



ANNAMACHARYA UNIVERSITY

EXCELLENCE IN EDUCATION; SERVICE TO SOCIETY
(ESTD, UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)
Rajampet, Annamayya District, A.P – 516126, INDIA

REPORT ON GUEST LECTURE

Title: RECENT ADVANCES IN IMAGE-BASED STRUCTURAL HEALTH MONITORING

Resource Person: Dr. Vaddemani Guru Prathap Reddy

Assistant Professor (Grade-II)

Associate Dean (P&D)

Department of Civil Engineering

National Institute of Technology (NIT), Nagaland

ANNAMACHARYA UNIVERSITY

Formerly, ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES::RAJAMPET
Estd. under Andhra Pradesh Private Universities (Establishment and Regulation) Act, 2016



A SPECIAL TALK ON



RECENT ADVANCES IN IMAGE-BASED STRUCTURAL HEALTH MONITORING



RESOURCE PERSON

Dr. V. Guru Prathap Reddy
Asst. Professor (G-II) and Associate
Dean (P&D), Department of Civil
Engineering, NIT Nagaland

Organized by:

Civil Engineering Department,
Annamacharya University

5th January 2026

Time 10:00 A.M- 12:00 P.M.

Civil Engineering
Department Smart
class room
(Room no :202)





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Educational Background

Dr. V. Guru Prathap Reddy obtained his **Ph.D. in Structural Engineering** from **NIT Warangal** (2018– 2023). His doctoral research focused on Structural Condition Assessment and Service Life Estimation of Deteriorating Concrete using Imaging-Based Analysis. The research developed a novel non-destructive methodology for quantifying concrete deterioration due to chemical attacks using digital image processing, color-space analysis, and reliability modeling approaches.

He completed his M.Tech in Computer Aided Structural Engineering from JNTUA College of Engineering, Anantapur, and B.Tech in Civil Engineering with First Class with Distinction.

Academic and Research Experience

Dr. V. Guru Prathap Reddy is currently serving as Assistant Professor (Grade-II) at NIT Nagaland. He has earlier worked as a Senior Research Fellow and Junior Research Fellow at NIT Warangal, contributing extensively to experimental and analytical research in structural health monitoring and concrete durability. He also has prior teaching experience at REVA University and KLM College of Engineering.

Research Interests

- Image-Based Structural Health Monitoring (SHM)
- Digital Image Correlation (DIC)
- Digital Image Processing (DIP)
- Concrete Deterioration and Durability
- Computer Vision and Machine Learning
- Structural Reliability and Retrofitting
- Non-Destructive Testing Techniques

Technical Expertise Highlighted in the Lecture

The lecture emphasized:

- Digital Image Correlation (DIC) for full-field, non-contact measurement of displacement and strain
- Digital Image Processing techniques for assessing chemical deterioration in concrete
- Use of CIE XYZ, Lab, and HSI color spaces to correlate surface color changes with residual compressive strength
- Development of durability loss indices and service life estimation frameworks
- Application of Fokker–Planck equations for reliability modeling of deteriorating RCC structures

Professional Contributions

Dr. V. Guru Prathap Reddy has published extensively in SCI and Scopus indexed journals such as *Measurement*, *Construction and Building Materials*, *Structures*, and *Computers and Concrete*. He also serves as a reviewer for reputed journals including *IEEE Sensors and Structures*.

He has handled several consultancy and condition assessment projects involving hospitals, public buildings, metro rail bridges, and RCC structures using non-destructive evaluation methods like Rebound Hammer, UPV, and DIC.



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Outcome of the Guest Lecture

The lecture provided valuable exposure to modern non-destructive and image-based monitoring techniques, enabling students to understand advanced tools used in structural assessment, durability evaluation, and infrastructure maintenance. The session effectively bridged the gap between theoretical concepts and real-world applications in civil engineering practice.

The guest lecture on “Recent Advances in Image-Based Structural Health Monitoring” was successfully conducted with the active participation of nearly 60 members, including students and faculty. The session was well-organized and informative, covering fundamental concepts of Structural Health Monitoring along with recent developments in image-based techniques. The resource person explained the topic in a clear and engaging manner using practical examples, real-time applications, and case studies. Participants gained valuable knowledge about modern monitoring tools, damage detection methods, and their importance in improving the safety and performance of civil engineering structures. The interactive discussion session further enhanced understanding and interest among the attendees.

