



# Institute For Plasma Research

In the Frontiers of Plasma Science & Technology ...  
Leading the Nation In The Quest For Harnessing Fusion Power

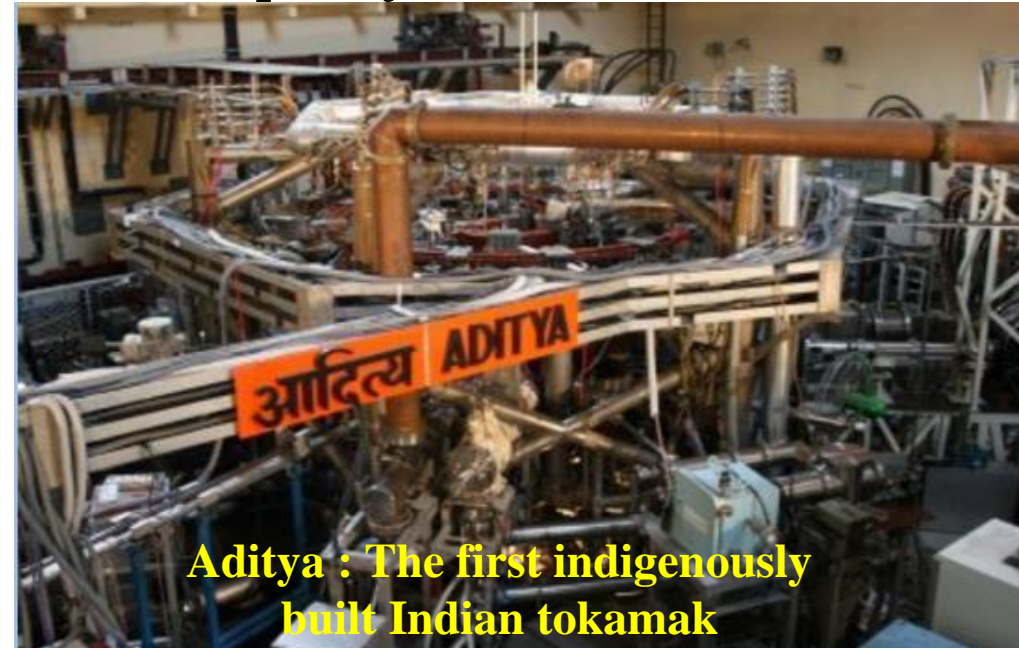
Gandhinagar, 382 428, Gujarat (India)

<http://www.ipr.res.in>



The history Plasma and Fusion related research in India traces back to Vikram Sarabhai who formed a theory group in PRL in 1970s and also initiated some basic experiments in plasma. Though the main objective then was space science, fusion research was in the vision and the Group's efforts transformed it in to the Plasma Physics Programme in 1982 funded by the DST. The PPP later on became the Institute for Plasma Research in 1986. By 2010 the Institute had three major subdivisions outside its main campus; the Facilitation Centre for Industrial Plasma Technology (FCIPT), ITER- India and also the CPP (Centre For Plasma Physics) at Guwahati which merged into it. Today the Institute, with its vast resources and experience, conducts many experimental studies touching upon every aspects of plasma physics and also represents India in the seven nation group in establishing the International Thermonuclear Experimental Reactor "ITER" at Cadarache, France. Institute is also involved in collaborative work with international Institutions like CEA and WEST. Most recently the Institute, along with RRCAT and IUCAA, has been mandated to build the Laser Interferometer Gravitational-Wave Observatory LIGO in India under LIGO-INDIA

