Do you have an innovative idea for the application of geospatial sciences?
Apply Now!

Geo-Innovation Challenge
On Innovations in Geospatial Science

5 to 7 January 2022, A Virtual Event

Organized by

Department of Civil Engineering, Indian Institute of Technology Roorkee, Roorkee, Uttarakhand, India

Supported by

National Geospatial Program, Department of Science and Technology, Government of India, New Delhi

सत्यमेव जयते
Department of Science & Technology
Govt. of India

Principal Investigator

Prof. Sanjay Kumar Ghosh,

Professor and Head, Department of Civil Engineering, Indian Institute of Technology Roorkee, Roorkee, Uttarakhand

Co-Principal Investigators

- Prof. Pradeep Kumar Garg, Professor, Department of Civil Engineering, Indian Institute of Technology Roorkee, Roorkee, Uttarakhand

- Dr. Alok Bhardwaj, Assistant Professor, Department of Civil Engineering, Indian Institute of Technology Roorkee, Roorkee, Uttarakhand

Indian Institute of Technology Roorkee,

Indian Institute of Technology - Roorkee is among the foremost of institutes of national importance in higher technological education and in engineering, basic and applied research. Since its establishment, the Institute has played a vital role in providing the technical manpower and know-how to the country and in pursuit of research. The Institute ranks amongst the best technological institutions in the world and has contributed to all sectors of technological development. It has also been considered a trend-setter in the area of education and research in the field of science, technology, and engineering. The Institute had celebrated its sesquicentennial in October 1996 and now completed more than 170 years of its existence. It was converted to an IIT on September 21, 2001 by an Ordinance issued by the Government of India declared it as the nation's seventh Indian Institute of Technology, an "Institution of National Importance". The Institute offers Bachelor's Degree courses in 10 disciplines of Engineering and Architecture and Postgraduate's Degree in 55 disciplines of Engineering, Applied Science, Architecture and planning. The Institute has facility for doctoral work in all Departments and Research Centres. Visit us on: https://iitr.ac.in/

Civil Engineering Department

The Department of Civil Engineering at the Indian Institute of Technology, Roorkee is the oldest and the largest in the country. It was established on November 25, 1847 as Roorkee Civil Engineering College and renamed as Thomason College of Civil Engineering in 1854. The Department offers a four-year course leading to the Bachelors Degree in Civil Engineering and two-year courses leading to Master's degree in seven major specialisations of civil engineering (viz., Building Science and Technology, Environmental Engineering, Geomatics Engineering, Geotechnical Engineering, Hydraulics Engineering, Structural Engineering and Transportation Engineering). In total there are 636 students pursuing Bachelors degree and 231 students pursuing Masters Degree in the department. These programmes are supported with strong doctoral programmes in all the specialisations. More than 258 Ph. D. research scholars are currently working in the department on emerging research areas. The Department is known for its internationally reputed faculty having expertise in diverse fields. It has built up a wide research potential. Visit us on: https://civil.iitr.ac.in/

Infrastructure and Facilities

CAD Lab

The Computer-Aided Design (CAD) Lab of the Civil Engineering Department was established in 1986. The lab facilitates the practicals for the course work of UG students. It expediates the computation platform to execute simulation/ modelling/ analyses related to the research work of UG/ PG/ PhD students of the department.
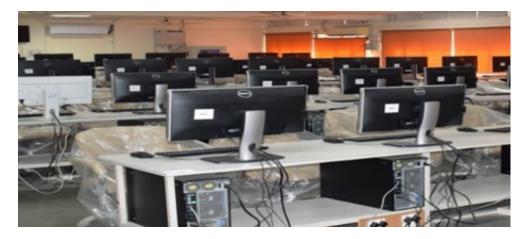
Facilities: Scientific / Engineering Software: Abaqus, Ansys, ArcGIS, Autocad, ERDAS IMAGINE, Matlab, MIDAS Civil, PLAXIS 2D&3D, SAP2000, ETABS, Solidworks, STAAD PRO

Development Tools & Compilers: Intel Visual Fortran, Dev C++

Wind Lab

Tunnel Description

The wind tunnel under description has been constructed with financial support from the Department of Science and Technology, Government of India under their sponsored research programme. The design was carried out after studying a number of designs for industrial wind tunnels that already exist in other countries. With appropriate roughing of the approach terrain and the use of vortex generators, it is possible to develop a boundary layer with a thickness of approximately 1m at the test section. It is also possible to create mean wind velocity profiles and turbulence intensities consistent with different terrain conditions obtained in the field. Typical profile for the wind velocity and the turbulence intensity obtained in the tunnel using three different variations in the approach terrain. It is possible to test rigid as well as Aero-elastic models of various kinds of structures in this tunnel and to measure, with the help of instrumentation available, parameters of interests such as: Velocity Profile, Turbulence Characteristics, Pressures, Force Reactions & Moments, Displacements, Accelerations

What is the Geo-Innovation Challenge?

