

# Human Segmentation in the Browser

BE-CE Semester- VII

Prepared at



ISO 9001:2008  
ISO 27001:2013  
CMMI LEVEL-5

**Bhaskaracharya National Institute for Space Applications & Geo-informatics**  
**Ministry of Electronics and Information Technology, Govt. of India.**

**Gandhinagar**

**Prepared By**

**Bhagya Solanki.**

**ID No. B1**

**Avdishkumar Prajapati.**

**ID No. B1**

**Guided By:**

**Prof. Arpita Limbachiya**  
**Department of CE**  
**SSIU, Gandhinagar.**

**External Guide:**

**Sidhdharth Patel**  
**BISAG-N, Gandhinagar**

**Punit Lalwani**  
**CISO**  
**BISAG- N, Gandhinagar.**

**SUBMITTED TO**

**Swarnnim Startup & Innovation University**



**Swarnnim Institute of Technology - Gandhinagar**



---

## **CERTIFICATE**

*This is to certify that the project report compiled by **Mr. Bhagya Solanki and Mr. Avdishkumar Prajapati** students of 7th Semester **BE -CE** from **Swarnnim Institute of Technology, Gandhinagar, Swarnnim Startup and Innovation University, Ahmedabad** have completed their Summer internship project satisfactorily. To the best of our knowledge this is an original and bonafide work done by them. They have worked on Web-based application for “**Human Segmentation in the Browser**”, starting from May 13th, 2022 to July 13th, 2022.*

*During their tenure at this Institute, they were found to be sincere and meticulous in their work. We appreciate their enthusiasm & dedication towards the work assigned to them.*

*We wish them every success.*

**Punit Lalwani**

**CISO,**

**BISAG- N, Gandhinagar**

**T. P. Singh**

**Director General,**

**BISAG- N, Gandhinagar**

# Sample Certificate of College

## **CERTIFICATE**

*This is to certify that the 7<sup>th</sup> Semester Internship Project entitled "HUMAN SEGMENTATION IN THE BROWSER" has been carried out by Solanki & Avdishkumar Prajapati under my guidance in fulfilment of the degree of Bachelor of Engineering in COMPUTER ENGINEERING (7th Semester) of Swarnim Institute of Technology – Gandhinagar, Swarnim Startup and Innovation University during the academic year 2020-2021*

**Guide**

**Prof. Arpita Limbachiya**

**Head of the Department**

**Prof. Gaurav Ameta**



# About BISAG- N



## ABOUT THE INSTITUTE

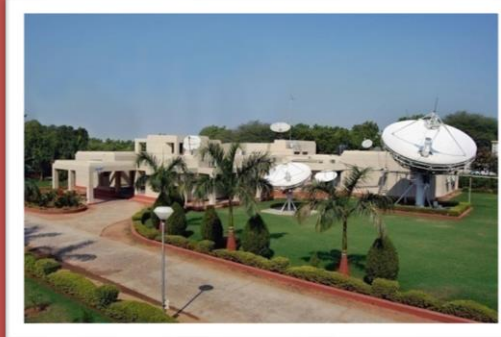
Modern day planning for inclusive development and growth calls for transparent, efficient, effective, responsive and low cost decision making systems involving multi-disciplinary information such that it not only encourages people's participation, ensuring equitable development but also takes into account the sustainability of natural resources. The applications of space technology and Geo-informatics have contributed significantly towards the socio-economic development. Taking cognizance of the need of geo-spatial information for developmental planning and management of resources, the department of Ministry of Electronics and Information Technology, Government of India, established "Bhaskaracharya National Institute for Space Applications and Geo-informatics" (BISAG- N). BISAG- N is an ISO 9001:2008, ISO 27001:2005 and CMMI: 5 certified institute. BISAG- N which was initially set up to carryout space technology applications, has evolved into a centre of excellence, where research and innovations are combined with the requirements of users and thus acts as a value added service provider, a technology developer and as a facilitator for providing direct benefits of space technologies to the grass root level functions/functionaries.

## BISAG- N's Enduring Growth

Since its foundation, the Institute has experienced extensive growth in the sphere of Space technology and Geo-informatics. The objective with which BISAG- N was established is manifested in the extent of services it renders to almost all departments of the State. Year after year the institute has been endeavouring to increase its outreach to disseminate the use of geo-informatics up to grassroots level. In this span of nine years, BISAG- N has assumed multi-dimensional roles and achieved several milestones to become an integral part of the development process of the Gujarat State.

