

# Sumanta Haldar

Associate Professor of Civil Engineering  
School of Infrastructure  
Indian Institute of Technology Bhubaneswar  
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## Education

**Doctor of Philosophy** in Civil Engineering (Specialization in **Geotechnical Engineering**), Indian Institute of Science, Bangalore, September 2008. (**Thesis title:** Reliability based design methods of pile foundations under static and seismic loads). Course work : CGPA - 7.0 out of 8.0

**Bachelor of Engineering**, in Civil Engineering, Jadavpur University, Kolkata, July 2000, 79%, First class honors.

**Higher Secondary Examination**, in Science, April 1996. 76.3%, First class with star marks.

**Secondary Examination**, March 1994. 79%, First class with star marks.

## Research Focus

- Offshore Wind Energy Foundation
- Soil-Structure Interaction
- Dynamics of Soil and Foundation

## Career

**May 2016 – Present** : Associate Professor at IIT-Bhubaneswar

**July 2009 – May 2016** : Assistant Professor at IIT-Bhubaneswar

**August 2008 – July 2009**: Geotechnical Engineer at WS Atkins, Bangalore, India.

**August 2003 – July 2008**: Doctoral Research Scholar at Indian Institute of Science, Bangalore, India.

**September 2000 – August 2003**: Assistant Engineer at Simplex Infrastructures Ltd. (Formerly M/S Simplex Concrete Piles (I) Ltd.), New Delhi, India.

## Teaching Experience

- Soil Mechanics (UG)
- Soil Mechanics Laboratory (UG)
- Soil Dynamics (PG)
- Dynamics of Soil and Foundation (UG)
- Computer Aided Design Laboratory (UG)
- Geotechnical of Earthquake Engineering (UG & PG)
- Advanced Geotechnical and Structural Engineering Laboratory (PG)
- Transportation Engineering (UG)
- Transportation Engineering Laboratory (UG)
- Engineering Drawing (UG)

## Awards and Achievements

- **Visiting faculty** at Department of Civil Engineering, Lassonde School of Engineering, York University, Canada (May – July 2014)
- **Excellent Paper Award** received from the International Association for Computer Methods and Advances in Geomechanics (IACMAG) for the paper “Failure mechanisms of pile foundations in liquefiable soil: A parametric study.” by Haldar, S. and Sivakumar Babu, G.L. published in International Journal of Geomechanics, ASCE, 2010.
- **Prof. Leonard’s best Ph.D. thesis award** for 2008 & 2009 among all institutes in India from Indian Geotechnical Society (IGS), New Delhi, India.
- **Government of India scholarship** for pursuing doctoral program at IISc. Bangalore.

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- **National Merit Scholarship** in (10+2) Standard Examination by Government of India.
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**Publications**

