

Visiting Faculty
Department of Civil Engineering
Indian Institute of Technology Palakkad
Ahalia Integrated Campus,
Palakkad, 678557, India
Email: sknayar@iitpkd.ac.in,
sunithasanthoshnair@gmail.com
Phone: +91 96001 52118

Dr. Sunitha K. Nayar

EDUCATION

- **Ph. D. in Civil Engineering** **April 2016**
Indian Institute of Technology Madras, Chennai, India
- **M. Tech. (with Distinction) in Structural Engineering** **May 2004**
National Institute of Technology Calicut, Kerala, India
- **B. Tech. (Honors) in Civil Engineering** **March 1998**
N. S. S. Engineering College Palakkad, Calicut University, Kerala, India

WORK EXPERIENCE

- **Visiting Faculty** (since December 2017)
Indian Institute of Technology Palakkad, Kerala, India
- **Women Scientist – WOS-A** (August 2015-December 2017)
Indian Institute of Technology Madras, Chennai, India
- **Doctoral Research Scholar** (July 2009-July 2015)
Indian Institute of Technology Madras, Chennai, India
- **Assistant Professor (SG)** (Jan 2009-July 2009)
Amrita School of Engineering, Amrita Vishwa Vidyapeetham Univ., Coimbatore, India
- **Assistant Professor** (July 2007-December 2008)
Amrita School of Engineering, Amrita Vishwa Vidyapeetham Univ., Coimbatore, India
- **Senior Lecturer** (July 2004-June 2007)
Amrita Institute of Technology, Coimbatore. India
- **Lecturer** (January 1999-June 2004)
Amrita Institute of Technology and Science, Coimbatore. India
- **Industry Experience as Engineer** (March 1998 – January 1999)
Thomas Panicker and Associates, Architects, Trivandrum, India

PUBLICATIONS

- **Journal articles published**

5. **Nayar, S. K., and Gettu, R., (2020)** Mechanistic – empirical design of fibre reinforced concrete (FRC) pavements using inelastic analysis, *Sādhanā*, Vol. 45, No. 19, 7 p., <https://doi.org/10.1007/s12046-019-1255-1>
4. **Nayar, S. K., and Gettu, R., (2017)** Design Methodology for Fibre Reinforced Concrete Slabs-on-grade Based on Inelastic Analysis, *Indian Concrete Journal*, Vol. 91, No. 3, pp 26-36
3. **Nayar, S. K and Gettu, R., (2016)** Benefits of Using Amorphous Metallic Fibres in Concrete Slabs-on-grade, *RILEM Technical Letters*, Open Access Journal of International Union of Laboratories and Experts in Construction Materials, Systems and Structures, RILEM, [S. I.], Vol. 1, Dec. 2016, pp. 122-128. ISSN 2518-0231.
2. **Nayar, S. K., and Gettu, R., (2015)** Synergy in Toughness by Incorporating Amorphous Metal and Steel Fibres, *ACI Materials Journal*, Vol. 112, No. 6, pp 821-827.
1. **Nayar, S. K., Gettu, R., and Krishnan, S., (2014)** Characterisation of the Toughness of Fibre Reinforced Concrete - Revisited in the Indian Context, *Indian Concrete Journal*, Vol. 88, No. 2, pp 8–23.

- **Book chapter**

1. **Nayar, S. K., and Gettu, R., (2016)** A Comprehensive Methodology for Design of Fibre Reinforced Concrete Pavements, Fibre-reinforced concrete: From design to structural applications, *joint publication of American Concrete Institute – International Federation for Structural Concrete CEB - fib, ACI SP 310 & fib Bulletin 79*, pp 321-330.

- **Books edited**

1. **Santhanam, M., Gettu, R., Pillai, R. G., and Nayar, S. K., (2017)**, Advances in Construction Materials and Systems Vol. 1-4 (Proc. of International Conference ICACMS 2017), RILEM Publications S.A.R.L., Bagnueux, France.
ISBN: 978-2-35158-190-2 SET
e-ISBN: 978-2-35158-191-9 (online version)
ISBN:978-2-35158-193-3 Vol. 1 Keynotes, 192 p.
ISBN: 978-2-35158-194-0 Vol. 2 Concrete, 662 p.
ISBN:978-2-35158-195-7 Vol. 3 Concrete suite, 644 p.
ISBN:978-2-35158-196-4Vol. 4 Others, 744 p.

