SDG9 : Industry, Innovation, and Infrastructure

SDG 9 in India: Industry, Innovation, and Infrastructure

Sustainable Development Goal 9 (SDG 9) focuses on building resilient infrastructure, promoting inclusive and sustainable industrialization, and fostering innovation. In India, a growing economy with vast infrastructure needs, SDG 9 is essential for achieving sustainable development. The government has implemented various initiatives to modernize infrastructure, drive industrial growth, and promote innovation.

Efforts by the Indian Government to Achieve SDG 9

1. **Infrastructure Development**:
    - Programs like the **Bharatmala Pariyojana** and **Sagarmala** focus on enhancing road and port infrastructure to improve connectivity and logistics.
    - The **National Infrastructure Pipeline (NIP)** aims to invest ₹111 trillion in infrastructure projects by 2025, including energy, transportation, and water supply systems.
2. **Smart Cities Mission**:
    - This initiative promotes urban infrastructure modernization through smart technologies, sustainable urban planning, and efficient resource management.
    - Over 100 cities have been selected for transformation under this mission.
3. **Make in India**:
    - The **Make in India** program aims to boost manufacturing, attract foreign investment, and enhance industrial competitiveness.
    - Focus areas include electronics, automotive, pharmaceuticals, and renewable energy industries.
4. **Digital India Initiative**:
    - The government is modernizing digital infrastructure through widespread broadband connectivity, digital literacy programs, and e-governance platforms.
    - Projects like the **BharatNet** aim to connect rural areas with high-speed internet, fostering inclusive digital growth.
5. **Innovation and Research**:
    - Programs like **Atal Innovation Mission (AIM)** promote research and innovation among students, startups, and industries.
    - The government supports innovation hubs and incubators through initiatives like the **Startup India** program.
6. **Renewable Energy and Sustainability**:
    - India is rapidly expanding its renewable energy capacity, with major investments in solar, wind, and hydropower projects.
    - Green infrastructure projects, such as metro rail systems and energy-efficient buildings, align with SDG 9's sustainability goals.
7. **Support for MSMEs**:

- Micro, Small, and Medium Enterprises (MSMEs) play a critical role in India's economy. Initiatives like the **Credit Guarantee Fund Scheme** provide financial support to MSMEs.
- Technology centers and skill training programs help MSMEs adopt modern techniques and enhance productivity.

8. **Research and Development (R&D)**:
   - India's R&D ecosystem is supported by institutions like the Indian Institutes of Technology (IITs) and Indian Space Research Organisation (ISRO).
   - Investments in areas like artificial intelligence, robotics, and biotechnology drive innovation and industrial growth.

SDG 9 at the University of Petroleum and Energy Studies (UPES)

UPES plays a pivotal role in advancing SDG 9 by fostering innovation, promoting research, and preparing future leaders for sustainable industrial development. The university integrates academic excellence, industry collaboration, and sustainable practices into its approach to education.

1. **Industry-Focused Academic Programs**:
   - UPES offers specialized programs in engineering, energy, law, and business, preparing students for high-demand industries.
   - Courses emphasize sustainable practices, digital transformation, and innovation, aligning with the principles of SDG 9.
2. **Research and Innovation**:
   - The university fosters research in renewable energy, infrastructure resilience, and industrial innovation.
   - Faculty and students collaborate on projects addressing real-world challenges, such as energy-efficient infrastructure and smart city solutions.
3. **Innovation Incubation**:
   - The **UPES Incubation Centre** supports startups and entrepreneurs with mentoring, funding, and resources.
   - Students are encouraged to develop innovative solutions for industries like energy, transportation, and digital technology.
4. **Digital and Green Infrastructure on Campus**:
   - UPES integrates smart campus technologies, such as energy-efficient lighting, renewable energy systems, and digital learning platforms.
   - Sustainable campus practices align with SDG 9's focus on resilient and sustainable infrastructure.
5. **Partnerships with Industry**:
   - The university collaborates with leading companies to offer internships, research opportunities, and industry exposure for students.
   - Partnerships with organizations in energy, technology, and manufacturing ensure that UPES remains at the forefront of industrial trends.
6. **Skill Development and Training**:
   - UPES provides workshops, certification programs, and technical training in cutting-edge fields like artificial intelligence, blockchain, and advanced manufacturing.
   - The focus on skill development ensures students are equipped to contribute to India's industrial growth.
7. **Community Outreach and Infrastructure Support**:

- The university engages with local communities to promote sustainable infrastructure development, such as solar installations and water management systems.
- Training programs for local artisans and entrepreneurs align with the inclusive growth principles of SDG 9.

8. **Promoting Sustainable Industrialization**:
   - UPES conducts seminars and conferences on sustainable development, bringing together industry leaders, academics, and policymakers.
   - Student projects often focus on green technologies and solutions for industrial sustainability.

Impact of UPES's Contributions to SDG 9

UPES is a leader in advancing SDG 9 through its focus on innovation, industry collaboration, and sustainable practices. By fostering research, preparing skilled professionals, and promoting inclusive growth, the university contributes meaningfully to India's industrial transformation. UPES's initiatives empower students to become changemakers in industries that align with global goals for sustainable development, resilient infrastructure, and innovation.

One Week Training Program on "Materials Synthesis & Characterization Techniques" Under STUTI Program, Department of Science & Technology (DST), Govt. of India (October 11-17, 2022)

https://research.upes.ac.in/2022/09/23/one-week-training-program-on-materials-synthesis-characterization-techniques-under-stuti-program-department-of-science-technology-dst-govt-of-india-october-11-17-2022/ [1]

About STUTI:

STUTI stands for Synergistic Training program Utilizing the Scientific and Technological Infrastructure funded by the Department of Science & Technology (DST), Government of India. This scheme is intended for the development of human resources (Scientists/Faculty Members/PhDs and Post-Doctoral fellows) actively involved in research across various institutions in the country. The capacity building of the human resource is accomplished by providing them open access to state-of-the-art S & T Infrastructure across the country.

Goals of STUTI Program:

• The participants will familiarize themselves with various sophisticated instruments supported by DST, GoI, & other funding agencies.

• The participants will be upskilled in the handling of various sophisticated instruments and characterization techniques and their analysis.

• The participants will be acquainted with the sophisticated instruments and characterization tools to design and implement appropriate strategies

for their research work.

UPES COUNCIL FOR INNOVATION AND ENTREPRENEURSHIP

https://www.upes.ac.in/ucie [2]

UPES Council For Innovation And Entrepreneurship

Innovation is the vehicle which will steer the next level of economic growth and social development. UPES Council for Innovation and Entrepreneurship (UCIE) was formed with the intention to advance the novel ideas of start-ups and early stage companies. It is a business incubator with focus on technology sectors in the Delhi NCR and Uttarakhand region. The mandate of the centre is to assist entrepreneurs of the UPES community (faculty, staff, alumni and students) as well as the external business community to commercialise their product/service ideas and accelerate economic growth.

The key technology focus areas are: Transportation, Infrastructure, E-commerce, Education, Energy, IT/ITES Gaming and Animation Cloud Computing, Biotechnology, Energy Technology, Food Processing Technology, Retail Technology and Fashion Technology.

UCIE is a member of the University Business Incubator (UBI) Global, an international platform, which connects corporations and governments with innovative thinkers and doers globally. This collaboration provides UCIE a unique opportunity to understand, explore and visualize the state and impact of India's incubation ecosystem in a more efficient manner.

