

Date: 26/03/2024

To,

Group Director
NRSC, Hyderabad

Dear Madam,

SUB: Request letter for Student Project at NRSC – reg.

With reference to above cited subject and I am sending this request letter for opportunities of student Internship projects at NRSC, Hyderabad. From last 2017 we have been sending the students to NRSC and totally 5 CSE batches have been successfully completed the Internship projects under the guidance of your esteemed scientists.

We would like to request you to consider our 3 batches of CSE students internship projects for this duration May-June, 2024.

Thanking You



Dr. Manjunath Kotari

Professor & Head, CSE

AIET, Moodbidri
H. O. D.

Dept. Of Computer Science & Engineering
Alva's Institute of Engg. & Technology
Mijar, MOODBIDRI - 574 225



Dr. Peter Fernandes

Principal

AIET, Moodbidri
PRINCIPAL

Alva's Institute of Engg. & Technology,
Mijar. MOODBIDRI - 574 225, D.K

राष्ट्रीय सुदूर संवेदन केंद्र National Remote Sensing Centre
प्रबंधन प्रणाली क्षेत्र Management Systems Area (MSA)
प्रशिक्षण, शिक्षण एवं जनसम्पर्क समूह Training, Education & Outreach group
जनसम्पर्क सुविधा जीडीमेटला Outreach Facility-Jeedimetla

दिनांक Date: 10/05/2024

एम ए फ़ैज़ी M A Fyzee

समूह निदेशक, प्रशिक्षण, शिक्षण एवं जनसम्पर्क समूह
Group Director, Training, Education & Outreach group
NRSC: ORF:2024/May/ 164

To
Dr Manjunath Kotari,
HOD, Dept., of CSE
Alva's Institute of engineering and technology,
Belagavi, Karnataka.

महोदय/ महोदया Dear Sir/Madam

विषय: एनआरएससी में विद्यार्थी प्रोजेक्ट Sub: Student Project/ Internship at NRSC.

With reference to your above letter this is to inform you that **Mr V Bhavani Krishna**, student of B.E is permitted to undertake project work/Internship at NRSC. Duration of the project/Internship is from 13/05/2024 to 26/06/2024.

Shri Venkatesh D, ASD/AS&LSPG/ECSA has been identified as his/her/their Guide. The above student/students are advised to work in **offline** mode with him/her to carry out the project.

छात्रों के लिए आवश्यकता The students are required to:

- I. Be regular in work during the project period.
- II. On completion of the project, submit a project report in soft copy to the Guide and to the undersigned.
- III. Obtain prior written permission from NRSC for publication of the Project work/ results and share authorship with NRSC project guide for publications/presentations.
- IV. **Project completion certificate will be issued by TEOG upon submission of Soft & Hard copies of Project Document along with the Project Closeout Presentation.**

yours sincerely

एम ए फ़ैज़ी

(एम ए फ़ैज़ी M A Fyzee)

Copy to:

1. **Mr V Bhavani Krishna**
2. Dr Manjunath Kotari, HOD, Dept., of CSE
3. GD, TEOG
4. PPEG
5. Project Guide – **Shri Venkatesh D** - Kindly ensure that the student completes the assigned work.
6. Head, ASD – **Dr Alok Taori**
7. DD, ECSA



[Handwritten signature]

राष्ट्रीय सुदूर संवेदन केंद्र National Remote Sensing Centre
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Group Director, Training, Education & Outreach group
NRSC: ORF:2024/May/ 162

To
Dr Manjunath Kotari,
HOD, Dept., of CSE
Alva's Institute of engineering and technology,
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महोदय/ महोदया Dear Sir/Madam

विषय: एनआरएससी में विद्यार्थी प्रोजेक्ट **Sub:** Student Project/ Internship at NRSC.

With reference to your above letter this is to inform you that **Ms K G Shreya**, student of B.E is permitted to undertake project work/Internship at NRSC. Duration of the project/Internship is from 13/05/2024 to 25/06/2024.

Shri Syed Shadab, WS&ISD/ECSA has been identified as his/her/their Guide. The above student/students are advised to work in **offline** mode with him/her to carry out the project.