• **Peer reviewed international conference articles** (*Name indicates the presenter)

6. ***Nayar, S. K., and Gettu, R.**, (2016), Assessment of a Design Methodology for FRC Slabs-on-grade, *Proceedings of BEFIB 2016, Ninth RILEM International Conference on Fibre Reinforced Concrete*, Vancouver. Canada, pp 1369-1384
5. ***Gettu, R., and Nayar, S. K.**, (2015), A Design Methodology for Fibre Reinforced Concrete Slabs-on-grade, *Proceedings of 27th Biennial National Conference of the Concrete Institute of Australia in conjunction with the 69th RILEM Week conference (Concrete 2015)*, Australia, pp 443-452.
4. ***Nayar, S. K. and Gettu, R.**, (2014), A Design Methodology for Fibre Reinforced Concrete Pavements and Slabs-on-grade, *Proceedings of 10th fib International Ph. D symposium*, Quebec, Canada, pp 51-56.
3. ***Nayar, S. K. and Gettu, R.**, (2014), A Comprehensive Methodology for the Design of Fibre Reinforced Concrete Pavements, *Proceedings of Joint ACI-fib International workshop on FRC: From design to structural applications, FRC 2014*, Montreal, Canada, pp 453-464.
2. **Nayar, S. K., and *Gettu, R.**, (2012), On the Design of Steel Fibre Reinforced Concrete Pavements and Slabs-on-grade, *Proceedings of BEFIB 2012, Eighth RILEM International Conference on Fibre Reinforced Concrete.*, Guimarães, Portugal, 11 p.
1. **D'costa, G., *Nayar, S. K., and Gettu, R.**, (2011), Sustainability Assessment of Steel Fibre Reinforced Concrete Pavements, *Proceedings of the International conference on Structural engineering, Construction and Management, ICSECM 2011*, Kandy, Sri Lanka, 15 p.

• **Peer reviewed national conference articles**

8. **Premavathy, A., *Nayar, S. K., Jeyanthi. R, Ravindra Gettu, Manu Santhanam, Pascal Boustingorry and Shyam Sundar G.**, (2018) Assessment of a Methodology for Formulation of Robust Self-Compacting Concrete Mixes, *Proceedings of the 3rd R.N. Raikar Memorial International Conference and Gettu-Kodur International Symposium on Advances in Science and Technology of Concrete*, 14-15 December, Mumbai, India
7. ***Nayar, S. K., and Gettu, R.**, (2015), A Methodology for Designing Fibre Reinforced Concrete Pavements, *Proceedings of 3rd Conference of Transportation Research Group of India, CTRG 2015*, December 2015, **Awarded the Best Poster in the conference poster presentation section.**
6. **Nayar, S. K., and *Gettu, R.**, (2015), Performance of Concrete Reinforced with Combinations of Amorphous Metallic and Conventional Steel Fibres, *Proceedings of 4th Asian conference on Ecstasy in concrete, ICI-ACECON 2015*, October 2015, pp 21-28.
5. ***Nayar, S. K., and Gettu, R.**, (2012), On the Design of Fibre Reinforced Concrete Slabs-on-Grade and Pavements, *Proceedings of the Conference on Fibre Reinforced Concrete – Global Developments, FIBCON 2012*, Nagpur, February, pp 85-92.