# BISAG-N JOURNEY

**2003-04**



**Gujarat  
SATCOM  
Network**

**2007-08**



**Centre for  
Geo-  
informatics  
Applications**

**2010-11**



**Academy of  
Geo-  
informatics  
for  
Sustainable  
Development**

**2012-13**

**A full-fledged  
Campus**

## Activities



### Satellite Communication..

for promotion and facilitation of the use of broadcast and teleconferencing networks for distant interactive training, education and extension.



### Remote Sensing..

for Inventory, Mapping, Developmental planning and Monitoring of natural & man-made resources.



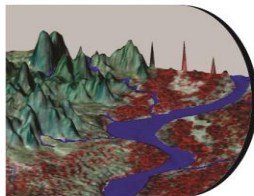
### Geographic Information System..

for conceptualization, creation and organization of multi purpose common digital database for sectoral/integrated decision support systems.



### Global Navigation Satellite System..

for Location based Services, Geo-referencing, Engineering Applications and Research.



### Photogrammetry..

for Creation of Digital Elevation Model, Terrain Characteristic, Resource planning.



### Cartography..

for thematic mapping, value added maps.



### Software Development..

for wider usage of Geo-spatial applications, Decision Support Systems (desktop as well as web based), ERP solutions.



### Education, Research and Training..

for providing Education, Research, Training & Technology Transfer to large number of students, end users & collaborators.



## Applications of Geospatial Technology for Good Governance: Institutionalization

Through the geospatial technology, the actual situation on the ground can be accessed. The real life data collected through the technology forms the strong foundation for development of effective social welfare programs benefiting directly the grass root level people. The geospatial data collected by the space borne sensors along with powerful software support through Geographic Information System (GIS), the vital spatio-temporal maps, tables, and various statistics are being generated which feed into Decision Support System (DSS).

A multi-threaded approach is followed in the process of institutionalization of development of such applications. The 5 common threads which run through all the processes are: *Acceptability, Adaptability, Affordability, Availability and Assimilability*.

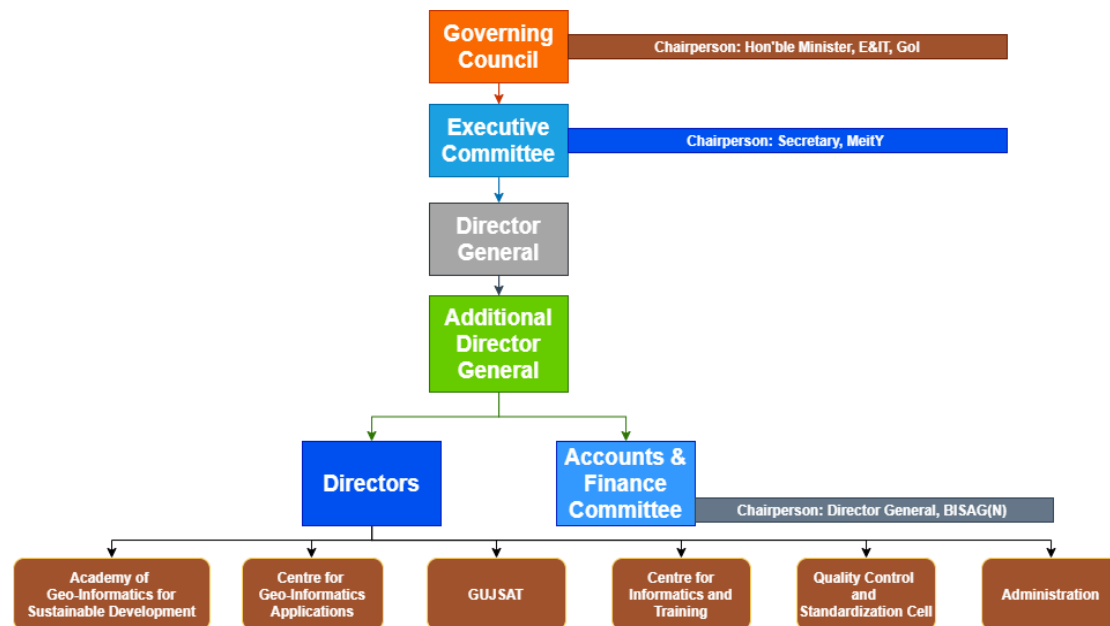
These are the “Watch Words” which any application developer has to meet. The “acceptability” addresses the issue that the application developed has met the wide acceptability among the users departments and the ultimate end beneficiary by way of providing all necessary data and statistics required. The “affordability” addresses the issue of the application product being cost effective. The “availability” aspect looks into aspect of easily accessible across any platform, anywhere and anytime. The applications should have inbuilt capability of easy adaptability to the changing spatio- and temporal resolutions of data, new aspects of requirements arising from time to time from users. The assimilability aspect ensures that the data from various sources / resolutions and technologies can be seamlessly integrated.