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Copy to:

1. **Ms K G Shreya**
2. Dr Manjunath Kotari, HOD, Dept., of CSE
3. GD, TEOG
4. PPEG
5. Project Guide – **Shri Syed Shadab** - Kindly ensure that the student completes the assigned work.
6. DD, ECSA



Handwritten signature

राष्ट्रीय सुदूर संवेदन केंद्र National Remote Sensing Centre
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Group Director, Training, Education & Outreach group
NRSC: ORF:2024/May/ 161

To
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विषय: एनआरएससी में विद्यार्थी प्रोजेक्ट Sub: Student Project/ Internship at NRSC.

With reference to your above letter this is to inform you that **Ms Ankitha Anand Joshi**, student of B.E is permitted to undertake project work/Internship at NRSC. Duration of the project/Internship is from 13/05/2024 to 25/06/2024.

Shri Syed Shadab, WS&ISD/ECSA has been identified as his/her/their Guide. The above student/students are advised to work in **offline** mode with him/her to carry out the project.

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Copy to:

1. **Ms Ankitha Anand Joshi**
2. Dr Manjunath Kotari, HOD, Dept., of CSE
3. GD, TEOG
4. PPEG
5. Project Guide – **Shri Syed Shadab** - Kindly ensure that the student completes the assigned work.
6. DD, ECSA



[Signature]

राष्ट्रीय सुदूर संवेदन केंद्र National Remote Sensing Centre
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Group Director, Training, Education & Outreach group
NRSC: ORF:2024/May/ 168

To
Dr Manjunath Kotari,
HOD, Dept., of CSE
Alva's Institute of engineering and technology,
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महोदय/ महोदया Dear Sir/Madam

विषय: एनआरएससी में विद्यार्थी प्रोजेक्ट **Sub:** Student Project/ Internship at NRSC.

With reference to your above letter this is to inform you that **Mr Neerav V Patel**, student of B Tech is permitted to undertake project work/Internship at NRSC. Duration of the project/Internship is from 13/05/2024 to 25/06/2024.

Shri Hareef Baba Shaeb K, ASD/AS&LSPG/ECSA has been identified as his/her/their Guide. The above student/students are advised to work in **offline** mode with him/her to carry out the project.

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(एम ए फ़ैज़ी M A Fyzee)

Copy to:

1. **Mr Neerav V Patel**
2. Dr Manjunath Kotari, HOD, Dept., of CSE
3. GD, TEOG
4. PPEG
5. Project Guide - **Shri Hareef Baba Shaeb K** - Kindly ensure that the student completes the assigned work.
6. Head, ASD – **Dr Alok Taori**
7. DD, ECSA



(Handwritten signature)

राष्ट्रीय सुदूर संवेदन केंद्र National Remote Sensing Centre
प्रबंधन प्रणाली क्षेत्र Management Systems Area (MSA)
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जनसम्पर्क सुविधा जीडीमेदला Outreach Facility-Jeedimetla

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Group Director, Training, Education & Outreach group
NRSC: ORF:2024/May/174

दिनांक Date: 10/05/2024

To
Dr Manjunath Kotari,
HOD, Dept., of CSE
Alva's Institute of engineering and technology,
Belagavi, Karnataka.

महोदय/ महोदया Dear Sir/Madam

विषय: एनआरएससी में विद्यार्थी प्रोजेक्ट Sub: Student Project/ Internship at NRSC.

With reference to your above letter this is to inform you that **Mr Sathish S**, student of B Tech is permitted to undertake project work/Internship at NRSC. Duration of the project/Internship is from 13/05/2024 to 25/06/2024.

Shri Rounaq Goenka, ASD/AS&LSPG/ECSA has been identified as his/her/their Guide. The above student/students are advised to work in **offline** mode with him/her to carry out the project.