- 4 **Nayar, S. K., and *Gettu, R.,** (2012), Characterization of Fibre Reinforced Concrete, *Proceedings of the Conference on Fibre Reinforced Concrete – Global Developments, FIBCON 2012*, Nagpur, pp 30-47.
- 3 ***Nayar, S. K., and Gettu, R.,** (2011), On the Toughness-Based Design of Steel Fibre Reinforced Concrete Pavements, *Proceedings of 1st Conference of the transportation research group of India, CTRG*, Bangalore, India, 12 p.
- 2 **Nayar, S. K., D’costa, G., and *Gettu, R.,** (2010), Special concretes for Pavement Construction, *National Workshop on Sustainable pavements: Practices, Challenges and Direction*, IIT Madras.
- 1 ***Nayar, S.K., Gettu, R., Aravind, T., Ajox, F. H., and Satheesh, B.,** (2010), Flexural Toughness Testing of Steel Fibre Reinforced Concrete, *Proceedings of Fourth CUSAT National Conference RACE 2010*, India, pp 105-110. **Awarded the best paper in the Structural Engineering section of the conference.**
 - **Technical Committee Recommendations (as a committee member)**
 - **ICI-TC/01.1**, Test Methods for the Flexural Strength and Toughness Parameters of Fiber Reinforced Concrete, ICI Technical Committee Recommendation, Indian Concrete Institute Journal, Vol. 15, No. 2, 2014, pp 39–43. – **The test configuration, test procedure and reporting methods described in the guidelines are based on the characterization program done as part of my Ph. D dissertation. Currently this TC recommendation is being circulated as a draft by the BIS to be adopted as a national standard.**
 - **ICI-TC/01.2**, Specifications for Reference Concretes to be used for Evaluating Fibres for Concrete Reinforcement, ICI Technical Committee Recommendation.
 - **ICI-TC/01.3**, Definitions, Specifications and Conformity Requirements for Steel Fibres to be Used as Concrete Reinforcement, ICI Technical Committee Recommendation.
 - **ICI-TC/01.4**, Definitions, Specifications and Conformity Requirements for Polymeric Fibres to be Used as Concrete Reinforcement, ICI Technical Committee Recommendation.

AWARDS AND GRANTS

- Indian National Academy of Engineers (INAE) Innovative Project Award (Doctoral Level) 2016.
- Indian Concrete Institute (ICI) (Chennai Centre) – UltraTech Award – 2016 for Outstanding Thesis in the field of Concrete in Tamil Nadu (Category – Doctoral)
- Best Poster Award at the 3rd Conference of Transportation Research Group of India, CTRG 2015, held at Kolkata, India
- Research grant from Department of Science and Technology (DST) under the Women Scientist Scheme (WOS-A) for a period of three years starting from August 2015.
- Best Paper Award at the Fourth CUSAT National Conference RACE 2010 held at Kochi, India.

SPONSORED RESEARCH PROJECTS

- *Title: Study of the deterioration mechanisms in glass textile reinforced concrete and improvement of its durability*, funded by SERB - Department of Science and Technology (DST), Govt. of India under the Core Research Grant (CRG) scheme, duration – 3years, Grant amount 54,81,900 INR, Role: Co- PI, Project period – 2020-2023.
- *Title: Development, Characterization and Prototype Application of High Performance Fibre Reinforced Concrete*, funded by Department of Science and Technology (DST), Govt. of India under the WOS-A program, duration – 3 years, Grant amount – 19 lakhs INR, Role: PI, Project period 2015-2018

CONSULTANCY PROJECTS

Checking and Vetting of Design Solution for FRC Flooring Submitted by Durafloor Concrete Solutions LLP, funded by Durafloor Concrete Solutions LLP, undertaken at IIT Palakkad, completed on 31st January 2019.

TEACHING EXPERIENCE

- **Undergraduate courses taught and number of batches**

Courses taught	No: of batches	Institution
Engineering Mechanics	2 batches of 80 and 120 students	IIT Palakkad
	18 batches of approximately 60 students each	AMRITA Univ.
Civil Engineering Materials and Construction Technology	1 batch of 28 students	IIT Palakkad
Environmental Engineering	1 batch of 23 students	IIT Palakkad
Engineering Economics and Management	1 batch of 23 students	IIT Palakkad
Strength of Materials	3 batches of 60 students each	AMRITA Univ.
Engineering Drawing	8 batches of 60 students each	AMRITA Univ.
Fluid Mechanics	2 batches of 60 students each	AMRITA Univ.
Dynamics	1 batch of 60 students	AMRITA Univ.
Basic Civil Engineering	4 batches of 60 students each	AMRITA Univ.