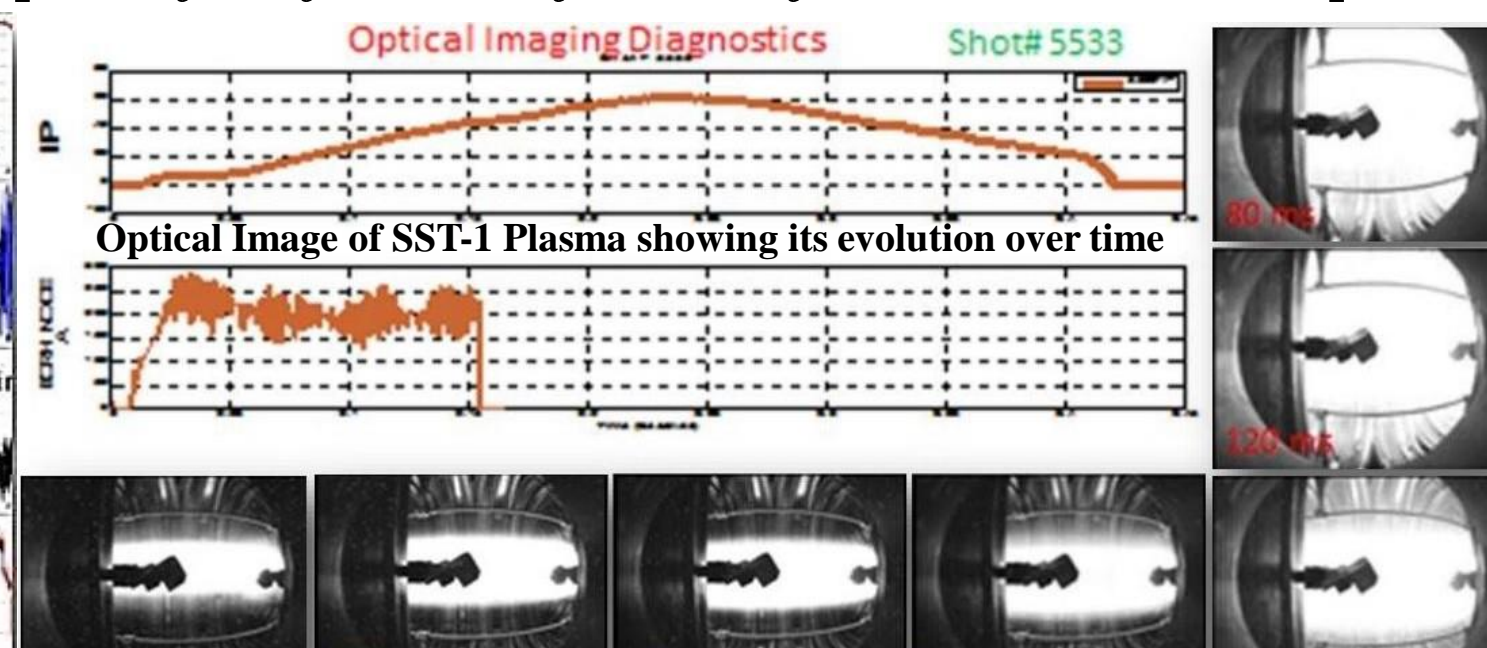
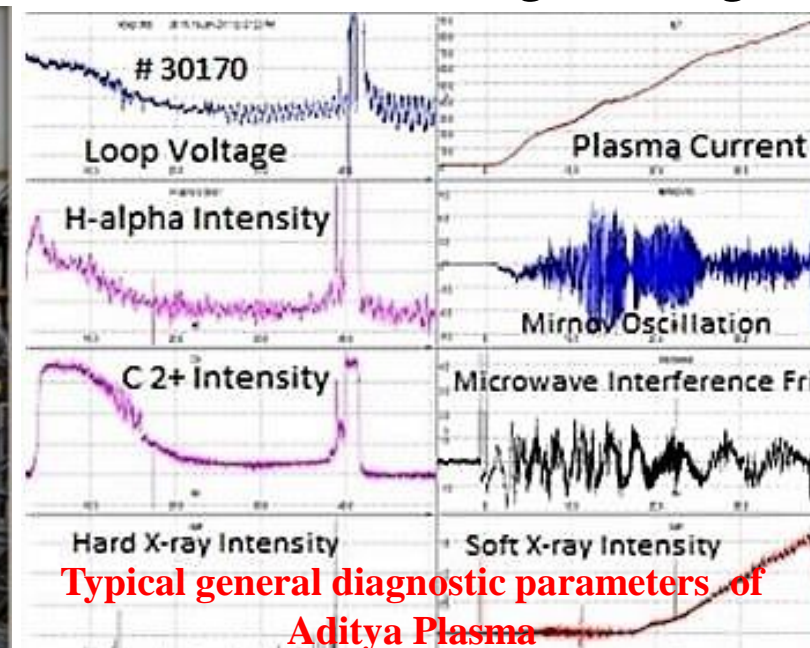
Main campus of the Institute is where the Tokamak systems are located and related theoretical & engineering aspects of the frontiers of nuclear fusion research are explored.