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(एम ए फ़ैज़ी M A Fyzee)

Copy to:

1. **Mr Sathish S**
2. Dr Manjunath Kotari, HOD, Dept., of CSE
3. GD, TEOG
4. PPEG
5. Project Guide – **Shri Rounaq Goenka** - Kindly ensure that the student completes the assigned work.
6. Head, ASD – **Dr Alok Taori**
7. DD, ECSA



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राष्ट्रीय सुदूर संवेदन केंद्र National Remote Sensing Centre

प्रबंधन प्रणाली क्षेत्र Management Systems Area (MSA)

प्रशिक्षण, शिक्षण एवं जनसम्पर्क समूह Training, Education & Outreach group

जनसम्पर्क सुविधा जीडीमेटला Outreach Facility-Jeedimetla

दिनांक Date: 10/05/2024

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समूह निदेशक, प्रशिक्षण, शिक्षण एवं जनसम्पर्क समूह

Group Director, Training, Education & Outreach group

NRSC: ORF:2024/May/ 160

To

Dr Manjunath Kotari,

HOD, Dept., of CSE

Alva's Institute of engineering and technology,

Belagavi, Karnataka.

महोदय/ महोदया Dear Sir/Madam

विषय: एनआरएससी में विद्यार्थी प्रोजेक्ट **Sub:** Student Project/ Internship at NRSC.

With reference to your above letter this is to inform you that **Ms Archana G Hublikar**, student of B.E is permitted to undertake project work/Internship at NRSC. Duration of the project/Internship is from 13/05/2024 to 25/06/2024.

Shri Hareef Baba Shaeb K, ASD/AS&LSPG/ECSA has been identified as his/her/their Guide. The above student/students are advised to work in **offline** mode with him/her to carry out the project.

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(एम ए फ़ैज़ी M A Fyzee)

Copy to:

1. **Ms Archana G Hublikar**
2. Dr Manjunath Kotari, HOD, Dept., of CSE
3. GD, TEOG
4. PPEG
5. Project Guide - **Shri Hareef Baba Shaeb K** - Kindly ensure that the student completes the assigned work.
6. Head, ASD – **Dr Alok Taori**
7. DD, ECSA



Santhosh

राष्ट्रीय सुदूर संवेदन केंद्र National Remote Sensing Centre
प्रबंधन प्रणाली क्षेत्र Management Systems Area (MSA)
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समूह निदेशक, प्रशिक्षण, शिक्षण एवं जनसम्पर्क समूह

Group Director, Training, Education & Outreach group

NRSC: ORF:2024/May/ 170

To

Dr Manjunath Kotari,

HOD, Dept., of CSE

Alva's Institute of engineering and technology,

Belagavi, Karnataka.

महोदय/ महोदया Dear Sir/Madam

विषय: एनआरएससी में विद्यार्थी प्रोजेक्ट **Sub:** Student Project/ Internship at NRSC.

With reference to your above letter this is to inform you that **Mr Shahir Bilagi**, student of B Tech is permitted to undertake project work/Internship at NRSC. Duration of the project/Internship is from 13/05/2024 to 25/06/2024.

Shri Venkatesh D, ASD/AS&LSPG/ECSA has been identified as his/her/their Guide. The above student/students are advised to work in **offline** mode with him/her to carry out the project.

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Copy to:

1. **Mr Shahir Bilagi**
2. Dr Manjunath Kotari, HOD, Dept., of CSE
3. GD, TEOG
4. PPEG
5. Project Guide - **Shri Venkatesh D** - Kindly ensure that the student completes the assigned work.
6. Head, ASD – **Dr Alok Taori**
7. DD, ECSA



Santh

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Group Director, Training, Education & Outreach group
NRSC: ORF:2024/May/ 165

To
Dr Manjunath Kotari,
HOD, Dept., of CSE
Alva's Institute of engineering and technology,
Belagavi, Karnataka.

महोदय/ महोदया Dear Sir/Madam

विषय: एनआरएससी में विद्यार्थी प्रोजेक्ट Sub: Student Project/ Internship at NRSC.

With reference to your above letter this is to inform you that **Mr Gurukiran P**, student of B.E is permitted to undertake project work/Internship at NRSC. Duration of the project/Internship is from 13/05/2024 to 26/06/2024.

Shri Rounaq Goenka, ASD/AS&LSPG/ECSA has been identified as his/her/their Guide. The above student/students are advised to work in **offline** mode with him/her to carry out the project.