In India's recent journey of sustainable economic growth, knowledge has been identified as one of the key drivers. In this odyssey, India has adopted a new information regime through its 'Digital India' program to support good governance, sustainable development goals and empowerment of its citizens. The challenges of this developmental path are inclusiveness, transparency, efficiency and productivity while balancing economic growth and sustainable development. Over the last three decades, geospatial technologies have proven to be an effective enabler to meet these challenges. Increasing g-governance and efficiency of the system, necessitates innovation in geospatial technologies. While there has been widespread adoption of geospatial technologies into various sectors, innovation brings economic and social value through the combination of geospatial technologies with artificial intelligence, IoT, big data, etc. This Geo Innovation Challenge Program will serve as a repository of ideas leading to the development of full proposals that could be supported by the DST at a future stage.

Objective of the program

The objective of this Geo-Innovation Challenge is to recognize, encourage and nurture geo-innovation in the field of geospatial science in the themes given below.

This call invites young professionals under the age of 35 to submit their innovative ideas in the prescribed format that can address any of the sub- themes as mentioned below bringing in innovation in their approach. The ideas will have to be presented to an eminent jury drawn from the industry, academia and premier research institutions. The three top innovative ideas will be awarded cash prizes and a certificate with an opportunity to be mentored in developing the idea into a full proposal/ business proposition.

First Prize: Merit Certificate + Rs. 12000/-

Second Prize: Merit Certificate + Rs. 8000/-

Third Prize: Merit Certificate + Rs. 5000/-

Who can apply?

The three day Geo-Innovation Challenge is targeted at young professionals under the age of 35 years. We encourage you to apply if you are:

- 35 yrs or below 35 yrs of age
- Have a doctoral degree from any recognized University.
- Have atleast with one paper published in SCOPUS/Web of Science indexed journals.

You will also be considered if you don't have a doctoral degree but have relevant industry or field experience and have an innovative original idea.

How to apply?

Apply through the portal http://dst-iget.in. Upload the following documents as a single pdf

1. Abstract (not more than 300 words) clearing stating the title, need for the proposed innovation, data, methods and proposed output alongwith keywords and names of team members, email ids/mobile nos. (max. 2 team members)
2. Your identity card /s from the institution where you are currently working.
3. Your published paper/s.

- Selected candidates will be informed by mail. Once selected all further guidelines for presentation will be sent via email by the Principal Investigator. Candidates should ensure that they are thoroughly prepared for their final presentation.
- For any further queries write to dst-iget@bvieer.edu.in or call on +91-20-24375684/24362155.
- Address all queries regarding the program to the PI & Co-PIs through email.

What are the theme/ subthemes for submitting abstracts?

Theme: The Main Theme of the proposal is: **Innovations in Geospatial Science**

The main theme comprises of six sub-themes. Each sub-theme is described in detail as follows:

Subtheme 1: Data Quality Improvement

a) Data Sources and its Integrity

Integrity of different sources of geospatial datasets. Innovation is new ways to collect geospatial datasets and improvement in older techniques to collect such datasets with integrity

b) Collection, Conversion, and Storage Techniques

Innovation is how collected datasets are converted to the correct format and stored in a way for faster retrieval by different software or written codes

c) Error Analysis and Adjustments

An important element of stored datasets is that they are error-free or adjusted to the correct reference frame. Innovation is to introduce adjustments to reduce error of stored datasets without changing their meaning

d) High Dimensionality Reduction of Data

Collected datasets could be of more than 3 dimensions. Innovation is to use new ways to reduce the dimensions of the datasets without affecting their statistical properties

e) Statistical Analysis

Innovation will be examined on the use of new and conventional statistical methods to extract meaningful information from geospatial datasets

f) High Resolution DEM and DSM Generation

Many geospatial datasets collected refer to ground elevation. Innovation is how to collect and store high-resolution elevation datasets with integrity