Aditya : The first indigenously built Indian tokamak

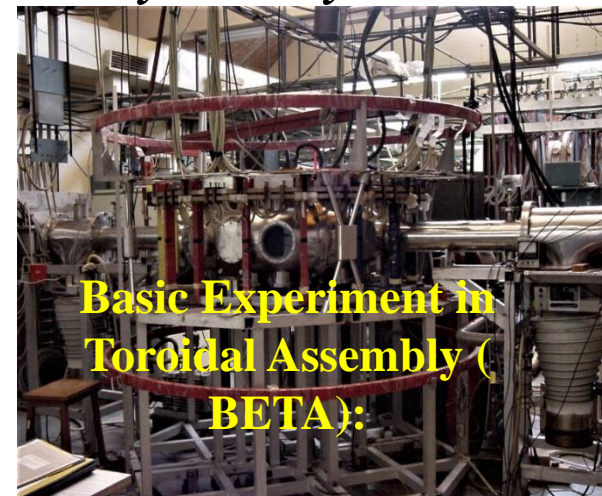


Steady State Superconducting Tokamak SST-1



**Ancillary Experiments and Technology developments:** Sophisticated scientific and engineering concepts make tokamak works. Ultra High Vacuum generation, heating & current drives, Diagnostics & related Electronics, Data Acquisition and control, high power systems, special materials, fuel injection, waste removal, Cryogenic plants & systems, Tritium breeding blanket, remote handling and Robotics, fusion fuel-cycle development etc. are some to mention and being intensively taken up the Institute.

Many R&D Systems and experiments to understand the properties of man made as well as naturally occurring Plasma States are running at the Institute and many are projects for P.h.D scholars



Basic Experiment in Toroidal Assembly (BETA):



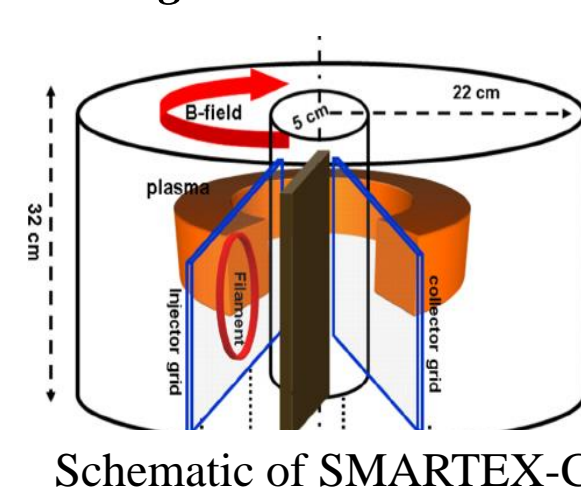
The large Volume Plasma Device



Inverse Mirror Plasma Experimental Device (IMPED)