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(एम ए फ़ैज़ी M A Fyzee)

Copy to:

1. **Mr Gurukiran P**
2. Dr Manjunath Kotari, HOD, Dept., of CSE
3. GD, TEOG
4. PPEG
5. Project Guide – **Shri Rounaq Goenka** - Kindly ensure that the student completes the assigned work.
6. Head, ASD – **Dr Alok Taori**
7. DD, ECSA



(Handwritten signature)

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Group Director, Training, Education & Outreach group
NRSC: ORF:2024/May/ 167

To
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HOD, Dept., of CSE
Alva's Institute of engineering and technology,
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महोदय/ महोदया Dear Sir/Madam

विषय: एनआरएससी में विद्यार्थी प्रोजेक्ट Sub: Student Project/ Internship at NRSC.

With reference to your above letter this is to inform you that **Ms Reshna Nandipi**, student of B.E is permitted to undertake project work/Internship at NRSC. Duration of the project/Internship is from 13/05/2024 to 25/06/2024.

Shri Hareef Baba Shaeb K, ASD/AS&LSPG/ECSA has been identified as his/her/their Guide. The above student/students are advised to work in **offline** mode with him/her to carry out the project.

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Copy to:

1. **Ms Reshna Nandipi**
2. Dr Manjunath Kotari, HOD, Dept., of CSE
3. GD, TEOG
4. PPEG
5. Project Guide - **Shri Hareef Baba Shaeb K** - Kindly ensure that the student completes the assigned work.
6. Head, ASD – **Dr Alok Taori**
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Group Director, Training, Education & Outreach group
NRSC: ORF:2024/May/ 169

To
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HOD, Dept., of CSE
Alva's Institute of engineering and technology,
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महोदय/ महोदया Dear Sir/Madam

विषय: एनआरएससी में विद्यार्थी प्रोजेक्ट Sub: Student Project/ Internship at NRSC.

With reference to your above letter this is to inform you that **Mr Vikhyath Rai M S**, student of B.E is permitted to undertake project work/Internship at NRSC. Duration of the project/Internship is from 13/05/2024 to 25/06/2024.

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- III. Obtain prior written permission from NRSC for publication of the Project work/ results and share authorship with NRSC project guide for publications/presentations.
- IV. **Project completion certificate will be issued by TEOG upon submission of Soft & Hard copies of Project Document along with the Project Closeout Presentation.**

yours sincerely

एम ए फ़ैज़ी

(एम ए फ़ैज़ी M A Fyzee)

Copy to:

1. **Mr Vikhyath Rai M S**
2. Dr Manjunath Kotari, HOD, Dept., of CSE
3. GD, TEOG
4. PPEG
5. Project Guide – **Shri Syed Shadab** - Kindly ensure that the student completes the assigned work.
6. DD, ECSA



(Handwritten signature)

राष्ट्रीय सुदूर संवेदन केंद्र National Remote Sensing Centre
प्रबंधन प्रणाली क्षेत्र Management Systems Area (MSA)
प्रशिक्षण, शिक्षण एवं जनसम्पर्क समूह Training, Education & Outreach group
जनसम्पर्क सुविधा जीडीमेटला Outreach Facility-Jeedimetla

दिनांक Date: 10/05/2024

एम ए फ़ैज़ी M A Fyzee

समूह निदेशक, प्रशिक्षण, शिक्षण एवं जनसम्पर्क समूह
Group Director, Training, Education & Outreach group
NRSC: ORF:2024/May/ 163

To
Dr Manjunath Kotari,
HOD, Dept., of CSE
Alva's Institute of engineering and technology,
Belagavi, Karnataka.

महोदय/ महोदया Dear Sir/Madam

विषय: एनआरएससी में विद्यार्थी प्रोजेक्ट Sub: Student Project/ Internship at NRSC.

With reference to your above letter this is to inform you that **Mr Shetty Yash Chandrashekhar**, student of B.E is permitted to undertake project work/Internship at NRSC. Duration of the project/Internship is from 13/05/2024 to 25/06/2024.

Shri Venkatesh D, ASD/AS&LSPG/ECSA has been identified as his/her/their Guide. The above student/students are advised to work in **offline** mode with him/her to carry out the project.

