Device circuit co-design</td>
</tr>
<tr>
<td><strong>Prof Rahul Mishra</strong></td>
<td>Nanoelectronics, Spintronics, Neuromorphic Devices</td>
</tr>
<tr>
<td><strong>Prof Kirti Dhwaj</strong></td>
<td>Antenna Systems, Microwave Filters</td>
</tr>
<tr>
<td><strong>Prof S K Koul</strong></td>
<td>Microwave Integrated Circuits, Microwave Phase Shifters, CAD, Optical and millimeter waves dielectric Integrated Circuits</td>
</tr>
<tr>
<td><strong>Prof Rajendar Bahl</strong></td>
<td>Signal and image processing, acoustic imaging, target identification, sensor systems simulation and design, bio-sonar</td>
</tr>
<tr>
<td><strong>Prof Ulrich L Rohde</strong></td>
<td>Microwave Circuits (Amplifiers and Oscillators), frequency Synthesizers</td>
</tr>
<tr>
<td><strong>Prof Vikram Kumar</strong></td>
<td>Experimental Solid State Physics, Structure and Growth of Thin Films, Plasma Processing of Materials, Solid Interfaces</td>
</tr>
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</table>
Recruitment Procedure

Student-in-charge or placement officer, Office of Career Services (OCS) shall provide the company a Job Notification Form (JNF) [https://tnp.iitd.ac.in/](https://tnp.iitd.ac.in/). JNF requires details of the job offer – role offered, pay package, place of posting, eligible departments.

Once the filled-in-JNF with all the required details is received, companies are assigned username/password to access their online account at [https://tnp.iitd.ac.in/](https://tnp.iitd.ac.in/).

Companies are also assigned space on the server on which they may upload any presentation, videos, data or other information they want the students to see.

The JNF must be frozen on the OCS website by the company till a deadline.

Students shall be able to view all the details, and the eligible candidates may apply.

After the application deadline for the students, the resumes are visible to the company. The company submits shortlist on its online account before a deadline.

Short-listed students get notified and OCS allots the dates for the campus interviews.

After the completion of the selection procedure on campus, company is required to announce the final list of the students on the same day itself.

Resume Verification: All claims made by students in resumes submitted for campus placements are duly verified by OCS. For

Further details regarding Recruitment Process:

Ms. Anishya Madan
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Office of Career Services
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Phone: 011-26591731/32