Multi Cusp Plasma experiment System



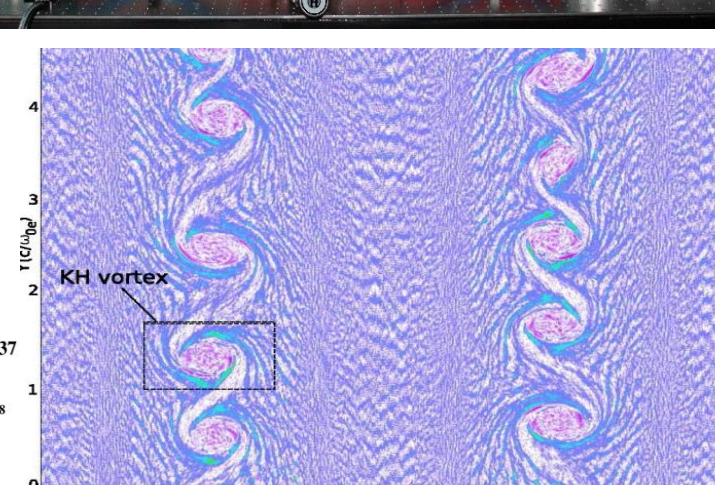
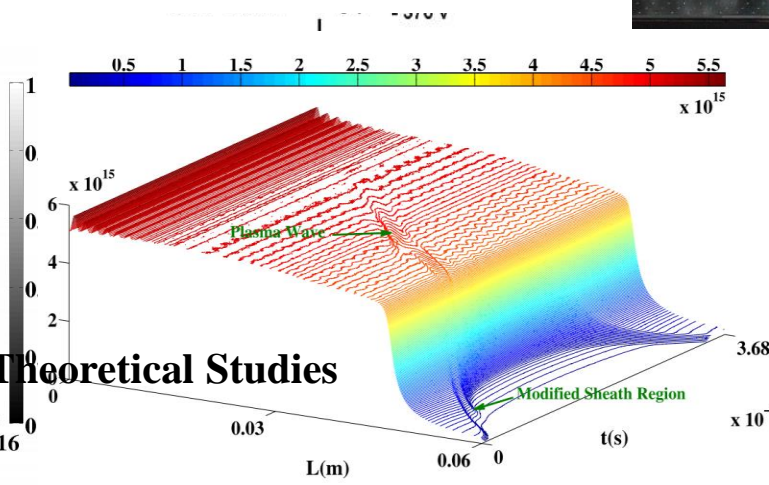
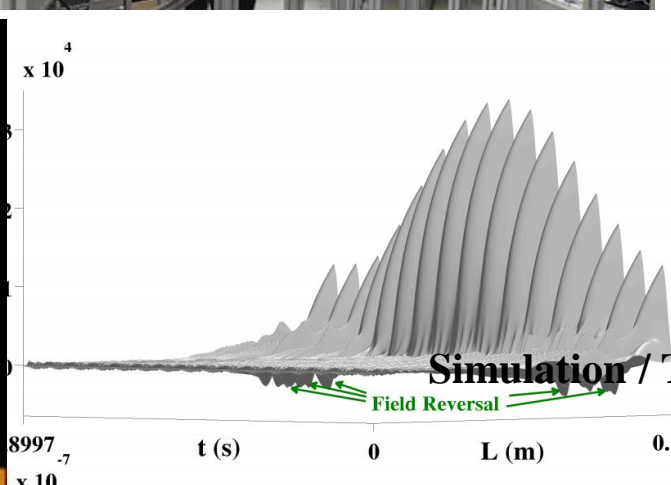
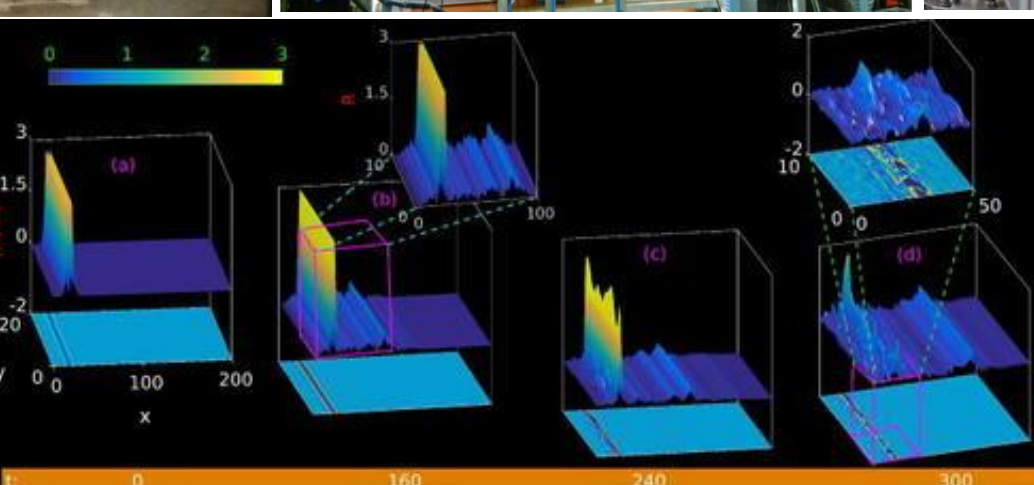
Schematic of SMART-EX-C



Plasma Wake Field Accelerator Experiment System



Laser Illuminated Dust formation in Dusty Plasma Expt



Non-Linear Plasma Studies and Simulation, Dusty / Complex / Laser/fusion Plasma Studies,,Global Gyro-kinetic Studies, Non-neutral Plasma Studies , Molecular Dynamics (MD) Simulations, MHD Analysis, PIC simulation, Fusion Neutronics Modelling, REBs and waves in cold plasma are subjects of intense theoretical study subjects at the Institute