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3. GD, TEOG
4. PPEG
5. Project Guide – **Shri Venkatesh D** - Kindly ensure that the student completes the assigned work.
6. Head, ASD – **Dr Alok Taori**
7. DD, ECSA



[Handwritten signature]

राष्ट्रीय सुदूर संवेदन केंद्र National Remote Sensing Centre
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दिनांक Date: 10/05/2024

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Group Director, Training, Education & Outreach group
NRSC: ORF:2024/May/ 166

To
Dr Manjunath Kotari,
HOD, Dept., of CSE
Alva's Institute of engineering and technology,
Belagavi, Karnataka.

महोदय/ महोदया Dear Sir/Madam

विषय: एनआरएससी में विद्यार्थी प्रोजेक्ट Sub: Student Project/ Internship at NRSC.

With reference to your above letter this is to inform you that **Ms Harshika**, student of B.E is permitted to undertake project work/Internship at NRSC. Duration of the project/Internship is from 13/05/2024 to 25/06/2024.

Shri Rounaq Goenka, ASD/AS&LSPG/ECSA has been identified as his/her/their Guide. The above student/students are advised to work in **offline** mode with him/her to carry out the project.

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Copy to:

1. **Ms Harshika**
2. Dr Manjunath Kotari, HOD, Dept., of CSE
3. GD, TEOG
4. PPEG
5. Project Guide - **Shri Rounaq Goenka** - Kindly ensure that the student completes the assigned work.
6. Head, ASD – **Dr Alok Taori**
7. DD, ECSA



(Signature)



NRSC Project Presentation Report

Internship Project Title: Developing a Multi-Parameter AI Model for Predicting PM2.5 Levels

Project Mates: Neerav V Patel, Reshna Nandipi

Place of the Internship Project Carried Out: NRSC, Hyderabad

Guide: K. Hareef baba shaeb, Sci./Engr. 'SF', ASD/ECSA, NRSC, ISRO

Date & Venue of Presentation: 23rd July 2024 and AIET, Mijar

Introduction to the Presentation: Air pollution, particularly particulate matter with a diameter of less than 2.5 micrometers (PM2.5), poses significant health and environmental risks worldwide. Accurate prediction of PM2.5 concentrations is crucial for effective public health management, air quality control, and the formulation of environmental policies. This project aims to develop a sophisticated multi-parameter artificial intelligence model to accurately predict PM2.5 concentrations across India, with initial training focused on Karnataka.

Importance of Predicting PM2.5 Levels: PM2.5 can penetrate deep into the lungs and even enter the bloodstream, causing a variety of health problems such as respiratory and cardiovascular diseases. Understanding and predicting its levels can help mitigate these health risks.

Overview of the AI Model: The AI model integrates Long Short-Term Memory networks and Convolutional Neural Networks. The LSTM component captures temporal dependencies, while the CNN component extracts spatial features from aerosol optical thickness (AOT) and other relevant environmental parameters.

40-Year Dataset from MERRA-2: The model is trained on 40 years of high-resolution atmospheric data from the Modern-Era Retrospective analysis for Research and Applications, Version 2 (MERRA-2), covering the period from 1983 to 2022.

Detailed Explanation of the Project Objectives:

1. Comprehensive Data Collection and Preprocessing:

- **Data Sources:** Utilize high-resolution atmospheric datasets from MERRA-2.
- **Data Cleaning and Preparation:** Implement rigorous data cleaning protocols to handle missing values, normalize datasets, and ensure data quality.

2. Advanced Feature Engineering:

- **Feature Selection:** Identify and select relevant environmental parameters that influence PM2.5 levels, such as AOT, temperature, humidity, and wind speed.
- **Feature Transformation:** Develop new features through transformations and combinations of existing parameters to enhance the predictive power of the model.



3. Development of the LSTM-CNN Hybrid Model:

- **Model Architecture:** Design a hybrid model that combines LSTM networks to capture temporal dependencies and CNNs to extract spatial features.
- **Training Process:** Train the model using the collected dataset, employing techniques such as data splitting into training, validation, and test sets, and optimizing the model through hyperparameter tuning.

4. Model Evaluation and Validation:

- **Evaluation Metrics:** Use metrics like Root Mean Square Error (RMSE), Mean Absolute Error (MAE), and R^2 score to assess the model's performance and accuracy.
- **Validation:** Conduct thorough validation of the model's predictions against actual PM2.5 measurements to ensure reliability and robustness.