UCIE works keeping the following three parameters in mind:

- Value for ecosystem: Economic development and talent retention
- Value for clients: Improved competence, access to funds and networking
- Value of the incubator: Program appeal and post-incubation performance

UCIE Partners

UCIE aims to build an entrepreneurial ecosystem in Uttarakhand and empower the existing stakeholders by providing them a network to share/discuss/leverage areas of common interest. This is achieved by conducting a series of events with its network, comprising the local community, state government departments, NGOs, the Confederation of Indian Industry (CII), the Federation of Indian Chambers of Commerce & Industry (FICCI) and the PHD Chamber of Commerce by providing information about UCIE and its activities. This facilitates mutual cooperation and growth of entrepreneurship in the Uttarakhand region, invariably resulting in increased business, data bases, foreign investors and export opportunities.

Objectives

- Create a conducive and professional environment for entrepreneurial activities
- Provide resources to aspiring entrepreneurs to start their companies
- Impart mentoring services to young businesses
- Help in financing businesses
- Provide R&D infrastructure for innovation-based start-ups
- Assist in commercialisation of intellectual property
- Provide consultancy in business planning, market research and corporate development
- Generate business opportunities in the area of renewable energy and green technology
- Develop strong alliances with regional businesses and technology communities through incubation programs

Incubation Model

UCIE provides a platform to students, aspiring entrepreneurs, technology start-ups as well as lab-stage innovations to flourish. It promotes critical thinking which is not constrained by resources so one can become an entrepreneur or a successful corporate professional. UCIE encourages talent and innovation by giving opportunities to the potential change-makers, thereby contributing towards bringing a social and economic transformation.

Facilities Institutional support

- Faculty
- Student
- Expertise

Access to our Mentors

- Access to Services
- Access to UPES Academic Experts

Individual Support

- Emerging Entrepreneurs
- Professionals
- Students
- Start-ups

How UCIE Helps Inculcate an entrepreneurial mindset, develop knowledge & skills

- Creative, out-of-the-box thinking, not constrained by resources
- Knowledge and skills relevant to venture creation

So you can be

- Future entrepreneurs
- Highly sought after successful entrepreneurial employees

UCIE association with University Business Incubator (UBI) Global

UCIE is a member of UBI Global, this provides Centre a unique opportunity to understand, explore and visualize the state and impact of India's incubation ecosystem in a more efficient way. This also helps in sharing global incubation best practices and insights and nurtures a network within Centre’s own ecosystem.

UCIE primarily works with focus on following three parameters and their sub-constituents to improve and evaluate operational and strategic effectiveness:

Value for Ecosystem

- Economy Enhancement
- Talent retention
- Value for Clients

Competence development

- Access to funds
- Access to network

- Attractiveness of the Incubator

Program Attractiveness

Post incubation performance

UCIE Partners

UCIE aims to build an Entrepreneurial ecosystem in Uttarakhand to strengthen the existing stakeholders by providing them a network to share/discuss/leverage areas of common interest. This would invariably result in valuable help in a short period of time there by economic cooperation in the future. UCIE conducts a series of events with network of local community, Departments of State Government, NGOs, Confederation of Indian Industry (CII), Federation of Indian Chambers of Commerce & Industry (FICCI), PHD Chamber of Commerce by providing information about UCIE and its activities to build mutually enriching cooperation and growth of entrepreneurship in Uttarakhand region. This Entrepreneurial ecosystem will also establish contacts with other programs supporting business, data bases, foreign investors and export opportunities.

Activities @ UCIE

Centre is currently working with 32 Incubatee organizations; of which 3 are Pvt. Ltd. entities, one is LLP and One Incubatee organization's registration as a trust is under process. Ms. Pramiti Upadhyay, Founder of SOCH (an incubatee organization) has been selected as one of the honorary for Prestigious Laureate Here for Good Award. In last semester of academic year 2016-17; 532 students of 8 B. Tech Programs and 4 BBA Programs were taught Venture Ideation though LNO Portal as a pilot project.

For the next academic year Centre would be educating 2936 young students the basic concepts of Entrepreneurship through online courses. This will include all second year students of 32 B. Tech Programs of College of Engineering Studies, 14 BBA Programs of School of Business, 5 Programs of School of Law and 2 Programs of School of Design .