- **Other administrative and academic duties:**

- Assisted in purchase and upgradation of materials testing laboratory at IIT Palakkad.
- UG Board of Studies member when Civil Engineering Department was started at Amrita Vishwa Vidyapeetham during 2008-2009.
- Had initiated the setting up of Geotechnical laboratory in Amrita University during 2008-2009.
- Involved in the preparation of B. Tech curriculum when Amrita Vishwa Vidyapeetham University was being formed during 2002.
- Upgradation of the Strength of Materials laboratory at Amrita during 2000-2001.

- Served as the faculty advisor for 5 batches of UG students.
- Had been actively involved in all administrative activity at the Department level during the AICTE and NBA accreditation of Amrita University.
- Mentored many undergraduate students and conducted several remedial classes for all subjects to improve the performance of weak students.
- Served as the faculty advisor to the arts club at Amrita University

RESEARCH ACTIVITIES

- **Ph. D guidance – on going**
 - Co-guiding a Ph. D student at IIT Palakkad, *Area of research: Modelling of Flexural Characteristics of FRC using Deep learning techniques and Experimental Validation*
 - Co-guiding a Ph. D student registered in Kerala Technical University, Area of research: Development of White Topping Technology using Recycled Aggregates
- **As Women Scientist**
 - Completed a DST sponsored project as *Principal Investigator* under the DST-WOS scheme with grant of INR 17,00,000/-
 - Title of project: *Development, Characterization and Prototype Application of High Performance Fibre Reinforced Concrete*
 - Funding agency: *Department of Science and Technology, Govt. of India*
 - Duration of Project: 3 years
 - Project outcome:
 - 2 – refereed journal publications – 1 national and 1 international journal
 - 1 – refereed international conference publication
 - Mentor: Prof. Ravindra Gettu
 - Affiliated organization: IIT Madras
 - Technical experience gained:
 - Prepared the proposal, presented and defended the proposal at the assessment committee meeting
 - Maintained accounts of the project amount
- **As Co-investigator in consultancy project**
 - Title of project: Performance of self-compacting concrete with materials from two geographical areas
 - Organizations: CHRYSO India Pvt. Limited, IIT Madras
 - Consultancy amount: 91 lakhs
 - Duration of Project: 3 years
 - Project outcome: 1 refereed conference paper accepted for publication, 1 journal paper under preparation.
 - Roles and responsibilities
 - Coordinated project group working under sponsored consultancy projects including report preparation and interaction with clients.
 - Authoring technical articles related to the project
 - Preparation of project reports
 - Assisted in design consultancy for other leading clients such as Owens Corning, Bekaert Industries, TARA etc.

- **International Visits**

- Attended and presented paper at Vancouver, Canada during September 2016 at the Ninth RILEM International Conference on Fibre Reinforced Concrete, BEFIB 2016.
- Visited Politecnico de Milano during September-November 2014 for a period of one week as the student member under the Indo-Italian collaborative project titled “Study of Self-Healing Ability of Advanced Fibre Reinforced Cement Based Materials” within the Executive Program of Scientific and Technological Cooperation between Italian Republic and Republic of India
- Attended and presented paper at Montreal Canada during July 2014 at the Joint ACI-fib International workshop on FRC: From design to structural applications, FRC 2014.
- Attended and presented paper at Quebec, Canada during July 2014 at the 10th fib International Ph. D symposium.
- Attended and presented paper at Kandy, Sri Lanka during December 2011 at the International conference on Structural engineering, Construction and Management, ICSECM 2011.