<b>ACCEPTABILITY</b>	<ul style="list-style-type: none"> <li>▪ Problem definition by users</li> <li>• Proof of Concept development without financial liability on users</li> <li>▪ Execution through collaboration under user’s ownership</li> </ul>
<b>ADOPTABILITY</b>	<ul style="list-style-type: none"> <li>▪ Applications as per present systems &amp; database</li> <li>▪ Maximum Automation</li> <li>▪ Minimum capacity building requirement at the user end</li> </ul>
<b>AFFORDABILITY :</b>	<ul style="list-style-type: none"> <li>▪ Multipurpose geo-spatial database, common, compatible, standardized (100s of layers)</li> <li>▪ In house developed/open source software</li> <li>▪ Full Utilization of available assets</li> </ul>
<b>AVAILABILITY:</b>	<ul style="list-style-type: none"> <li>▪ Departmental /Integrated DSS</li> <li>▪ Desired Product delivery anytime, anywhere in the country</li> </ul>
<b>ASSIMILABILITY</b>	<ul style="list-style-type: none"> <li>▪ Integration of Various technologies like RS, GIS, GPS, Web MIS, Mobile etc.</li> </ul>

## Organizational Setup

The Institute is responsible for providing information and technical support to different Departments and Organizations. The Governing Body and the Empowered Executive Committee govern the functioning of BISAG- N. The Institute is registered under the Societies Registration Act 1860. Considering the scope and extent of activities of BISAG- N, its organizational structure has been charted out with defined functions.

### Organizational Setup of BISAG- N



## Governing Body

For smoother, easier and faster institutionalization of Remote Sensing and GIS technology, decision makers of the state were brought together to form the Governing Body. It is the supreme executive authority of the Institute. The Governing Body comprises of ex-officio members from various Government departments and Institutes.

- ◆ Hon'ble Minister of Electronics and Information Technology..... Chairperson (Ex-Officio)
- ◆ Hon'ble Minister of State Electronics and Information Technology.....Deputy Chairperson (Ex-Officio)
- ◆ Secretary of Government of India: Ministry of Electronics and Information Technology.....Executive Vice Chairperson (Ex-Officio)
- ◆ Chief Executive Officer, Niti Aayog.....Member (Ex-Officio)
- ◆ Chairman, Indian Space Research Organization .....Member (Ex-Officio)
- ◆ Secretary to Government of India: Department of Science and Technology .....Member (Ex-Officio)
- ◆ Additional Secretary to Government of India: Ministry of Electronics and Technology .. .Member (Ex-Officio)
- ◆ Chief Secretary to Government of Gujarat.....Member (Ex-Officio)
- ◆ President & Chief Executive Officer, National e-Governance Division, Ministry of Electronics and Information Technology..... Member (Ex-Officio)
- ◆ Financial Advisor to Government of India: Ministry of Electronics and Information Technology...Member (Ex-Officio)
- ◆ Distinguished Professionals from the GIS field-Three (3) (To be nominated by the Chairperson)
- ◆ Director-General, Bhaskaracharya National Institute for Space Application and Geo-Informatics {BISAG(N)} ..... Member Secretary (Ex-Officio)



# Centre for Geo-informatics Applications

## Introduction



The objective of this technology group is to provide decision support to the sectoral stakeholders through scientifically organized, comprehensive, multi-purpose, compatible and large scale (village level) geo-spatial databases and supporting analytical tools. These activities of this unit are executed by a well-trained team of multi-disciplinary scientists. The government has provided a modern infrastructure along with the state-of-the-art hardware and software. To study the land transformation and development over the years, a satellite digital data library of multiple sensors of last twenty years has been established and conventional data sets of departments have been co-registered with satellite data. The geo-spatial databases have been created using conventional maps, high resolution satellite 2D and 3D imagery and official datasets (attributes). The geo-spatial databases include terrain characteristics, natural and administrative systems, agriculture, water resources, city survey maps, village maps with survey numbers, water harvesting structures, water supply, irrigation, power, communications, ports, land utilization pattern, infrastructure, urbanization, environment data, forests, sanctuaries, mining areas, industries. They also include social infrastructure like the locations of schools, health centres, institutions, aganwadies, local government infrastructure etc. The geospatial database of nagar-palikas includes properties and amenities captured on city and town planning maps with 1000 GIS layers. Similar work for villages has been initiated as a pilot project.