As the Centre moves further and starts playing a pivotal role in building startup ecosystem in Uttarakhand region, it would be working as Knowledge Partner with JumpStart; Jumpstart is the first co-working hub and incubator in the private sector in Uttarakhand located in the heart of Dehradun.

Major activities at Centre include: Incubation and Seed-funding of Innovative Start-ups

The university helps innovative start-ups with incubation services like Networking Activities, Marketing Help, Training for Developing Presentation Skills, Links to Strategic Partners, Expert Advice, Broad Business Training Programs, and more.

Research on Industry Trends

Start-ups require research of the industry growth pattern, competitors, problems, challenges, and other relevant market information. UCIE, therefore, supports the young entrepreneurs by providing research-based analytical insights. Conferences are held for young entrepreneurs in order to share knowledge on industry trends and innovation on the whole.

Workshops

The workshops developed by UCIE are framed around businesses and involve academic researchers and professionals from the industry. The workshops are organised to provide basic understanding of what it takes to commercialize and thrive in the market. Supported by the faculty of UPES and industry experts, these workshops cover a wide variety of topics, viz. industry analysis, technical feasibility

study, market feasibility, demand forecasting, financial feasibility study, and strategy development. The theoretical knowledge is enhanced by the industry experts and entrepreneurs, who also share their personal experiences with the participants.

Centre of Inter-Disciplinary Research & Innovation (CIDRI)

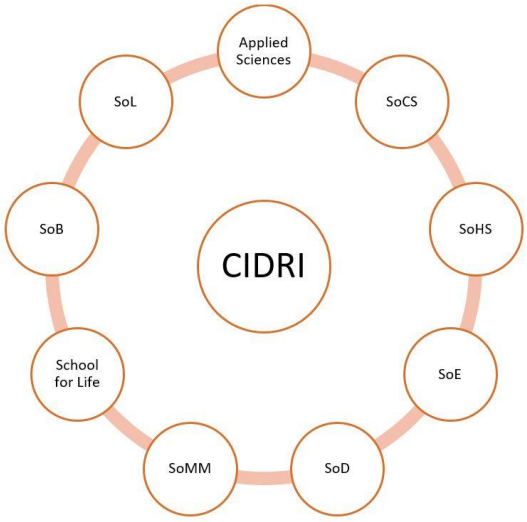
https://research.upes.ac.in/centre-of-inter-disciplinary-research-innovation-cidri/ [3]

CIDRI Centre for Inter-disciplinary Research & Innovation

Centre of Inter-disciplinary Research & Innovation (CIDRI) at UPES provides a platform for interaction across the boundaries of various disciplines – such as science, engineering, health environment, computer science, design, management, humanities, law, etc. – and address the key technical, organizational and logistical challenges that currently hinder truly transdisciplinary research.

CIDRI promotes and facilitates the interfacing and collaborating with industries, clinicians and doctors in hospitals for translational research, research groups of prominent national and international universities/institutes. CIDRI aim at bringing together the researchers in the field of basic sciences, all streams of engineering, artificial intelligence, machine learning along with experts of design as well as business and law so as to finally emerge with a product with intellectual property rights and business plan.

This Centre will work as a vibrant interdisciplinary group of professionals in the area of Nanotechnology, Bio-technology, Electronics, Industrial Design, Mechanical, Electronic Communication. A dedicated laboratory and workshop will be established for research/ development in cutting-edge technology and engineering. Close linkages will be developed with the industries, R&D institutions and agencies to provide support for industry-oriented product development, equipment designing and other industrial development.The center will also work towards manpower training of students from other institutions, engineering college teachers, and industry professionals by means of short courses on paid basis.