RESEARCH INTERESTS

- Material modelling using deep learning techniques
- Development of robust techniques for special concretes
- Design of fiber reinforced concrete structures
- Physical and mechanical characterization of construction materials and systems
- Sustainability analysis of construction materials and systems
- Long term performance of high performance concrete systems

INVITED TALKS

- 12 “Special concrete – from application perspective”, at the three day training program on Advanced concrete technology – Tips on practical implementation conducted by KHRI Kerala PWD on 7th November 2018 at Thiruvananthapuram.
- 11 A keynote talk on “Inelastic design of fibre reinforced concrete pavements”, at the National Conference held on 18th April 2018 at FISAT, Kerala.
- 10 “Fibre reinforced concrete – fibre selection based on design”, at the One-day workshop on Quality Concrete Construction organized by Indian Concrete Institute (Kochi) on 24th February 2018.
- 9 “Mechanical Characterization of concrete systems”, at the two week Faculty Development Programme on “Advanced Concrete Technology” from 7th December to 20th December 2017 organized by Department of Civil Engineering, Mar Athanasius College of Engineering, Kothamangalam.
- 8 “Upcoming flooring guideline ICI TC/09”, at the Technology Conference on Industrial & Commercial Flooring held on 12-13 September 2017 at Mumbai.

- 7 “Challenges in developing robust SCC mixes”, at the two days National seminar on “Admixtures and Construction Chemicals” on 10th and 11th Aug 2017 by IE(I) Tamilnadu State Center
- 6 “Concrete Past, Present and Way forward”, at the Concrete cube testing competition at Vel’s University, Chennai on 08th March 2017.
- 5 “Upcoming flooring guideline ICI TC/09”, at the Technology Conference on Industrial & Commercial Flooring held on 27-28 September 2016 at Chennai Trade Centre.
- 4 “Characteristics of a Special Concrete” at Sri Sivasubramaniya Nadar College of Engineering, Chennai on 25th July 2016.
- 3 “Improving resistance to cracking of concrete”, at the National workshop ICCDR’16 at B S Abdur Rahman University, Chennai on 20th April 2016.
- 2 “How to control cracking in concrete systems?” at the national conference in Innovations and Sustainability in Civil Engineering and Technology, ISCET 2016 at E. S. Engineering College, Villupuram on 24th March 2016.
- 1 “Special Concretes and Application” and “Use of FRC in Pavement Application” at the 2-Day Seminar on Latest Innovations in Concrete, conducted by ICI Goa Chapter at Madgaon, Goa on 5-6 February 2016

PROFESSIONAL AND ACADEMIC SERVICES

- **Membership of Professional Bodies**
 - Affiliate Member of RILEM, International Union of Laboratories and Experts in Construction Materials, Systems and Structures
 - Life Member, Indian Concrete Institute
 - Life Member, India Society for Technical Education
- **Member of Technical Committees – 2**
 - ICI TC/01 - Technical Committee on Fibre Reinforced Concrete
Actively took part in drafting the document IC TC/01.1, Test Methods for the Flexural Strength and Toughness Parameters of Fiber Reinforced Concrete
Given inputs for the procedure, calculation and reporting for the same document based on the characterization program and the pre-normative developed based on Ph. D. dissertation work.
 - ICI TC/09 - Technical Committee of Flooring
Active in drafting of various chapters pertaining to design in the TC documents.
Assisting the TC chairman in organizing the periodic TC meetings.

PERSONAL PROFILE

Date of birth: 23/12/1975

Sex: Female

Marital status: Married

Nationality: Indian

Languages: English, Hindi, Malayalam, Tamil

REFERENCES

- **Prof. Ravindra Gettu**
Dean, Industrial Consultancy and Sponsored Research, and the Prof. V.S. Raju Chair
Professor
Department of Civil Engineering
Indian Institute of Technology Madras
1st Floor, IC&SR Centre
Chennai 600036, India
E-mail: gettu@iitm.ac.in

- **Prof. Pramod S. Mehta**
Professor and Former Dean (Academics)
Indian Institute of Technology (IIT) Palakkad,
Ahalia Integrated Campus, Kozhipara P. O,
Palakkad – 678557
Email: psmehta@iitpkd.ac.in

- **Prof. Manu Santhanam**
Professor and Head of Department of Civil Engineering
Department of Civil Engineering,
Indian Institute of Technology, Madras
Chennai, India 600036
Email: manusanthanam@gmail.com