SOORAJ KUMAR A. O. NAIR

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EDUCATION

- **Doctor of Philosophy (Ph.D.)** in Civil Engineering
  Arizona State University (ASU), Tempe, USA 2017 - Present

- **Master of Science (M.S.)** in Civil Engineering
  Indian Institute of Technology Madras (IITM), Chennai, India 2014 - 2017

- **Bachelor of Technology (B.Tech)** in Civil Engineering
  National Institute of Technology Calicut (NITC), Kozhikode, India 2010 - 2014

SCHOLARSHIPS/ AWARDS

1 **Graduate Research Assistantship** (Duration: 2014-2017)
Awarded by Ministry of Human Resources and Development, India for students eligible under the national level Graduate Aptitude Test in Engineering.

2 **Best Poster Award – CORCON 2016**
One out of the 5 best posters, among 22 candidates at *CORCON 2016 – International conference and expo on corrosion* organised by NACE International held at New Delhi on September 18-21, 2016.

3 **Best Project Award – ESIC 2017**
Project titled "A Low Cost Extensometer for Civil/Mechanical Engineering Research Laboratories in Developing Countries" selected as the 'Best Project' under 'National Level' category in 'Civil Engineering' stream in the *Engineering Students Innovation Challenge (ESIC) 2017* organised by International Society for Scientific Research and Development (ISSRD), India during January 2017.

4 **Best M.S. Student Award – CEA 2017**
Awarded by the Civil Engineering Association (CEA, IIT Madras) on behalf of the Department of Civil Engineering, IIT Madras for the academic year 2016-17.

5 **Best Master's Thesis Award – NIGIS-SZ 2017**
Awarded by the National Association of Corrosion Engineers (NACE) Gateway India Section – NIGIS as part of the 'NIGIS Corrosion Awareness Awards – 2017' for the best master's level student thesis for the academic year 2016-17.

6 **Best Poster (Honorary mention) – Arizona State University 2018**
Awarded by School of Sustainability Engineering and Built Environment (SSEBE), ASU as part of the '8th Annual SSEBE Graduate Research Symposium' for the best poster presentation for the academic year 2017-2018.

7 **Best Student Research Video – American Ceramic Society**
Awarded by American Ceramic Society as part of the '9th Advances in Cement Based Materials (CEMENTS 2018)' held at Pennstate University for the best student research video during June 2018.

RESEARCH/ACADEMIC EXPERIENCE

ACADEMIC PROJECTS

❖ **Ph.D. in Civil Engineering**, Arizona State University, Tempe, USA
- Thesis on the "**Performance based mix design of 3D printable (3DP) binders**"
  Under the guidance of Dr. Narayanan Neithalath, Professor, ASU (2017 - Present)

- Mix proportioning and extrusion of 3DP binders
- **Rheological and extrusion characterization** of cementitious/ alkali activated 3DP binders
- Dimensional, rheological, and mechanical **post-print characterization of 3DP binders**

❖ **M.S. in Civil Engineering**, Indian Institute of Technology Madras (IITM) Chennai, India
- Thesis on "**Corrosion and mechanical characteristics of Quenched and Self-Tempered steel reinforcing bars used in reinforced concrete structures**"
  Under the guidance of Dr. Radhakrishna G. Pillai, Asst. Professor, IIT Madras (2014 - 2017)

- Identification and understanding the effects of uneven cross-sectional phase distribution on mechanical and electrochemical properties of QST steel bars
- Experience in **connecting micro level properties to the macro level** (tensile and corrosion) properties
- Developed a user-friendly test setup and acceptance criteria for in-situ practice
- Exposure to a **wide range of experimental tests and equipment**
- Experience in **designing mechanical setups and instrumentation**
- Executed a student project in the **design and fabrication of a low-cost clip-on type extensometer (strain gauge based)** as a partial fulfilment towards the master's degree

