

Rajat Chandrashekhar Shinde

CONTACT INFORMATION

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Google Scholar | Github | OSGeo

OBJECTIVE

I am seeking opportunities to develop my research acumen by working in multi-disciplinary domains with constant efforts towards scientific development.

Interests: Lidar point cloud processing, Deep Learning, Compressive Sensing, High Performance Computing, 3D Vision, Geospatial Processing, Internet of Things

ACADEMIC QUALIFICATIONS

Indian Institute of Technology Bombay

M.Tech. - Ph.D. Dual Degree
Specialization: Geoinformatics
GPA: 9.62/10

July 2016 - 2022 (expected)

Recipient of the -

- ❑ Prestigious **Prime Minister's Research Fellowship (PMRF)**, Conferred by the **Ministry of Education, Government of India** to selected Research Scholars in India (2018-2022)
- ❑ **Google Cloud Research Credits program award- GCP19980904** (2020-2021)
- ❑ **Prime Minister Trophy Steel Authority of India Fellowship**, Conferred by the **Steel Authority of India Limited, Government of India** to selected Masters students in India (2016-2018)

National Institute of Technology Raipur

Bachelor of Technology (B.Tech)
Specialization: Electronics and Telecommunication Engineering
GPA: 8.94/10

July 2012 - June 2016

- ❑ Recipient of the Prime Minister Trophy Steel Authority of India *Sarvottam* ("the best" in English) Fellowship, Conferred by the **Steel Authority of India Limited, Government of India** to selected Bachelors students in India (2012-2016)

JOURNAL PUBLICATIONS

- ❑ **LidarCSNet: A Deep Convolutional Compressive Sensing Reconstruction Framework for 3D Airborne Lidar Point Cloud**
ISPRS Journal of Photogrammetry and Remote Sensing
Rajat Shinde, Surya Durbha, Abhishek Potnis
DOI: <https://doi.org/10.1016/j.isprsjprs.2021.08.019>, August 2021.
- ❑ **Semantics-Driven Remote Sensing Scene Understanding Framework for Grounded Spatio-Contextual Scene Descriptions**
ISPRS International Journal of Geo-Information
Abhishek Potnis, Surya Durbha, **Rajat Shinde**
DOI: <https://doi.org/10.3390/ijgi10010032>, January 2021.
- ❑ **Information Table based Decision Approach for Broadcast Storm Suppression in Vehicular Ad-Hoc Networks**
International Journal of Engineering Research and Technology
Aditya Om, **Rajat Shinde**, Sejal Agrawal, A S Raghuvanshi
Vol.5, Issue 4, ISSN: 2278-0181, April 2016.

- ❑ **MEMD-CSNet: Multivariate Empirical Mode Decomposition Driven Graph Convolutional Compressive Sensing Framework for Adaptive 3D Reconstruction of LiDAR Point Clouds**
Rajat Shinde, Surya Durbha
Expected Submission Date - March 2022
- ❑ **Semantics-driven 3D LiDAR Scene Understanding**
Rajat Shinde, Surya Durbha, Abhishek Potnis
Expected Submission Date - March 2022
- ❑ **Towards Enabling Deep Learning Based Question-Answering for 3D LiDAR Point Clouds**
IEEE International Geoscience and Remote Sensing Symposium (IGARSS 2021), Brussels, Belgium [Virtual Symposium]
Rajat Shinde, Surya Durbha, Abhishek Potnis, Pratyush Talreja, Gaganpreet Singh
- ❑ **Real-time Embedded HPC Based Earthquake Damage Mapping Using 3D LiDAR Point Clouds**
IEEE International Geoscience and Remote Sensing Symposium (IGARSS 2021), Belgium [Virtual Symposium]
Pratyush Talreja, Surya Durbha, *Rajat Shinde*, Abhishek Potnis
- ❑ **Towards Visual Exploration of Semantically Enriched Remote Sensing Scene Knowledge Graphs (RSS-KGS)**
IEEE International Geoscience and Remote Sensing Symposium (IGARSS 2021), Belgium [Virtual Symposium]
Abhishek Potnis, Surya Durbha, *Rajat Shinde*, Pratyush Talreja
- ❑ **Deep Learning based Real-time Building Classification using UAV Imagery**
IEEE Systems and Technologies for Remote Sensing Applications Through Unmanned Aerial Systems (STRATUS 2021), [Virtual Symposium]
Pratyush Talreja, Surya Durbha, *Rajat Shinde*, Abhishek Potnis
- ❑ **Online Point Cloud Superresolution Using Dictionary Learning for 3D Urban Perception**
IEEE International Geoscience and Remote Sensing Symposium (IGARSS 2020), Hawaii [Virtual Symposium]
Rajat Shinde, Abhishek Potnis, Surya Durbha
- ❑ **Towards Natural Language Question Answering Over Earth Observation Linked Data Using Attention-based Neural Machine Translation**
IEEE International Geoscience and Remote Sensing Symposium (IGARSS 2020), Hawaii [Virtual Symposium]
Abhishek Potnis, *Rajat Shinde*, Surya Durbha
- ❑ **Compressive Sensing Based Reconstruction and Pixel-Level Classification of VHR Disaster Satellite Imagery Using Deep Learning**
IEEE International Geoscience and Remote Sensing Symposium (IGARSS 2019), Yokohama, Japan
Rajat Shinde, Abhishek Potnis, Surya Durbha, Prakash Andugula
- ❑ **Multi-class Segmentation of Urban Floods From Multispectral Imagery Using Deep Learning**
IEEE International Geoscience and Remote Sensing Symposium (IGARSS 2019), Yokohama, Japan
Abhishek Potnis, *Rajat Shinde*, Surya Durbha
- ❑ **Rapid Earthquake Damage Detection Using Deep Learning from VHR Remote Sensing Images**
IEEE International Geoscience and Remote Sensing Symposium (IGARSS 2019), Yokohama, Japan

