

## Curriculum Vitae

### **Karthikeyan Manickam**

Doctoral Research Scholar  
Building Technology & Construction Management (BTCM) Division  
Department of Civil Engineering  
Indian Institute of Technology Madras  
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#### **EDUCATION**

- **Ph.D. in Civil Engineering (Building Materials)** *Ongoing*  
Indian Institute of Technology Madras, Chennai, India  
CGPA: 8.27  
Area of research: “Corrosion mechanisms and cathodic protection of grouted post-tensioned concrete systems”
- **M.E. in Construction Engineering and Management** *April 2018*  
College of Engineering, Guindy, Anna University, Chennai, Tamil Nadu  
CGPA: 9.37/10  
Thesis title: “A feasibility study on the concrete made with micronized biomass silica, M-sand and copper slag as replacement materials.”
- **B.E. in Civil Engineering** *April 2015*  
PSG College of Technology, Coimbatore, Tamil Nadu  
CGPA: 8.69/10  
Thesis title: “Synthesis of titanium dioxide nanoparticles and its partial replacement for cement in concrete and beam-column joint.”

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#### **AREA OF INTEREST**

- Repair and rehabilitation of concrete structures
- Corrosion assessment of prestressed concrete systems
- Cathodic protection of prestressed concrete systems
- Use of supplementary cementing materials in concrete

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#### **AWARDS AND ACHIEVEMENTS**

- Recipient of NACE Foundation India scholarship 2020
- Recipient of KN Chintamani memorial award for best project work titled “Synthesis of titanium dioxide nanoparticles and its partial replacement for cement in concrete and beam-column joint”, PSG College of Technology, 2015.
- Secured school second rank in Higher Secondary Board Examination, Nirmala Matriculation Higher Secondary School, Chidambaram, 2011

## ACADEMIC RESEARCH WORK

### 1. Corrosion mechanisms and cathodic protection of grouted post-tensioned concrete systems

- *Ph.D. work under the guidance of Dr. Radhakrishna G. Pillai, Associate Professor, Indian Institute of Technology Madras, Chennai, India (ONGOING)*

Post-tensioned (PT) concrete systems are widely used throughout the world for the construction of highway and railway bridges. These systems are generally designed for a service life of more than 100 years. However, premature strand corrosion has been observed largely. The main reason for corrosion is attributed to the formation of voids near the anchorage zone. The presence of humidity in these regions accelerates the galvanic corrosion. Cathodic protection using galvanic anodes is one of the proven technologies to control corrosion in concrete systems. The research focuses on the galvanic corrosion mechanisms in PT systems and the feasibility of corrosion control using galvanic anodes.

### 2. A feasibility study on the concrete made with micronized biomass silica, M-sand and copper slag as replacement materials

- *M. Tech. project work under the guidance of Prof. K.C. Pazhani, College of Engineering Guindy, Anna University, Chennai, India.*

Micronized biomass silica (MBS) a pozzolanic material produced from rice husk was used as a partial replacement of cement to improve the performance of the concrete containing M-sand and copper slag as full replacement for fine aggregate. The replacement level of MBS are 10%, 20%, 30% of cement and the replacement ratio of M Sand and copper slag are (40% - 60%), (50% - 50%) and (60% - 40%) for fine aggregate. Microstructure investigation of concrete specimens was also performed. Experimental results are illustrated such as compressive strength, split tensile strength, flexural strength, water absorption and sorptivity of concrete. This concrete has considerable potential to be used as a sustainable material in the Indian construction industry

### 3. Synthesis of titanium dioxide nanoparticles and its partial replacement for cement in concrete and beam-column joint

- *B.E. project work under the guidance of Mr. G. Venketraman, Assistant professor, PSG College of Technology, Coimbatore, India.*

Titanium dioxide nano particles prepared through planetary ball milling were used for strength enhancement of concrete. Titanium dioxide was replaced in 1%, 2%, 3%, 4% by weight of cement in cement mortar and 1% by weight of cement in concrete. HRTEM was performed for the characterization of nano TiO<sub>2</sub>. The concrete specimens with above stated 1% of TiO<sub>2</sub> nano particles were tested for compressive strength, flexural strength, splitting tensile, modulus of elasticity and the obtained results evidently showed that strength and ductility parameters were increased comparing to control specimens. Further, Beam-Column junction was replaced with TiO<sub>2</sub> embedded concrete and was subjected to Quasi-static load. Test results showed a delayed failure

of the junction compared to the control specimens which proves that the ductility parameter had been enhanced.

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### **INTERNATIONAL CONFERENCE PAPER**

- **Karthikeyan M.**, Srinivasan V., Pazhani K.C., “Experimental evaluation on micronized biomass silica with M-sand and copper slag as fine aggregates in concrete” Advances in Construction Materials and Structures, IIT Roorkee, Uttarakhand, India, March 7-8, 2018.
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### **POSTER PRESENTATIONS**

1. **Manickam K. and Pillai R.G.**, “Understanding the compatibility issue in void re-grouting of post-tensioned concrete systems” CORCON 2019, Mumbai, India.
  2. **Manickam K. and Pillai R.G.**, “Cathodic prevention of prestressed concrete systems” Concrete Research in India (CRI) symposium, IIT Bombay, India.
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### **WORK EXPERIENCE**

- **Graduate Teaching Assistant** *2018 – Present*  
Indian Institute of Technology Madras, Chennai, India
    - CE 2330 – Civil Engineering Materials and Construction  
Prepared question papers and graded answer sheets
    - CE 5120 – Maintenance and Rehabilitation of Constructed Facilities  
Prepared question papers and graded answer sheets
    - NPTEL course – Maintenance and Repair of Concrete Structures
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### **INTERNSHIPS**

- **Research internship** at Institute of Building Materials Research and Chair of Building Materials, **RWTH Aachen University**, Aachen, Germany, under the supervision of Prof. Michael Raupach for 30 days.
  - 30 days summer training with Southern Railways, Chennai, India
  - 15 days summer training with Neyveli Lignite Corporation (NLC), Tamil Nadu.
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## PROFESSIONAL SOCIETY MEMBERSHIP AND ACTIVITIES

- Student Member of NACE Gateway India Section (NIGIS) – South zone student section (July 2018 – till date)
- Volunteered in session management team during CORCON 2019, Mumbai, a conference organized by NACE Gateway India Section

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## SKILL SET

Software : AutoCAD, Autodesk Revit, STAAD.Pro,

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## REFERENCES

Dr. Radhakrishna G. Pillai (Associate Professor) Department of Civil Engineering, Indian Institute of Technology Madras Email: pillai@civil.iitm.ac.in Ph: +91-44-2257 4303	Dr. Manu Santhanam (Professor) Department of Civil Engineering Indian Institute of Technology Madras Email: manus@iitm.ac.in Ph: +91- 44 – 2257 4283
Dr. Piyush Chaunsali (Assistant Professor) Department of Civil Engineering, Indian Institute of Technology Madras Email: pchaunsali@iitm.ac.in Ph: +91-44-2257 4312	