❖ **B.Tech. in Civil Engineering**, National Institute of Technology Calicut (NITC), Kerala, India
- Major project on "Development of a material management model in highway construction projects" – Under the guidance of Dr. Arun C., Associate Professor, NITC (2010 - 2014)

- Experience in data collection and assimilation, predicting distribution curves, and application in modelling

- Aimed at data collection of road construction projects (quantity survey reports, project management schedule) and its **statistical evaluation**
- The final output was a **base level computer aided simulation model** (using ARENA© software package) applying the statistical conclusions to minimize idle time and maximize productivity in highway construction

▪ Student project on "**Performance characteristics of Bamboo Reinforced Concrete (BRC) Wall Panels**" – Under the guidance of Dr N. Ganesan, Professor, NITC (2013 - 2014)

- The partial sustainable replacement for steel by bamboo was studied using **Bamboo Reinforced Concrete**. The scope was limited to **wall panels for the use in small scale housing projects**. The wall panels were tested for axial and eccentric compression (flexure), for specific aspect ratios and slenderness ratios

INTERNSHIPS

1 Research Internship at Civil Engineering Department, IIT Madras under the guidance of Dr. Radhakrishna G. Pillai during May - July 2013. Study on "Mixture proportioning of flowable cementitious grouts for Post tensioned Segmental bridges"
Leading a group of 4 students from various institutions, rigorous testing and analysis of data on different grout mixes for post tensioning was executed. Final results were **published at a conference meet** at the end of a three and a half month study

PUBLICATIONS/ PRESENTATIONS

❖ JOURNAL

1 **Sooraj A. O. Nair** and Radhakrishna G. Pillai, 'TM-ring test' - A quality control test for TMT (or QST) steel reinforcing bars used in reinforced concrete systems, *Indian Concrete Institute Journal*, 18 (1), 27-35, July

2 **Sooraj A. O. Nair**, Hussam Alghamdi, Aashay Arora, Iman Mehdipour, Gaurav Sant, and Narayanan Neithalath, Microstructural packing, rheology, and ram extrusion characteristics of 3D-printable cementitious binders, *Cement and Concrete Composites*, Elsevier (Under review)

❖ CONFERENCE

1 Ashokreddy Annapareddy, **Sooraj Kumar**, Tejaswi Annapareddy, Akilesh Ramesh, Chelsa Mariam and Radhakrishna G. Pillai. "Flowable grout for post-tensioned segmental concrete bridges", *Proceedings of R N Raikar Memorial International Conference*, December 20-21, 2013, Mumbai, 345-351, India Chapter of ACI

2 **Sooraj A.O. Nair**, Gokul P.R., Sethuraj R., Nandipati S., Radhakrishna G. Pillai., "Variations in microstructure and mechanical properties of Thermo-Mechanically-Treated (TMT) steel reinforcement bars", *Proceedings of the 4th Asian Conference on Ecstasy in Concrete (ACECON)*, October 08-10, 2015, Kolkata, 325-331, Indian Concrete Institute

3 **Sooraj A.O. Nair**, Radhakrishna G. Pillai. "Localized chloride-induced corrosion of quenched and self-tempered (QST) steel rebar due to discontinuous peripheral tempered martensite phase", *Proceedings of the Concrete Service Life Extension conference*, May 23-25, 2016, Florida, NACE International

4 **Sooraj A.O. Nair**, Radhakrishna G. Pillai, Ravindra Gettu. "Corrosion characteristics of Quenched & Self-Tempered steel reinforcement bars", *Proceedings of the International RILEM conference on Materials, Systems and Structures in Civil Engineering 2016*, August 21-24, 2016, Lyngby, Denmark, RILEM

5 **Sooraj A.O. Nair**, Radhakrishna G. Pillai, Ravindra Gettu. "Corrosion characteristics of Quenched & Self-Tempered steel reinforcement bars", *Proceedings of the International RILEM conference on Materials, Systems and Structures in Civil Engineering 2016*, August 21-24, 2016, Lyngby, Denmark, RILEM