NON
PEER-REVIEWED
CONFERENCE
PUBLICATIONS

- Ujwala Bhangale, Surya Durbha, Abhishek Potnis, **Rajat Shinde**
 □ **Semantic Framework For Spatial Query Reformulation For Disaster Monitoring Applications**
IEEE International Geoscience and Remote Sensing Symposium (IGARSS 2019), Yokohama, Japan
 Kuldeep Kurte, Abhishek Potnis, Surya Durbha, **Rajat Shinde**
- **SPark: An Open Source Smart Parking Application Using Internet of Things and pgRouting**
FOSS4G-Asia 2017 conference, Hyderabad, India
 Ankur Shukla, **Rajat Shinde**, Surya Durbha

The Publications list can be accessed at [Google Scholar](#).

THESIS AND
NOTED ACADEMIC
PROJECTS

- M.Tech. - Ph.D. Thesis: Embedded Geospatial Applications Development for 3D Lidar Data Processing**
Supervisor: Prof. Surya Durbha Jul. 2017 - Present
- Implemented novel Deep Learning based convolutional Compressive Sensing framework (named *LiDARCSNet*) for 3D point cloud reconstruction and classification (named *LiDARNet* and *LiDARNet++*)
 - Implemented novel Multivariate Empirical Mode Decomposition and Graph convolution based 3D point cloud reconstruction framework (named *MEMD-CSNet*) for deep Compressive Sensing
 - Working on embedded supercomputing device to accommodate implemented frameworks for streaming 3D LiDAR point cloud of forest and urban environments
- Earthquake Prediction Using Machine Learning** Jan. - Apr. 2017
- Implemented machine learning models (SVM, ANN, Random Forests & Decision Tree Classifier) obtaining maximum accuracy of **94.5%** to predict an earthquake in the Andaman & Nicobar Islands and Sumatra region
 - Performed Exploratory Data Analysis for extracting (***b-values***) from USGS earthquake dataset of the last 26 years to train models
- SPark: An IoT based Smart Parking App for Smart City** Sep. - Dec. 2016
- In a team of 2, developed an Internet of Things (IoT) based smart parking web-app for efficient parking
 - Presented at the [FOSS4G-Asia 2017](#) conference in Hyderabad, India

OTHER PROJECTS

- EcoViz: A web application for visualization of ecological status** Sep. 2019
Google Summer of Earth Engine 2019
- [Web-based application](#) for scientific visualization of ecological status for the world heritage site - The Western Ghats of India using Earth Observation data archive
 - An end-to-end **Google Earth Engine application** for generating spatio-temporal insights about the ecological status and trend
- Identifying Solar Farms in India using Machine Learning with Google Earth Engine** Mar. 2019
Google Earth Engine India Advanced Summit Buildathon 2019
- Employed the Random Forest Classifier with R,G,B, NIR and VV Polarization as features to obtain an accuracy of 81.07%