5. Prediction and Analysis:

- **Prediction of PM2.5 for 2022:** Use the trained model to predict PM2.5 concentrations for the year 2022, providing insights into recent air quality trends and dynamics.
- **Performance Analysis:** Analyze the model's performance, identifying strengths, weaknesses, and areas for improvement. This includes examining prediction errors and their potential causes.

Feature Engineering Techniques: Feature engineering plays a crucial role in enhancing the predictive power of the model by selecting and transforming relevant environmental parameters like AOT, temperature, humidity, and wind speed.

Model Architecture and Development Process: The model architecture combines LSTM and CNN components, leveraging the strengths of both types of neural networks. The LSTM component captures the temporal dynamics of the data, while the CNN component extracts spatial features.

Evaluation Metrics and Their Significance: Evaluation metrics like RMSE, MAE, and the R^2 score are used to assess the model's accuracy and reliability. These metrics provide a comprehensive understanding of the model's performance.

Discussion Questions

1. What were the major challenges faced during data preprocessing?
2. How does the hybrid LSTM-CNN model improve prediction accuracy?
3. What are the key environmental parameters affecting PM2.5 levels?

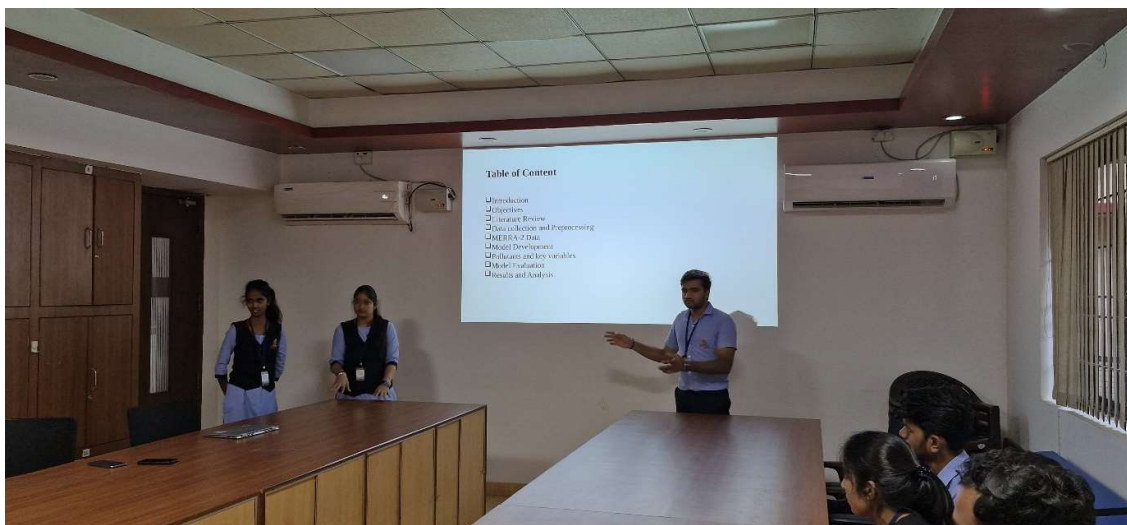
Conclusion

Summary of the Project Outcomes: The outcome of this project is a predictive model that provides actionable insights for air quality management, supporting public health initiatives, and informing environmental policies across India.

Insights Gained from the Model Predictions: The model's predictions for PM2.5 concentrations in 2023 provide valuable insights into recent air quality dynamics, highlighting the strengths and areas for improvement.

Implications for Air Quality Management and Policy-Making: Discuss the implications of the model's predictions for air quality monitoring and management, emphasizing how this advanced AI model can support efforts to mitigate the adverse effects of air pollution.

Future Research Directions and Potential Enhancements: Suggest directions for future research and potential enhancements to the model, such as incorporating additional data sources, refining the model architecture, or applying the model to other geographical regions.





ALVA'S INSTITUTE OF ENGINEERING & TECHNOLOGY

Shobhavana Campus Mijar, Moodbidri , D.K. Karnataka 574225

(Autonomous Institution affiliated to VTU, Belagavi)

(Accredited by NAAC with A+ Grade, and Accredited by NBA New Delhi 2019-2025)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
