CURRICULUM VITAE

Dr. Umesh Hule

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PROFESSIONAL EXPERIENCE	
Senior Project Scientist Indian Institute of Technology Delhi, India **Research project:** Development of non-destructive test methods for measuring the depth of carbonation front in concrete structures. Independently managing research projects, leading the development of innovative electrochemical and non-destructive testing techniques for concrete durability assessment, and mentoring M.Tech. and Ph.D. students in research planning, experimental investigations, data interpretation, and publication of scientific results.	*01/07/2026 – Present*
Prime Minister's Research Fellow (PMRF), PhD Researcher Indian Institute of Technology Madras, India **Research outputs:** Conducted research on carbonation-induced corrosion and the durability of low-clinker reinforced concrete, and developed predictive service-life models, in addition, developed embedded sensing systems for long-term durability monitoring of reinforced concrete structures.	*02/08/2022 – 02/08/2025*
Junior Engineer Tirupati Construction Pvt. Ltd. **Key Responsibilities:** Assisted in surveying activities for a National Highway project, monitoring site progress and coordinating labour, construction equipment, and material resources. Estimated earthwork quantities and supervised subgrade preparation in accordance with design profiles and project specifications. Gained practical experience in highway construction and site management under real field conditions while applying engineering principles to optimize equipment scheduling, improve construction productivity, and maintain high safety standards.	*04/01/2019 – 15/06/2019*
EDUCATION	
Ph.D. (Civil Engineering) Indian Institute of Technology Madras, Chennai, India, 600036 **Thesis:** Carbonation-induced corrosion in steel in low-clinker concretes and service life design **CGPA: 9.00/10**	*02/08/2021-02/07/2026*
M.TECH. (Construction Management) College of Engineering Pune (COEP), Pune, India, 411005 **Project:** Development of Project Definition Rating Index (PDRI) for Tunnels **CGPA: 8.54/10**	*01/07/2019-01/08/2021*
B. E. (Civil Engineering) Maharashtra Institute of Technology (MIT), Pune, India, 411038. **Project:** Feasibility analysis of sewage sludge digestion using anaerobic reaction **Percentage: 73.4 %** (First Class with Distinction)	*01/07/2014-10/10/2018*

RESEARCH PROJECTS UNDERTAKEN	
The project on "*High-Performance Concretes for Nuclear Power Plants in Coastal Regions – Corrosion and Service-Life Assessment* **(**Project funding: ₹30 lakhs). Conducted research on the use of corrosion inhibitors and nanoparticles to enhance the corrosion resistance of reinforcing steel and extend the service life of reinforced concrete structures exposed to aggressive marine environments. **Role:** Designed and executed the experimental programme, supervised research assistants, and coordinated regular testing and data collection. Evaluated the effectiveness of corrosion inhibitors and nanoparticles in enhancing reinforcement corrosion resistance, assessed corrosion progression under different exposure conditions, and estimated the service life of reinforced concrete structures. Recommended optimum mix designs to achieve enhanced durability and extended service life for nuclear infrastructure in splash and submerged exposure zones.	*15/08/2021 – 15/07/2024*
Joint research project between IIT Madras, India, and Holcim Innovation Centre, France, on "C*arbonation and carbonation-induced corrosion in concretes incorporating supplementary cementitious materials (SCMs)"* **(**Project funding: €25,000). Investigated the corrosion resistance of reinforcing steel in SCM concretes, developed predictive service-life models, and proposed strategies to enhance the long-term durability of low-carbon reinforced concrete structures. **Role:** Managed specimen preparation, accelerated and natural carbonation exposure, and durability testing. Independently conducted carbonation depth measurements and evaluated the long-term corrosion performance of low-clinker systems using electrochemical techniques. Maintained regular technical communication with the Holcim team through progress reports, coordinated the subsequent project phase, and supported continued funding discussions based on the research outcomes.	*01/05/2022 – 15/03/2025*