The applications of space technology and geo-informatics have been operational in almost all the development sectors of the state. Remote sensing and GIS applications have provided impetus to planning and developmental activities at grass root level as well as monitoring and management in various disciplines.

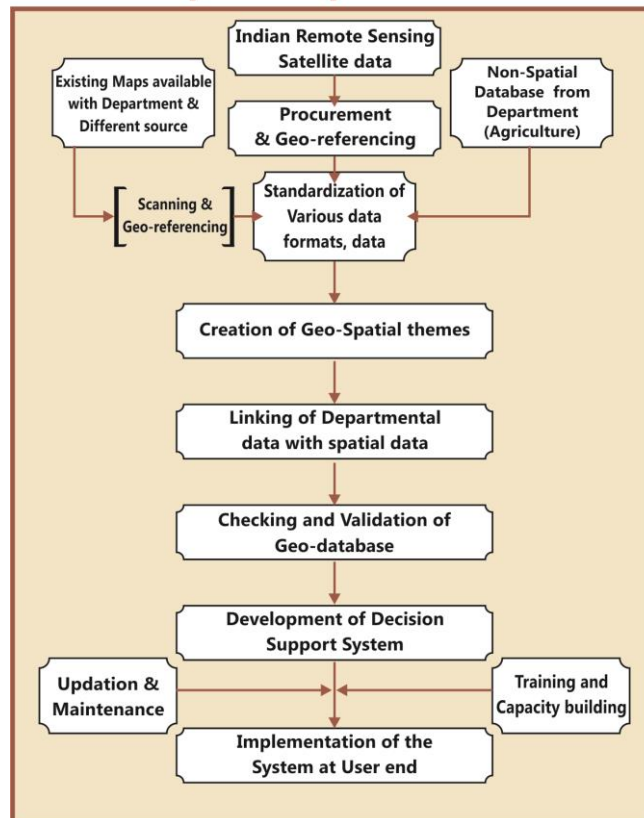
## The GIS based Applications Development

The GIS software is a powerful tool to handle, manipulate and integrate both the spatial and non-spatial data. The GIS system operates on the powerful backend data base and Sequential Query Language (SQL) to inquiry the data bases. It has the capability to handle large volume of data and process to yield values of parameters which can be input to very important government activity as Decision Support System (DSS). Its mapping capabilities help the users and specialists in generating single and multi-theme wise maps.

The GIS based applications development has been institutionalized in BISAG- N. This process can be listed as (Refer Figure for Details)

- Making the users aware of the GIS capabilities through introductory training programme and by exposing to already developed projects as success stories.
- Helping the users in defining the GIS based projects.
- Digitizing the data available with the users and encouraging them to collect any additional data as may be required.
- Generating the appropriate data bases with the full involvement of the users following the data bases standards

### Concept of Departmental GIS



## Remote Sensing and GIS Sectoral Applications:

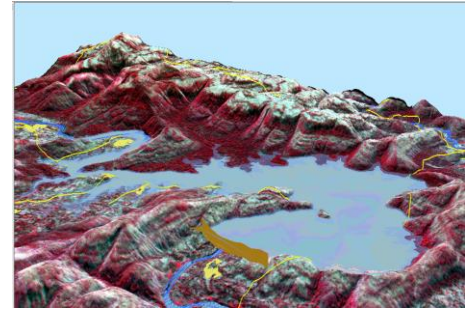
### Geo-informatics based Irrigation Management and Monitoring System

- The Geo-spatial information system for Irrigation water Management and Monitoring system for command areas in Sardar Sarovar Narmada Nigam Limited (SSNL) has been developed. Satellite image-based Irrigation monitoring system has been developed in GIS. From the multi-spectral Satellite images of every month, the irrigated areas were extracted.
- The irrigated area were overlaid on the geo-referenced cadastral maps and the statistics of area irrigated has been estimated.
- The user friendly Customized Decision Support System (DSS) has been developed.