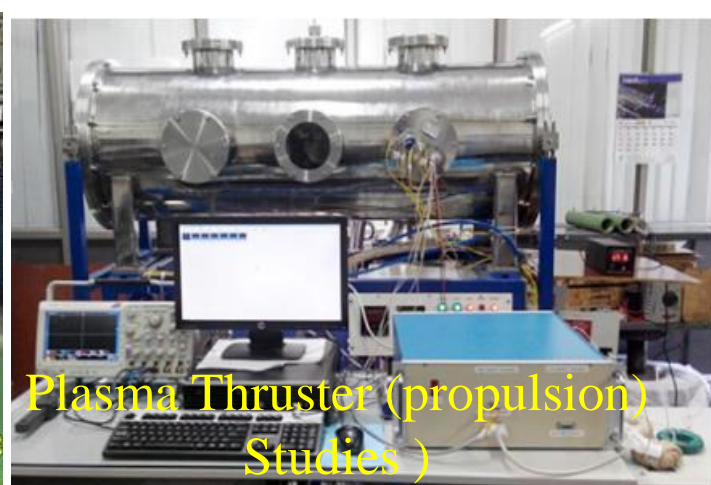
Set up in 1997 the **FCIPT** aims to bring Plasma physics and technology to immediate applications for societal well being. Technologies are developed, incubated, demonstrable units are made and technology transferred to industries for commercial exploitation. Plasma Nitriding, Surface Coating /engineering, Plasma Wool and textile Processing, Plasma Medical applications, Physical Vapour Deposition, Nano Structures are some of the fields other than shown below .



Plasma Torch Studies



Plasma reactor developed by FCIPT, IPR and functioning at MANTRA, Surat



Plasma Thruster (propulsion) Studies



The plasma pyrolysis system developed by FCIPT



Space Craft Plasma Interaction Experiment SPIEX-II

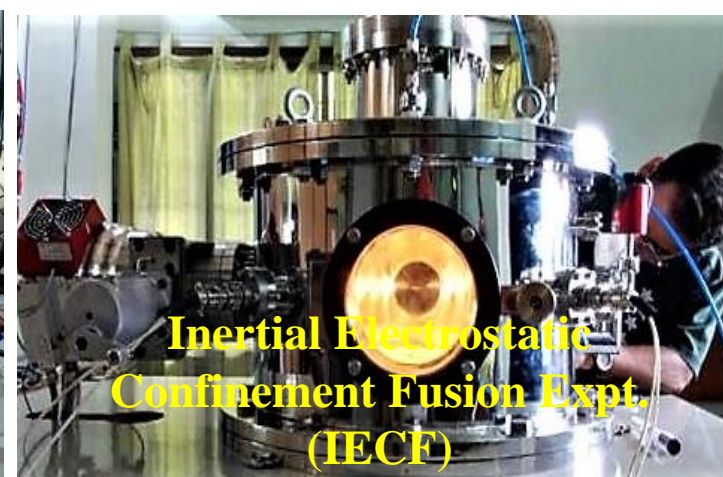


Coal Gasification

**CPP-IPR.** houses laboratories in the fields of Thermal Plasma Processed Materials, Pulsed Power Technology, Pulsed Plasma Accelerator, Fusion Studies, Dusty Plasma, Double Plasma Device, Cross-Disciplinary Plasma Sciences and Theory and Simulation



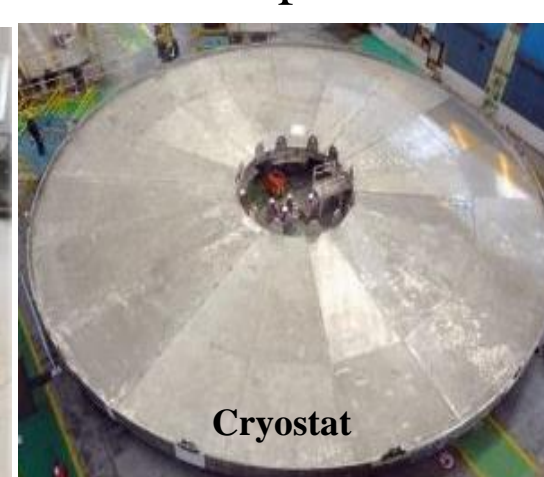
Pulsed Plasma Accelerator Expt



Inertial Electrostatic Confinement Fusion Expt (IECF)