6 **Sooraj A.O. Nair**, Hussam Alghamdi, and Narayanan Neithalath, Modelling Extrusion-Based 3D Printing of Cement-Based Materials, *9th Advances in Cement-Based Materials (Cements 2018)*, June 11-12, Pennsylvania, USA

7 Pu Yang, **Sooraj A.O. Nair**, and Narayanan Neithalath, Discrete Element Simulations of Rheological Response of Cementitious Binders as applied to Extrusion-Based 3D Printing, *Proceedings of the RILEM 1st International Conference on Concrete and Digital Fabricaton*, September 10-12, 2018, Zurich, Switzerland, RILEM

❖ PRESENTATIONS

1 Radhakrishna G. Pillai, Jayachandran Karuppanasamy, Dhanya B. S., **Sooraj A.O. Nair**, Manu Santhanam, Ravindra Gettu. "Enhancing the corrosion resistance of reinforced concrete structures - Indian Scenario and challenges ahead", *International Conference and Expo on Corrosion (CORCON)*, November 19-21, 2015, Chennai, NACE International

2 Prabha Mohandoss, **Sooraj A.O. Nair**, Sreeram K.K., Shree K. Maheswari, Radhakrishna G. Pillai. "Factors affecting performance of bond in pre tensioned concrete systems", *Gordon Research Conference 2016*, July 31 - August 5, 2016, Hong-Kong, Gordon Research Conferences

3 **Sooraj A.O. Nair**, Abhinav R., Mitra Pradeep, Aiswarya R., Suhail Ishack, Radhakrishna G. Pillai. "Microstructural phase distribution and corrosion characteristics of Thermo Mechanically Treated(TMT) steel reinforcement bars", *CORCON 2016 – International conference and expo on corrosion*, September 18-21, 2016, New Delhi, NIGIS-SZ NACE International

4 **Sooraj A.O. Nair**, and Radhakrishna G. Pillai. "Corrosion and mechanical characteristics of Quenched & Self-Tempered (QST/TMT) steel reinforcing bars used in concrete structures", *CORROSION 2018*, April 15-18, 2016, Phoenix, USA, NACE International

5 **Sooraj A. O. Nair**, Hussam Alghamdi, Aashay Arora, and Narayanan Neithalath. "3D printing of concrete: Rheology and extrusion characterization of amenable binders", *8th Annual SSEBE Graduate Research Symposium*, February 16, Tempe, USA, Arizona State University

PATENTS FILED

Pillai, R.G., and Nair, S.A.O (inventors), "TM-Ring Test: Method of Testing TMT/QST Steel Reinforcing Bars", Ref. No. 201741036718, October 2017, Provisional application, Pending.

PROFESSIONAL MEMBERSHIPS

- American Concrete Institute (ACI) – Student member
- American Society of Civil Engineers (ASCE) – Student member
- National Association of Corrosion Engineers (NACE) – Student member
- Society for Failure Analysis (SFA) – Life member

POSITIONS HELD

- Volunteer, Indian Students Association, ASU (2017-18)
- Student Mentor, Global Guides Programme, ASU (2018-19)
- Graduate Student Secretary, Civil Engineering Association, IITM (2015-16)
- Placement Co-ordinator, Civil Engineering Department, IITM (2015)
- Graduate Student Mentor (Civil), MiTr (Institute student support initiative), IITM (2015-16)
- Joint Secretary, Civil Engineering Association, NITC (2013-14)
- Placement Co-ordinator, Civil Engineering Department, NITC (2014)
- Student Co-ordinator, ICI (Indian Concrete institute-NITC Chapter) (2013-14)

SKILL SET SUMMARY

- Confident in experimental work, instrumentation, and test method development
- Good command over written English and presentation skills
- Confident in programming skills (computer languages: C, C++, HTML)
- Exposed to software packages including MS Office, AutoCAD, Visual Studio, MATLAB, Sketchup, ARENA, and Adobe Photoshop
- Languages known: Fluent in English and Malayalam; Knows Hindi, Tamil, and German