Sub-theme 2: Data Fusion Approaches

a) Analysis Ready Datasets

On many occasions, end-user is only concerned with datasets that can provide meaningful insights without the hassle of pre-processing. Innovation is to combine different geospatial datasets in a single framework to produce datasets that are ready for analysis

b) HRS Data Fusion

Hyperspectral Remote Sensing (HRS) refers to data at near individual bands. Innovation is to analyze and extract meaningful insights from HRS data from different sources at different bands

c) Automated and Semi-Automated Approaches

Innovation is to develop frameworks of automated and semi-automated data fusion approaches

Sub-theme 3: Unmanned Aerial Vehicles (UAVs)

a) Automated Data Mosaicing and Georeferencing

UAV collects large amounts of digital images in a short period of time. Innovation is automated data mosaicking and automated georeferencing of UAV images on the fly

b) Big UAV Data Analysis in Near real-time

UAV produces Big Datasets. Innovation is to analyse quality of images on the fly in order to modify flight plan of UAV

c) Operational Nuisances

Operational nuisances refer to battery failure, short amounts of current flight times, optimizing payloads to increase flight time, return home feature upon breakage of any UAV component. Innovation is addressing all such issues

d) Feature Extraction

UAV collects high resolution images. Innovation is to extract point, line, and polygon features on the fly

Sub-theme 4: Data Visualization

Following are sub-parts of sub-theme 4

a) Internet of Things (IoT)

Innovation in ways to use and visualize geospatial datasets collected from Internet of Things (IoT)

b) Augmented Reality & Virtual Reality

Innovation is visualization of geospatial information associated with physical objects and their locations using Augmented Reality (AR) and Virtual Reality (VR)

c) Blockchain

Innovation is to use Blockchain for proper book-keeping of geospatial information associated with physical objects to avoid theft and duplication of geospatial data

d) 3D Printing

3D Printing of topographical maps, DEM and DSM

Sub-theme 5: GPS and GIS

a) Performance of GPS with Low Signals

Innovation is to develop methods to retrieve coordinates using low GPS signals in urban and canopy areas

b) Accuracy Improvement of GPS Positioning

Improvement of locational accuracy using GPS positioning

c) Interoperability of Various Data in GIS

The ability of computer systems or software to exchange and make use of information available in different formats collected/generated by various tools for the purpose of using them in an integrated way.

Sub-theme 6: TLS and LiDAR

a) Data Integration

Innovation is to integrate Terrestrial Laser Scanner (TLS) and LiDAR data for building 3D information of surroundings

b) Error Analysis

Innovation is to remove errors from TLS and LiDAR data before performing data fusion

c) 3D Printing

3D Printing of TLS and LiDAR based products

d) Cloud Optimization

Innovation is to host big datasets from TLS and LiDAR on cloud to be rendered by users

Important Information

Last date for registration : 15 November 2021
Dates of the program: 5 to 7 January 2022
Mode of conduct: Online
No. of seats: 25
Registration Fees: Nil

Principal Investigator: Prof. Sanjay Kumar Ghosh, Professor and Head, Department of Civil Engineering, Indian Institute of Technology Roorkee, Roorkee, Uttarakhand
Email: sanjay.ghosh@ce.iitr.ac.in / hced@iitr.ac.in
Mobile : 9837090126 /01332285219

Co- Principal Investigator 1: Prof. Pradeep Kumar Garg, Professor, Department of Civil Engineering, Indian Institute of Technology Roorkee, Roorkee, Uttarakhand
Email: p.garg@ce.iitr.ac.in / pkgiitr@gmail.com
Phone: 9412999237

Co-Principal Investigator 2: Dr. Alok Bhardwaj, Assistant Professor, Department of Civil Engineering, Indian Institute of Technology Roorkee, Roorkee, Uttarakhand
Email: alok.bhardwaj@ce.iitr.ac.in
Phone: 9389494826

For any queries contact:
- **Prof. Sanjay Kumar Ghosh (Principal Investigator),** sanjay.ghosh@ce.iitr.ac.in / hced@iitr.ac.in , 9837090126 /01332285219
- **Prof. Pradeep Kumar Garg, (Co- Principal Investigator),** p.garg@ce.iitr.ac.in / pkgiitr@gmail.com , 9412999237
- **Dr. Alok Bhardwaj, (Co- Principal Investigator),** alok.bhardwaj@ce.iitr.ac.in , 9389494826

Address Department of Civil Engineering, Indian Institute of Technology Roorkee, Roorkee,- Haridwar Highway, Roorkee, Uttarakhand 247667

Grading and Certification

An e-certificate will be awarded to participants.