



Institutional Profile

Central Electronics Engineering Research Institute

Central Electronics Engineering Research Institute (CEERI), Pilani, is a pioneer Research Institute in the Country and a constituent laboratory of Council of Scientific and Industrial Research (CSIR), New Delhi, established in 1953, for advanced Research and Development (R&D) in the field of Electronics. Since its inception it has been working for the growth of electronics in the country and has established the required infrastructure and well experienced manpower for undertaking R&D in Electronics.



Major R&D Programmes

The major R&D programmes of CEERI can be categorized into three major areas; microwave tubes, semiconductor devices and electronics systems. In the area of microwave tubes the major focus is on communication tubes and industrial tubes. In the area of semiconductor devices, projects are being actively pursued on IC design, power devices, device processing, microwave devices, opto-electronic devices and semiconductor materials. R&D work in the area of electronics systems is focused on digital systems, agri-electronics, speech technology, industrial electronics, instrumentation systems and communication engineering. Some of the current projects related to:

- Development of PC-based monitoring system for withering process in tea industry
- Development of on-line monitoring system for glutton, moisture and brix in paper & pulp industry

- Development of InGaAs/InP PIN detectors
- Development of hybrid PIN/FET receivers for 140 M bit/s data rates
- Development of some sub-assemblies of G&P matched mini TWT
- ASIC design of advanced architecture microprocessor chip
- Design and simulation of D2 MAC & SECAM decoder
- Feasibility study of integrated performance index evaluation system for sugar industry

Significant Achievements



- Space qualification of hybrid microcircuits
- Design of serial data controller chip
- Development of high voltage deflection transistor for TV applications
- Development of space-qualified metalized alumina substrates and Ku band down converter
- Development of hybrid PIN/FET for long haul optical communication system
- Development of 30 W (CW) TWT, 2MW S-band magnetron, high current density cathodes and EPLD/FPGA-based design of decoder for digital TV
- Development of laboratory model of 2x35 kVA DC drive for mining loco
- Development of laboratory prototype of “Electric Vehicle”
- Development of vector impedance based moisture measurement system for agro-based industry

Technologies transferred to industry

- S-band, 30W TWT
- 500 VA UPS
- Zirconia oxygen analyzer
- Microprocessor based pan monitoring and control system (MIP-MOS)
- PC-based digital data capture system for photogrammatic applications

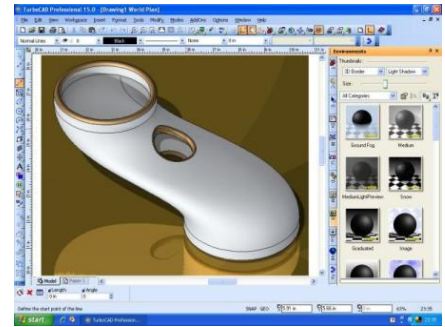


Technologies Ready for Transfer

- Digital coordinate capture system (PCEK-22)
- Automatic drip irrigation system
- 75 kW energy efficient DC drive for mining locomotives
- 50 kVA unity power factor converter
- Superheated system temperature controller for sugar industry
- Speech secrecy system (SECRA-PHONE)
- Integrated sulphur burner control (SULPHCON)

Main facilities

- Facility for computer-aided design (CAD) of ICs and discrete semiconductor devices and microwave tubes
- Fabrication facility for semiconductor devices and microwave power tubes
- Instruments and control systems design, testing and microprocessor development facilities
- Mechanical workshop, computers, testing and calibration facilities
- Library



computer-aided design (CAD)

Research areas

Electronics System : Areas of Research	Electron Tubes : Areas of Research	Semiconductor : Areas of Research
<ul style="list-style-type: none"> • Agri-Electronics • Embedded Systems • Digital Systems • Power Electronics 	<ul style="list-style-type: none"> • Gyrotron • Klystron • Magnetrons • Plasma Devices • Travelling Wave Tubes 	<ul style="list-style-type: none"> • Hybrid Microcircuits • IC Design • MEMS and Microsensors • Sensors and Nanotechnology • Photonics and Optoelectronics • Semi-conductor Materials and Technology

Agri-Electronics Group (AEG)

CEERI is involved in the design and development of state-of-art technologies for agro-based industries of India for more than two decades. Some of the technologies developed (know-how) are transferred to the industry and absorbed in their processes. Industry and the Government recognized the



scientific efforts and work of AEG CEERI team by bestowing honors such as NRDC award, CSIR technology shield, FICCI award, ELCINA award, Sugar Technology Mission award etc. Notable areas where CEERI contributed extensively in agro based applications are technology development and value addition for Sugar, Tea, Energy and food storage industries in improving the product quality and sustainability, energy saving.

Digital Systems

1. **Wireless Sensor Networks - Institutional Supra Project**
2. **Image Processing based Smart System for Human Gesture Identification - Institutional Supra Project.**
3. **Sensor characterization and development of intelligent measurement systems – Institutional Supra Project.**
4. **Development of system level reconfiguration techniques for smart reconfigurable computing system- Institutional Supra Project.**
5. **Development of impact analysis and pulsation behaviour monitoring subsystems for Iron ore processing - Network Project.**
6. **Development of image processing techniques to measure the pellet size distribution - Network Project.**
7. **Development of comprehensive technology for disaster prevention and management for Jharia coalfields - Network Project.**
8. **Modular Re-configurable Micro Manufacturing Systems (MRMMS) for Multi Material Desktop Manufacturing Capabilities - Network Project.**
9. **Cartographic Generalisation of Map objects - Sponsored Project.**
10. **Development of an E-tongue system based on voltammetry - Sponsored Project.**
11. **Design and development of System level reconfiguration techniques for Reconfigurable**

Computing Systems- Sponsored Project.

Gyrotron

- 1. Design and development of 42GHz, 200kW CW Gyrotron (Multi-institutional project).**
- 2. Design and development of Electron Gun, Cavity and Collector for high frequency (>110GHz) and high power (1MW) Gyrotron.**

Magnetrons Group

- 1. Feasibility study of THz Gyrotron.**
- 2. Modeling and simulation of Gyro-TWT.**

Hybrid Microcircuit Group

- 1. Development of low-temperature-cofired ceramics (LTCC) technology.**
- 2. Thick-film hybrid micro-circuit (HMC) fabrication for specific applications.**
- 3. Bonding and packaging of fine-pitch devices and components.**
- 4. High temperature stable interconnections based on isothermal solidification.**
- 5. Smart materials based on phase transformation and domain polarization.**

MEMS and Microsensors Group

- Design, Development of MEMS Pressure Sensors**
- Design and Development of MEMS Ultrasonic Transducers**
- Design and Development of Bio-Sensors**
- Design and Development of MEMS Inertial Sensors**
- Design and Development of MEMS Inertial Sensors**
- Design and Development of Micro-Wave MEMS**
- Fabrication of MEMS Ultrasonic Transducer for Non-Destructive Testing**

Sensors and Nanotechnologies

- Design and Fabrication of RF MEMS Phase Shifter**
- Development of Technology for Quantum Structures and their Applications in Futuristic Silicon Based Nano-electronic Devices**
- Nanogap electrodes patterning using Dip-Pen-Nanowriting (DPN)**

Optoelectronic Devices Group

Research Areas:

- Gallium Nitride based Devices
- Gallium Arsenide based Devices
- Silica-on-Silicon based Planar Lightwave Circuits

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