

Research Areas

Advanced Materials Research Centre (AMRC): The two distinguished professors and 15 young faculty members work on novel materials for various biological, electronic, energy storage and high energy applications. Some faculty are attempting to understand the mechanism of functioning of newly developed soft- and nano-materials with an ultimate goal of applying them in device fabrication. Others aim at better perfection in nanofabrication with cutting-edge materials for semiconductor device applications. Fundamental research is also pursued by some faculty.

AMRC has been created with an investment of about 5 million Euros and it houses advanced instruments for the characterization of materials such as transmission electron microscope, confocal microscope, X-ray diffractometer, NMR spectroscope, optical profiler and other instruments. Sponsored research funding: EUR 730,000

Uhl Centre: Established with funding from the Department of Science and Technology, Govt of India. It has five young faculty and one professor actively working on socio technological projects for Himalayan region. The focus is on the use of technology for rural development in the domains of education, agriculture, health, renewable energy and livelihood. Sponsored research funding: EUR 100,000

Communications, Networks & Distributed Systems: Three professors and four young faculty members are actively involved in this group. Areas include network coding theory for next generation wireless, optical networks, cryptography and network security, distributed applications especially for rural areas, distributed databases, web-scale software systems, information retrieval. Both experimental and theoretical research is done. Sponsored research funding: EUR 150,000

Speech, Image and Signal Processing: One mentor professor and four young faculty are working in the following areas:- **Computer vision:** Resolution enhancement and hole-filling for optical and range images, Shape-from-X. **Medical image analysis:** Resolution enhancement and segmentation of CT images, classification of cell images **Speech processing:** speech synthesis and recognition, speaker recognition. **Machine learning:** Neural networks and kernel-methods for analysis of varying-length patterns, time-series analysis. Sponsored research funding: EUR 125,000.

Condensed Matter Physics: One adjunct professor and six faculty members are doing research on experimental and theoretical aspects of condensed matter physics. Research includes strongly correlated electron physics, superconductivity, magnetism, thermo electricity, nanomaterials for energy, quantum transport in nanomaterial and photo emission spectroscopy, organic photovoltaics and optoelectronics of graphene. The theoretical faculty focus on simulations of phase transitions in complex liquids, photoabsorption studies on atomic systems, nanophotonics and quantum optics.

IIT is acquiring state of the art low temperature and high magnetic field instruments and facilities for single crystalline and nanostructure synthesis. Sponsored research funding: EUR 75,000

Energy and Energy Systems: Two professors and four young faculty members are working in several research areas. (1) **Power systems:** Development of cost effective and reliable systems for integration of Renewable Energy Sources with the Grid using Power Electronic Systems and



advanced control techniques. (2) **Alternate energy sources:** Utilization of biofuels such as alcohols, biodiesel, biogas and also solar-thermal hydrogen for fulfilling transport energy needs. The use of geothermal energy for the combined power and refrigeration production is also being investigated. The last area of interest is the use of phase change materials for room heating applications. Sponsored research funding: EUR 75,000

German Studies: German language is offered to IIT Mandi students at an advanced (B1) level that can lead to a Minor in German. Besides a Professor who is a renowned expert in Rilke and German philosophy, dedicated instructors of German origin are engaged for the German language courses.

Other Research Areas: A number of faculty members are also involved in several other research areas of Computer Science, Electrical Engineering, Mechanical Engineering, Mathematics, Physics, Chemistry, Biology, and Humanities and Social Sciences.

Growth plans for 2014-15

BioX Spurred by the needs of the largely agrarian Himalayan Region, and by the medical needs of the 700m rural Indians, IIT plans to expand in several areas of biological sciences and technologies. These include bioinformatics, systems biology and synthetic biology. IIT has started equipping necessary labs with a budget of about EUR 1,000,000.

Civil Engineering: Driven by the needs of the Himalayan Region, IIT plans to hire faculty for teaching and research in geology, environment, tunnels, structures, hydrology, landslides and earthquakes.

For further information, please see <http://www.iitmandi.ac.in/institute/faculty.html>

IIT Mandi is strongly committed towards cooperation with the TU9 Universities: IIT Mandi has earmarked 200,000 Euros funding for fostering collaboration with the TU9. This amount will cover local travel, hospitality, honoraria for lectures, travel within India to attend conferences and other research expenses of the visitors from TU9. Cost of international travel will be covered for those German faculty who visit IIT Mandi for a semester or more to teach courses, to set up new labs or programmes. IIT Mandi has a dedicated 1 Gb/s network connection with several electronic classrooms and meeting rooms available for collaborative research and teaching with the universities abroad.