## Preparation of DPR of Par–Tapi-Narmada Link using Geo-informatics for National Water development Agency (NWDA)

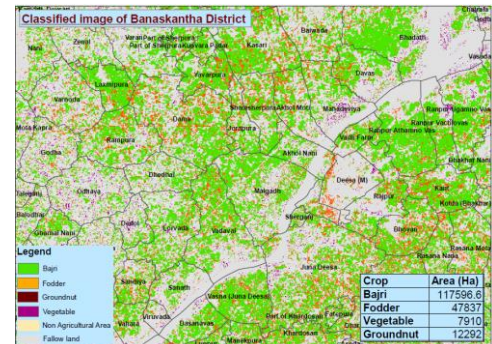
- The main objective of Par–Tapi-Narmada Link project is to divert surplus water available in west flowing rivers of south Gujarat and Maharashtra for utilization in the drought prone Saurashtra and Kachcha. On the request from NDWA, preparation of various maps for proposed DPR work was undertaken by the BISAG- N. Land use and submergence maps of proposed dams along with its statistics have been prepared by the BISAG- N. The detailed work consisted of generation of Digital Elevation Model (DEM), contour generation, Land use mapping, forest area generation of submergence extent at different levels etc.



## Agriculture

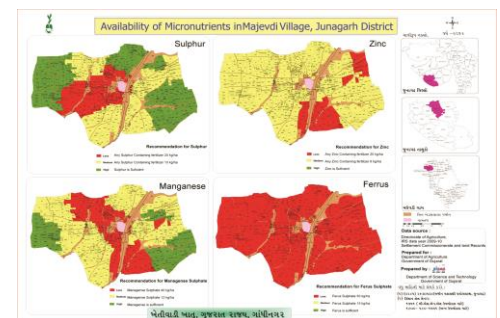
### District and Village-level Crop Inventory

- Remote Sensing (RS) based Village-level Crop Acreage Estimation was taken up in two villages of Anand and Mehsana districts of Gujarat state. The major objective of this study was to attempt village-level crop inventory during two crop seasons of Kharif (monsoon season) and Rabi (winter season) using single-date Indian Remote Sensing (IRS) LISS-III and LISS-IV digital data of maximum vegetative growth stage of major crops during each season.
- District-level crop acreage estimation during three cropping seasons namely Kharif, Rabi and Zaid (summer) seasons was also carried out in all the 26-districts of Gujarat State. Summer crop acreage estimation Gujarat State was carried out during 2012.



## Spatial Variability Mapping of Soil Micro-Nutrients

- The spatial variability of soil micro-nutrients like Fe, Mn, Zn and Cu in various villages of different districts, Gujarat state was mapped using geo-informatics technology. The major objectives of this study were i) to quantify the variability of Mn, Fe, Cu and Zn concentration in soil; ii) to map the pattern of micro-nutrient variability in cadastral maps, iii) suggest proper application of micro-nutrients based on status of deficiency for proper crop management and iv) preparation of village-level atlases showing spatial variability of micro-nutrients.





## Geo-spatial Information System for Coastal Districts of Gujarat

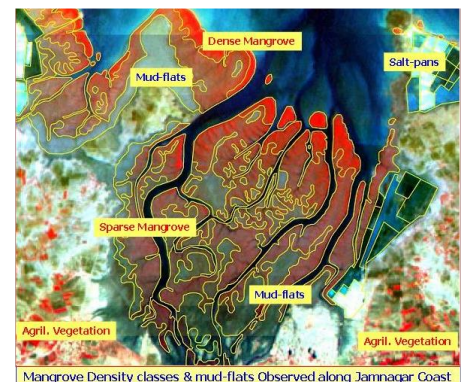
- The project on development of Village-level Geo-spatial Information System for Shrimp Farms in Coastal Districts of Gujarat, was taken with major objective of development of Village-level Geo-spatial Information System for Shrimp/Scampi areas using Remote Sensing (RS) and GIS. This project was sponsored by the Marine Products Export Development Authority (MPEDA), Ministry of Commerce & Industry, Government of India for scientific management of Scampi farms in the coastal districts which can help fishermen to better their livelihood and increase the economic condition on sustainable basis. The customized query shell was developed using the open source software for sharing the information amongst the officers from MPEDA and potential users. This has helped the farmers to plan their processing and marketing operations so as to achieve better remunerations.