Overall Impact

The guest lecture significantly enhanced students’ understanding of:

- Advanced SHM techniques
- Practical applications of imaging and computer vision in civil engineering
- Emerging research trends in concrete durability and infrastructure health monitoring

The program contributed meaningfully to achieving **Program Outcomes (POs)** related to engineering knowledge, modern tool usage, problem analysis, and professional practice.

CONTENTS

- Introduction to Structural Health Monitoring (SHM)
- Need for Image-Based Monitoring
- Recent Technological Advances
- Image Processing Techniques in SHM
- Real-Time Applications & Case Studies
- Benefits and Challenges
- Future Scope of Image-Based SHM

Course Outcomes (COs)

CO1: Understand principles and applications of image-based SHM using Digital Image Correlation (DIC).

CO2: Apply digital image processing and color-space techniques to assess concrete durability and deterioration.

CO–PO–PSO Mapping

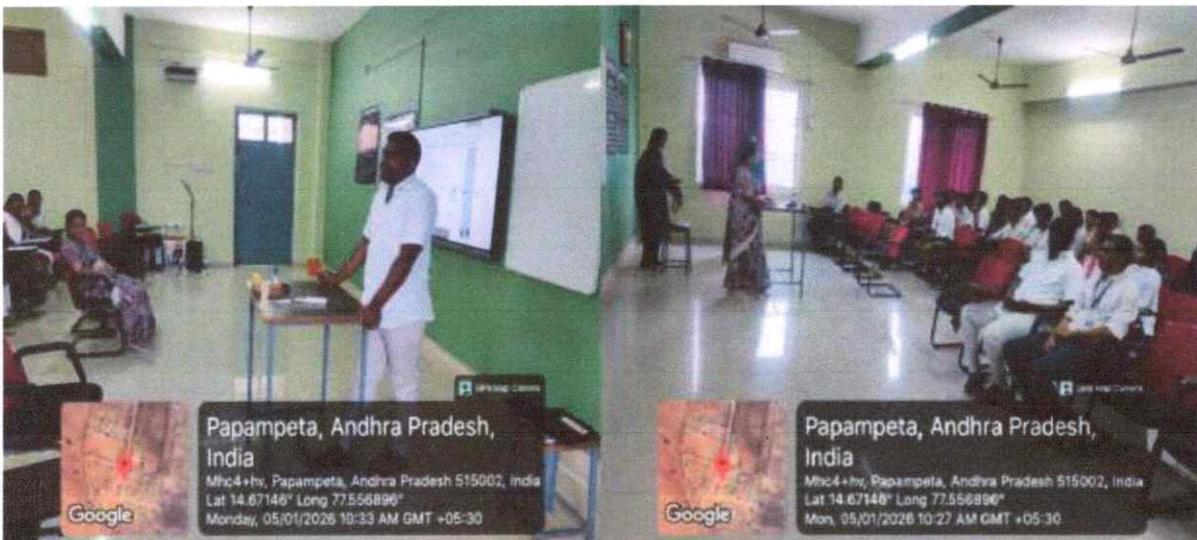
| CO \ PO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 |
|------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|
| CO1 | 3 | 2 | – | 2 | 3 | – | – | – | 1 | 1 | – | 3 | 2 |
| CO2 | 2 | 3 | 2 | 3 | 3 | – | 2 | – | 1 | 1 | – | 2 | 3 |



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**Picture: Lecture Images for Recent Advances in Image-Based Structural Health Monitoring
SDG Justification**



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| SDG No. | SDG Goal | Program Outcome / Activity Contribution |
|---------|---|---|
| SDG 9 | Industry, Innovation and Infrastructure | The guest lecture promotes the adoption of advanced image-based technologies for monitoring and improving the performance and safety of civil engineering infrastructure, fostering innovation and sustainable development. |
| SDG 11 | Sustainable Cities and Communities | The program enhances awareness on structural safety and resilience, contributing to the development of sustainable and disaster-resistant urban infrastructure. |
| SDG 12 | Responsible Consumption and Production | The application of SHM techniques supports preventive maintenance and efficient resource utilization by minimizing material wastage and reconstruction needs. |
| SDG 13 | Climate Action | The lecture highlights the role of monitoring systems in improving structural response to climate-induced hazards, thereby supporting climate-resilient infrastructure. |

Event Co-ordinators:

Mr. D. Rama Bhupal Reddy,
Assistant Professor,
Dept. of Civil Engineering

Dr. S. Venkata Vara Prasad,
Assistant Professor,
Dept. of Civil Engineering

HoD-CE

Dr. N.R. Gowthami