RESEARCH OUTPUTS

JOURNAL PUBLICATION

- **U. Hule,** R.G. Pillai, Corrosion of steel in concretes with fly ash and limestone calcined clay exposed to carbon dioxide, Constr. Build. Mater. 515 (2026) 145620. https://doi.org/10.1016/j.conbuildmat.2026.145620.
  → First comprehensive investigation of corrosion behaviour in carbonated LC3 concrete, providing durability design recommendations for low-carbon reinforced concrete.
- **U. Hule,** S. Rathnarajan, R. G. Pillai, R. Gettu, and M. Santhanam, "10-year natural carbonation of concretes with limestone, flyash, volcanic ash, and slag and exposed to tropical climate in India," Data in Brief, 2024. https://data.mendeley.com/datasets/gkcf2z4ts5/1.
  → Presents an open-access long-term experimental dataset on natural carbonation of SCM concretes, providing valuable benchmark data for validating carbonation and durability models.
- Hule, U., & Pillai, R. G. Corrosion initiation characteristics of steel in limestone calcined clay concrete (LC3) and exposed to carbon dioxide (**Under review**).
  →Identifies the corrosion initiation mechanisms and critical carbonation threshold for reinforcing steel in LC3 concrete, providing fundamental insights for durability assessment and service-life design of reinforced concrete.
- Hule, U., & Pillai, R. G. Corrosion propagation and durability design of reinforced concrete with limestone calcined clay (LC3) exposed to carbon dioxide (Under consideration)
- Hule, U., Pillai, R. G., Gettu, R., & Santhanam, M. Long-term durability of reinforced concrete structure with LC3 under coastal environmental conditions - a case study of demonstration structure (Under consideration)

PATENTS

- Hule, U., Sivakumar, A., & Pillai, R. G. Durable embedded sensors for long-term monitoring of microclimate at/near the surface of steel in concrete (**Provisional patent Filed**)
- Hule, U., Sivakumar, A., & Kamde D.K. Development of an embedded resistivity sensor system for non-destructive measurement of carbonation depth in concrete (Patent application under examination)

PEER-REVIEWED CONFERENCE PROCEEDINGS

- U. Hule, C. Pichaimuthu, R.G. Pillai, "Corrosion resistance of steel in limestone calcined clay cement (LC3) with corrosion inhibitor subjected to carbonation", International Conference on Condition Assessment, Rehabilitation & Retrofitting of Structures (CARRS 2025), IIT Roorkee, India, **(Best paper award)**
- U. Hule, R.G. Pillai, "Carbonation-induced corrosion characteristics of steel-cementitious systems with fly ash and limestone calcined clay-based binders" for the 79th RILEM Annual Week & ICONS 2025 International Conference on Advances in Engineering and Technology for sustainable development, Hanoi, Vietnam
- U. Hule, C. Pichaimuthu, and R.G. Pillai, "Effect of corrosion inhibiting admixtures on corrosion characteristics of steel in carbonating nanoparticles-based fly ash concrete" for the 10th international conference on concrete under severe conditions- Environment and loading (CONSEC24), Chennai, India
- U. Hule, R.G. Pillai, "Assessing steel corrosion resistance in limestone calcined clay cement (LC3) with corrosion inhibitor exposed to carbonation" for the 78th RILEM Annual Week & RILEM Conference on Sustainable Materials & Structures: SMS 2024, Toulouse France
- U. Hule, R.G. Pillai, "Characterizing $pH_{threshold}$ and estimating service life of various steel cementitious systems" for the 77th RILEM Annual Week and the 1st Interdisciplinary Symposium on Smart & Sustainable Infrastructures (ISSSI 2023), Vancouver Canada.
- U. Hule, S. Rathnarajan, S. Jain, R. G. Pillai, and M. Santhanam, "Carbonation and carbonation-induced corrosion in limestone calcined clay (LC3) concrete systems" International Conference on Condition Assessment, Rehabilitation & Retrofitting of Structures (CARRS 2023), Hyderabad, India
- S. Rathnarajan, U. Hule, R. G. Pillai, and R. Gettu, "Long-Term Natural Carbonation in Concretes with Fly Ash and Limestone Calcined Clay Systems," in International RILEM Conference on Synergising Expertise towards Sustainability and Robustness of Cement-based Materials and Concrete Structures, Cham: Springer Nature Switzerland, 2023, pp. 1133–1140.

COMPETITIVE FUNDING & FELLOWSHIPS/INTERNSHIPS

• Prime Minister's Research Fellowship (PMRF)	*02/08/2022 – 02/08/2025*
• JASSO Research Internship (Japan)	*01/02/2025-01/03/2025*
• Visiting Research Scholar, University of Cape Town, South Africa	*01/01/2026-28/02/2026*

TEACHING EXPERIENCE

• NPTEL TA for the Advance Concrete Technology	*05/01/2025-05/05/2025*
• NPTEL TA for the Admixture and Special Concrete	*01/02/2025-01/06/2025*
• NPTEL TA for the Advanced Topics in Science and Technology of Concrete	*04/07/2024-10/11/2024*