EXPERIENCE

- Added Wavelet Kernel-based Convolution as an additional feature to detect solar panels' texture thus improving the Accuracy to 83.65%

SenseQube: An IoT Platform for Smart Agriculture Aug. 2017 - Present

- Working in a team towards providing real-time farm insights to the farmers for increasing yield in Orange orchards
- 1 amongst the 9 IIT Bombay representatives at the [India-Japan Joint Research Laboratory Programme](#) held at IIT Hyderabad, India

DEEP LEARNING RESEARCH INTERN - Tathya Earth Apr. 2020 - Oct. 2020

- ❑ Explored and implemented instance segmentation approaches using satellite imagery for detecting iron ore mines and predicting commodities trading performance
- ❑ Designed the data ingestion and processing pipeline for deep learning based mineral prospectivity modeling

OPEN SOURCE CONTRIBUTIONS

Mentor for the United Nations-OSGeo Open Educational Challenge 2021:

Supervised the preparation of pgRouting workshop for the Challenge: "Workshop material for pgRouting"

Google Summer of Code Jul. 2020 - Present

Role: [Organization Administrator](#) for OSGeo

- ❑ Coordinating and handling the OSGeo's Google Summer of Code initiative
- ❑ Interacting and supervising the overall progress of the selected OSGeo GSOC projects over the program timeline

Google Summer of Code Jul. 2018 - Present

Role: **Mentor** for MapMint under OSGeo

- ❑ Co-Supervised following projects developed by the student developers

Implement 3D scene visualization support for MapMint using Potree	2021
Implement 3D scene visualization and shaders for MapMint using Potree	2021
Integrating 3D scene builder as Web Processing Service within MapMint UI	2021
Augmented Reality Draw experience in MapMint4ME Android application	2021
Integrating a 3D scan module within the MapMint4ME Android application	2021
Enhancing AR Support for MapMint4ME and adding GPS Satellite Tracking	2020
Adding Augmented Reality (AR) support to the MapMint4ME Android Application	2019
MapMint - porting from Python 2.x to Python 3.x	2019

Google Code-in 2019 - Mentored the OSGeo student contributors encouraging them for open source contributions

Google Summer of Code May 2017 - Sep. 2017

Role: **Student Developer** for MapMint under OSGeo

- ❑ Added Audio and Video data recording capability to the MapMint4ME Android application
- ❑ Added Sensor data recording capability to the MapMint4ME Android application for remote data acquisition

[Project](#) | [Final report](#)

Workshop contributor and Presenter

- ❑ FOSS4G 2020, FOSS4G 2019 for the [MapMint Workshops](#)
- ❑ FOSS4G 2021 for the [pgRouting Workshop](#)

TEACHING EXPERIENCE - *Guiding and helping incoming Masters students with the projects and tutorials for various introductory and advanced GIS courses*

- ❑ Teaching Assistant, GNR 629: [Advances in Geospatial Standards, Interoperability and Knowledge Discovery](#)
- ❑ Teaching Assistant, GNR 605: [Principles of Geographic Information Systems](#)
- ❑ Teaching Assistant, GNR 615: Geographic Information Systems Lab
- ❑ Teaching Assistant, GNR 402: Introduction to Geographic Information Systems

PRO-BONO/VOLUNTEERING

- ❑ **Session Leader** - Coordinated with the Speakers during the *FOSS4G Buenos Aires (virtual) 2021* Conference
- ❑ **Session Manager** - One of the selected volunteers for coordinating with the other Presenters and Session Chairs during 7 sessions at the *IEEE International Geoscience and Remote Sensing Symposium, IGARSS 2020*
- ❑ **Session Manager** - One of the selected volunteers for coordinating with the other Presenters and Session Chairs during the *IEEE International India Geoscience and Remote Sensing Symposium, InGARSS 2020*
- ❑ **General Program Committee** - Invited Member of the General Program Committee for the global FOSS4G 2022 to be organized in Firenze, Italy