## Environment and Forest

### Mapping and Monitoring of Mangroves in the Coastal Districts of Gujarat State

- Gujarat Ecology Commission, with technical inputs from the Bhaskaracharya National Institute for Space Applications and Geo-informatics - N (BISAG- N) made an attempt to publish Mangrove Atlas of the Gujarat state. Mangrove atlas for 13-coastal districts with 35-coastal talukas in Gujarat, have been prepared using Indian Remote sensing satellite images. The comparison of mangrove area estimates carried out by BISAG- N and Forest Survey of India (FSI) indicates a net increase in the area under mangrove cover. The present assessment by BISAG- N, has recorded 996.3 sq. km under mangrove cover, showing a steep rise to the tune of 88.03 sq. km. In addition to the existing Mangrove cover, the present assessment also gives the availability of potential area of 1153 sq. km, where mangrove regeneration program can be taken up.



# Academy of Geo-informatics for Sustainable Development



## Introduction

- Considering the requirement of high end research and development in the areas having relevance of geo-informatics technology for sustainable development, a separate infrastructure has been established. In collaboration with different institutes in the state as well as in the country, R&D activities are being carried out in the areas of climate change, environment, disaster management, natural resources management, infrastructure development, resources planning, coastal hazard and coastal zone management studies, etc. under the guidance of eminent scientists.
- Various innovative methodologies/models developed in this academy through the research process have helped in development of various applications. There are plans to enhance R&D activities manifold during coming years.
- This unit also provides training to more than 600 students every year in the field of Geo-informatics to the students from various backgrounds like water resources, urban planning, computer Engineering, IT, Agriculture in the areas of Remote sensing, GIS and their applications.
- This Academy has been established as a separate infrastructure for advanced research and development through following schools:
  - School of Geo-informatics
  - School of Climate & Environment
  - School of Integrated Coastal Zone Management



- School of Sustainable Development Studies
- School of Natural Resources and Bio-diversity
- School of Information Management of Disasters
- School of Communication and Society

During XIIth Five year Plan advance applied research through above schools shall be the main thrust area. Already M. Tech and Ph.D. students of other Universities/ Institutes are doing research in this academy in applied sciences under various collaborative programmes.

### **M. Tech. Students' Research Programme**

The academy started M. Tech. students' research programme in a systematic way. It admitted 11 students from various colleges and universities in Gujarat, Rajasthan and Madhya Pradesh for period of 10 months from August 2011 to May 2012. All the students were paid stipend of Rs. 6000 per month during the tenure. The research covered the following areas:

- Cloud computing techniques
- Mobile communication
- Design of embedded systems
- Aquifer modelling
- Agricultural and Soils Remote Sensing
- Digital Image processing Techniques (Data Fusion and Image Classification).

The research resulted in various dissertations and publications in national and international journals.

• Now nine students, one from IIT, Kharagpur, three from GTU, one from M. S University, Vadodara and four from GU, are undergoing their Ph. D programme. Out of nine, two thesis have been submitted. Two students are from abroad. One each from Vietnam and Yemen. Since then (after approval of research programme from the Governing Body), 200+ papers have been published by the Academy.



## **CANDIDATE'S DECLARATION**

We declare that 7<sup>th</sup> semester Summer internship project report entitled “**Human Segmentation in The Browser**” is our own work conducted under the supervision of the external guide **Punit Lalwani & Sidhdharth Patel** from BISAG-N ([Bhaskaracharya National Institute for Space Applications & Geo-informatics](#)). We further declare that to the best of our knowledge the report for this project does not contain any part of the work which has been submitted previously for such project either in this or any other institutions without proper citation.

Candidate 1's Signature

Bhagya Solanki

Student ID: B1

Candidate 2's Signature

Avdishkumar Prajapati

Student ID: B1

**Submitted To:**

Swarnnim Institute of Technology – Gandhinagar,

Swarnnim Startup and Innovation University.

## **ACKNOWLEDGMENT**

We are grateful to **T.P. Singh**, Director General (BISAG-N) for giving us this opportunity to work the guidance of renowned people of the field of MIS Based Portal also providing us with the required resources in the company.

We would like to express our endless thanks to our external guide **Mr. Punit Lalwani & Sidhdharth Patel** And Training Cell **Mr. Sidhdharth Patel** at Bhaskaracharya National Institute of Space Application and Geo-informatics for their sincere and dedicated guidance throughout the project development.

Also, our hearty gratitude to our Head of Department, **Dr. Gaurav Ameta** and our internal guide **Prof. Arpita Limbachiya** for giving us encouragement and technical support on the project.

**Bhagya Solanki.**

Student ID: B1

**Avdishkumar Prajapati.**

Student ID: B1