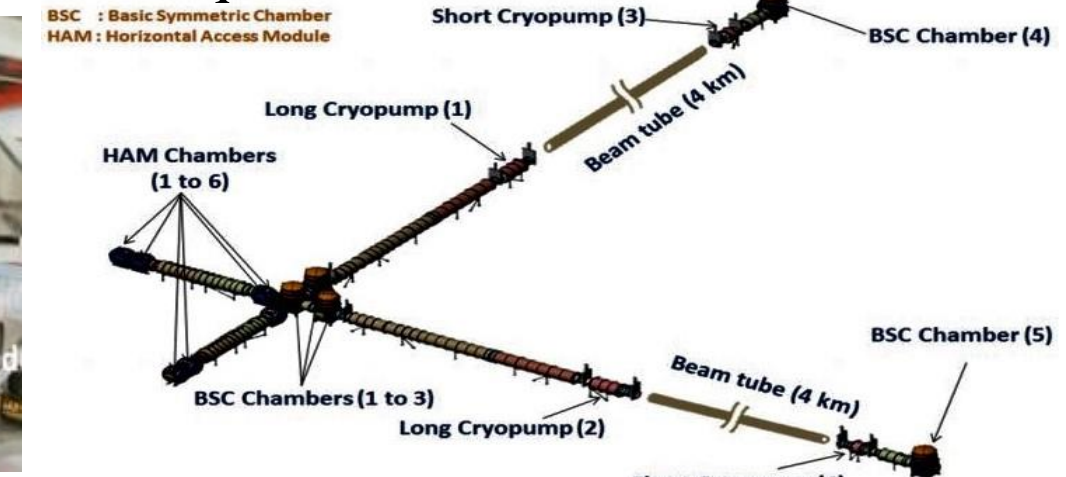
High Voltage Transmission Line



Cryostat



High power Power Supplies

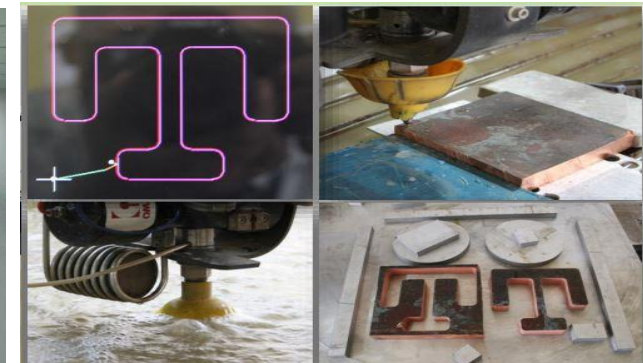


LIGO-India: The fourth observatory for Gravitation Wave, a multination project , will be made in India with IPR projected to build the vacuum chambers and also the data acquisition control .



**Collaborations:** Institute has active collaboration with many national and international universities and Institutions on theoretical and experimental studies in the frontiers of plasma physics and Controlled nuclear Fusion

**Infrastructural Resources**  
IPR Houses state-of-the-art 5.5 Terra Flop CPU based 320 core HPC Cluster High Performance Computing system "Udbhav". Computer Data Centre is one of the most advanced set ups in India. The Engineering workshop houses many heavy duty precision systems like CNC high pressure water jet system. An 8000 Sq.Ft Library holds vast collection in print and soft copies and subscribes to 106 periodicals and 2 Bibliographic databases. Field Emission Electron Transmission Microscope, High Power Excimer Laser System, High resolution Spectrometers are some of the notable tools available in the campus. IPR has a Crèche for infants of the staff and has well furnished student Hostel and guest House for students and visitors. Institute provides subsidised Canteen for staff and students and has a contributory medical schemes involving highest medical facilities to staff.



**Career Opportunities**  
Postdoctoral Fellowship , Ph.D, Technical Training Programme  
Summer School Program: A six-week program for Students of M.Sc / B.E. / B.Tech( Physics and Technology)  
National Fusion Program (NFP) : funding for projects to be carried at University and industrial level. NFP Internship Programme :Internal projects for Post Graduate and engineering students  
Academic project at IPR. : UG/PG projects for Science and engineering students  
INSPIRE Faculty Scheme DST.  
For More Info Visit <http://ipr.res.in/documents/career.html>

**Institutional and Social Outreach Programmes**  
Social Outreach Programs : With NCSTC and GUJCOST Outreach programmes are conducted at various centres of the state and country to spread awareness on IPR research activities among science students and faculties . Institute has initiated mentoring school students with aptitude for science and also do outreach programme for public welfare.

National Science Day : School Students from all over Gujarat are invited to participate science model, essay , poster skits and other competitions, Institute is open for public in the two days.