AWARDS AND RECOGNITION

- ❑ **Prime Minister's Research Fellow** - Recipient of the national fellowship by Ministry of Education, Government of India for working towards a topic of national importance as a Ph.D. thesis
- ❑ **Winner of Earth Engine India Advanced Summit Buildathon 2019**
Implemented Wavelet Kernel-based convolution approach for solar panels texture detection, improving accuracy to **83%** for locating solar farms across India
- ❑ **Google Earth Engine India Challenge 2018** - 1/7 Winners of National contest open for all the university students from India interested in geospatial data analysis
- ❑ Quarter-Finalist for the **India Innovation Challenge 2017** anchored by IIM Bangalore and conducted by Department of S&T, Government of India & Texas Instruments
- ❑ Recipient of the **IEEE GRSS Travel Grant** to present at International Geoscience and Remote Sensing Symposium (IGARSS) 2019, Yokohama, Japan
- ❑ Recipient of the **Prime Minister's Trophy Sarvottam Scholarship** during Masters/Bachelors granted by Steel Authority of India Limited under Government of India

SYNERGISTIC ACTIVITIES

Academic Research Manuscript Reviewer

- ❑ IEEE Photonics Journal
- ❑ IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing
- ❑ The Journal of Open Source Software

OSGeo Board of Directors - Member

Dec. 2021 - Present

Role: Elected as a [Board Member](#) by the existing worldwide Charter members for the Open Source Geospatial Foundation (OSGeo)

LEADERSHIP

	<p>Project Steering Committee Member Jan. 2021 - Present</p> <ul style="list-style-type: none"> ❑ Elected as one of the PSC Member for the ZOO-Project ❑ Contributing to an active Open Geospatial Consortium (OGC)-Web Processing Service (WPS) standard based open-source project used by various geospatial clients
	<p>OSGeo Charter Member Jul. 2018 - Present</p> <p>Nominated as one of the international Charter Member of the Open Source Geospatial Foundation for spreading awareness about the open-source geospatial science and development</p>
	<p>Company Coordinator (<i>awarded Certificate of Excellence towards work ethics and commitment 2017-18</i>) - Coordinated with the firms and helped ~ 1600 students during campus placements</p>
COURSES AND SUMMER SCHOOLS	<ul style="list-style-type: none"> ❑ Introduction to Scalable Deep Learning 2021 by the Juelich Supercomputing Centre ❑ IEEE GRSS Fall School - Advanced Methods for Remote Sensing Information Extraction - AMERSIE 2020 ❑ Reasoning Web Summer School 2021 under the Declarative AI 2021 conference
COMMUNITY MEMBERSHIPS	<ul style="list-style-type: none"> ❑ IEEE Graduate Student Member ❑ IEEE GRSS Graduate Student Member ❑ Member of the United Nations OpenGIS Initiative and GeoAI Working Group
SELECTED INVITED TALKS	<ul style="list-style-type: none"> ❑ Presented a talk on <i>Towards Semantics-driven Natural Language Question-Answering for 3D Lidar Data</i> in the Declarative AI 2021 - Reasoning Web Summer School 2021 ❑ Science and Technology Open House webinar on the topic - Young Turks: From Outreach, Research And Science Communication by the Department of Science of Technology Rajasthan, India. ❑ Lightning talk for Geo For Good talk Series hosted by Google Earth Outreach ❑ Conducted workshops in international FOSS4G 2019, 2020, 2021 and FOSS4G-Asia conferences ❑ Delivered a tutorial on Earth Engine UI and Apps at the Earth Engine Student Summit 2019 organized by Google Earth Outreach at IIT Bombay ❑ Organized talks on Preparing for Google Summer of Code for students at CSRE, IIT Bombay in January 2017, 2018 and 2019
RELEVANT SKILLS	<p>Operating System: <i>Windows, Linux (Ubuntu, Kubuntu), Fedora</i></p> <p>Programming Experience:</p> <ul style="list-style-type: none"> • Professional working proficiency: <i>Python, HTML/CSS, JavaScript, Android Development, C++, MATLAB</i> • Limited working proficiency: <i>Java, SQL, Bash, CUDA</i> <p>Software and Frameworks: <i>TensorFlow, Keras, QGIS, L^AT_EX, Git, Mercurial/ PyTorch, PyTorch-Geometric</i></p>
NOTED ACADEMIC COURSES	<ul style="list-style-type: none"> ❑ Foundations of Machine Learning ❑ Principles of Geographic Information Systems ❑ Advances in Geospatial Standards, Interoperability and Knowledge Discovery ❑ Principles and Advanced Methods in Satellite Image Processing