Objectives of CIDRI

To promote interdisciplinary scientific research, advanced teaching and training in chosen areas of interdisciplinary fields

To conduct high impact and interdisciplinary research with outcomes in terms of quality publications, patents, technology transfers etc

To provide a forum for interaction among scientists, research workers, teachers and students with national and international experts

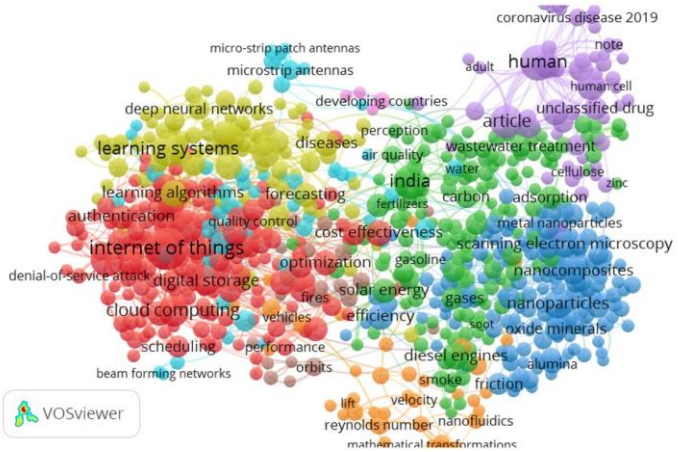
To conduct seminars, workshops, conferences and extension lectures to promote interdisciplinary research in basic sciences

Joint projects with industries

To enhance the visibility of UPES in industry and academia

The center is expected to produce quality research papers, patents and skilled manpower.

Scientific papers in quality journals
Conference papers at national and international levels
Technology developments and patents
Students minor and major projects (internal and external)
National/International Collaboration
Industry linkages
Student / staff exchanges (India and abroad)



Focus Research Areas

Focus research areas would be identified and updated based on our current strength (see figure 3), latest trends, the regional, national and global needs. Following are some of the focus research areas which we can take up immediately based on our current competency mapping and available infrastructure.

Sustainable energy:

Bio-fuel, Battery materials, supercapacitor, fuel cell, solar energy, thermal storage, thermoelectric materials, H storage materials, H generation by photo electro chemical splitting of water & by pho bio reactor, Geo thermal energy, Enhance Oil Recovery, Future Structural materials for fission and fusion reactors, Grid optimization, unconventional hydrocarbon resources

Waste to Energy:

Recycling of waste plastic to energy, Bio fuel/bio diesel, Solar thermal pyrolysis, AI based waste to energy segregator, Algae to energy, waste water to energy, Hydro-thermal liquification of biomass for energy generation. Biomass to Energy

Energy saving technologies:

- Passive cooling and heating of buildings
  Next Generation Insulation.
  Reflective Roofing Materials.
  Ultra-low loss High power transformers based on metallic glass cores

Water and environment remediation & nano based sensors:

Water and waste water treatment – heavy metal removal, emergent pollutant (pharmaceutical drugs and pesticide) detection and removal.

Health: Diagnostics and therapeutics:

Diagnostics: Nano bio sensors as early warning signals
Therapeutics: Drug delivery, Smart membranes
Clinical research

Food technology and nutrition and dietetics
Microbiology, Pharmaceutical sciences
Use of motion and pressure sensors in health care

Special Coatings and materials of Industrial interest:

Hard coatings, Anti corrosion coatings, Superhydrophobic/superhydrophilic, superoliophobic /superoliophilic, anti bacterial, Advance functional and nanostructured materials

Integration of AI and Machine Learning with Devices:

Sensors, *Smart agriculture*, *Surveillance*, *early fire and smoke detection.*
Modelling, *Simulations and Optimization*

Industrial Safety:

Accident forecasting and consequence assessment, Chemical industry loss prevention. Fundamental/applied Science using Mega facilities in India and abroad: 'Internet of things' as another very important upcoming field which requires interdisciplinary approach. It involves development of various sensors, low power electronics for communication, software development etc.