• NPTEL (PMRF TA) for the Modern Construction Materials	*10/04/2024-15/08/2024*
• NPTEL (PMRF TA) for the Basic Construction Materials	*05/07/2023-15/11/2023*
• NPTEL (PMRF TA) for the Design of Reinforced Concrete Structures	*04/03/2023-10/07/2023*
• NPTEL (PMRF TA) for the Maintenance and Repair of Concrete Structures	*14/07/2022-15/11/2022*
SELECTED INTERNATIONAL CONFERENCE PRESENTATIONS	
• 5th International Conference on Calcined Clay for Sustainable Concrete (ICCCSC 2026), Cape Town, South Africa	*05/02/2026*
• International Conference on Condition Assessment, Rehabilitation & Retrofitting of Structures (CARRS 2025), IIT Roorkee, India	*12/12/2025*
• Innovations in Concrete" in 6th Asian Conference on Ecstasy in Concrete (ACECON 2025), Hyderabad, India	*07/12/2025*
• 79th RILEM Annual Week & ICONS 2025 International Conference on Advances in Engineering and Technology for sustainable development, Hanoi, Vietnam	*23/08/2025*
• 2nd CORTEM 2025 - CII International Summit on Corrosion Technology & Management, Chennai	*01/07/2025*
• Third International Conference on Construction Materials and Structures "Synergy of Materials and Structures (ICCMS-2025), IIT Tirupati, India	*05/07/2025*
• The 10th international conference on concrete under severe conditions- Environment and loading (CONSEC24), Chennai, India	*25/09/2024*
• The 78th RILEM Annual Week & RILEM Conference on Sustainable Materials & Structures: SMS 2024, Toulouse France	*26/08/2024*
• The 77th RILEM Annual Week and the 1st Interdisciplinary Symposium on Smart & Sustainable Infrastructures (ISSSI 2023), Vancouver Canada.	*06/09/2023*
WORKSHOP ATTENDED	
• Third Edition of Research Scholars Meeting on Electrochemistry, Corrosion and Coatings (RSM-ECC 3.0)	*05/11/2025*
• The GIAN Course on Design and Construction of Precast Concrete Buildings	*05/07/2025*
• 2nd CORTEM 2025 - CII International Summit on Corrosion Technology & Management, Chennai	*20/07/2025*
• 7th One-day workshop on Corrosion and its Control in Concrete Structures (C3S), IIT Madras Research Park, Chennai, India	*10/10/2024*
• Two days Training program on Science and Application of LC3, IIT Delhi, India	*05/05/2024*
• GIAN course on Corrosion prevention and control: Importance in the era of sustainable development	*10/04/2023*
• A week on building industry-academia collaboration on Technologies for Low Carbon & Lean Construction, Chennai, India	*10/02/2023*
• Calcined Clays for Sustainable Concrete (CCSC 2022), Lausanne, Switzerland	*05/07/2022*
• Seminar on Corrosion Control in Concrete Structures (C3S), Chennai, India	*15/12/2021*
• 2-Day International Workshop on Advances in Technologies for Low Carbon & Lean Construction	*05/12/2021*
• International Virtual Workshop on Advances in Tunneling and Underground Construction, Organized by: Faculty of Tunnel Engineering at MIT-WPU	*20/03/2021*
• International conference on Advances in Construction Technology and Management (ACTM-2021), Organized by: COEP	*10/01/2021*

PROFESSIONAL ACTIVITIES	
• Member, RILEM Technical Committee TC-313 MMS- Modelling and experimental validation of moisture state in bulk cementitious materials and at the steel-concrete interface • Member, RILEM Technical Committee TC-314 OCM- On-site Corrosion Condition Assessment, Monitoring and Prediction • Observer, RILEM Technical Committee TC-329- CUC- Carbon dioxide uptake by concrete during and after service life • Observer, RILEM Technical Committee - Corrosion-Related Durability Properties of Low-Carbon Concrete • Peer reviewer for international journals in the field of concrete durability, carbonation, corrosion, and low-carbon cementitious materials.	*25/08/2024-present* *01/03/2026-present*

REFERENCES

Dr. Radhakrishna G. Pillai Professor at Dept. of Civil Eng., Indian Institute of Technology Madras Chennai, India- 600 036 **E-mail ID:** pillai@civil.iitm.ac.in	**Dr. Deepak Kamde** Assistant Professor, at Dept. of Civil Eng., Indian Institute of Technology Delhi Delhi - 110016, India **E-mail ID:** kamdedk@iitd.ac.in