**Peer Reviewed Journal Papers**

**International**

*Published /Accepted peer reviewed papers*

1. Bisoi, S and **Haldar, S.** (2016). "Impact of Climate Change on Dynamic Behavior of Offshore Wind Turbine." **Marine Georesources and Geotechnology** <http://dx.doi.org/10.1080/1064119X.2016.1257671> (In Press).
  2. Das, B., Saha, R., and **Haldar, S.** (2016). "Effect of in-situ variability of soil on seismic design of piled raft supported structure incorporating dynamic soil-structure-interaction." **Soil Dynamics and Earthquake Engineering** 84, 251-268.
  3. **Haldar, S.** and Basu, D. (2016). "Analysis of Beams on Heterogeneous and Nonlinear Soil." **International Journal of Geomechanics, ASCE**, Vol. 16, Issue 4,
  4. Bisoi, S. and Haldar S. (2015) Design of monopile supported offshore wind turbine in clay considering dynamic soil-structure-interaction. **Soil Dynamics and Earthquake Engineering** 73, 103-117
  5. Saha, R., **Haldar, S.**, and Dutta, S.C. (2015). "Influence of dynamic soil-pile raft-structure interaction: an experimental approach." **Earthquake Engineering and Engineering Vibration** 14 (4), 625-645
  6. Saha, R., Dutta, S.C., and **Haldar, S.** (2015). "Effect of raft and pile stiffness on seismic response of soil-piled raft-structure system." **Structural Engineering and Mechanics** 55 (1), 161-189
  7. Saha, R., Dutta, S.C., and **Haldar, S.** (2015). "Seismic response of soil-pile raft-structure system." **Journal of Civil Engineering and Management** 21 (2), 144-164.
  8. Bisoi, S., and **Haldar, S.** (2014). Dynamic analysis of offshore wind turbine in clay considering soil-monopile-tower interaction. **Soil Dynamics and Earthquake Engineering** 63, 19-35
  9. Dutta, S.C., Saha, R., and **Haldar S.** (2014). "Inelastic seismic behavior of soil-pile raft-structure system under bi-directional ground motion." **Soil Dynamics and Earthquake Engineering** 67, 133-157
  10. **Haldar, S.** and Basu, D. (2013). "Response of Euler-Bernoulli beam on spatially random elastic soil." **Computers and Geotechnics, Elsevier**, **50**, 110-128. <http://dx.doi.org/10.1016/j.compgeo.2013.01.002>
  11. **Haldar, S.** and Sivakumar Babu, G.L. (2012). "Response of vertically loaded pile in clay: A probabilistic study." **Geotechnical and Geological Engineering: An International Journal, Springer**, Volume 30, Issue 1, pp 187-196.
  12. **Haldar, S.** and Sivakumar Babu, G.L. (2010). "Failure mechanisms of pile foundations in liquefiable soil: A parametric study." **International Journal of Geomechanics, ASCE**, Vol. 10, No. 2, 74-84. DOI: 10.1061/(ASCE)1532-3641(2010)10:2(74).
  13. Srivastava, A., Sivakumar Babu, G.L. and **Haldar, S.** (2010). "Influence of spatial variability of permeability property on steady state seepage flow and slope stability analysis." **Engineering Geology, Elsevier**, Vol. 110, Issues 3-4, 93-101. DOI:10.1016/j.enggeo.2009.11.006.
  14. **Haldar, S.** and Sivakumar Babu, G.L. (2009). "Design of laterally loaded piles in clays based on cone penetration test data: A reliability based approach." **Geotechnique, Thomas Telford**, Vol. 59 (7), 593-607. DOI: 10.1680/geot.8.066.3685.
  15. **Haldar, S.** and Sivakumar Babu, G.L. (2009). "Probabilistic seismic design of pile foundations in non-liquefiable soil by response spectrum approach." **Journal of Earthquake Engineering, Taylor and Francis**, Vol. 13, 737-757. DOI: 10.1080/13632460902792410.
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16. **Haldar, S.** and Sivakumar Babu, G.L. (2009). "Ground improvement of machine foundation: A case study." *Ground Improvement, Thomas Telford*, Vol. 162, Issue G11, 1-6. DOI: 10.1680/grim.2009.162.1.1.
  17. **Haldar, S.** and Sivakumar Babu, G.L. (2008). "Load resistance factor design (LRFD) of axially loaded pile based on load test results." *Journal of Geotechnical and Geoenvironmental Engineering, ASCE*, Vol. 134 (8), 1106-1117. DOI: 10.1061/(ASCE)1090-0241(2008)134:8(1106).
  18. **Haldar, S.** and Sivakumar Babu, G.L. (2008). "Reliability measures for Pile Foundations Based on Cone Penetration Test data." *Canadian Geotechnical Journal, NRC Canada*, 45: 1699-1714. DOI: 10.1139/T08-082.
  19. **Haldar, S.,** Sivakumar Babu, G.L. and Bhattacharya, S. (2008). "Buckling and bending response of slender piles in liquefiable soils during earthquakes." *Geomechanics and Geoengineering, Taylor and Francis*, Vol. 3(2), 129-143. DOI: 10.1080/17486020802087101.
  20. Sivakumar Babu, G.L., Vasudevan, A. K. and **Haldar, S.** (2008). "Numerical simulation of fiber-reinforced sand behavior." *Geotextiles and Geomembranes, Elsevier*, Vol. 26 (2), 181-188. DOI: 10.1016/j.geotextmem.2007.06.004.
  21. **Haldar, S.** and Sivakumar Babu, G.L. (2008). "Probabilistic analysis of load-settlement response from pile load tests." *Georisk: Assessment and Management of Risk for Engineered Systems and Geohazards, Taylor and Francis*, Vol. 2(2), 79-91. DOI: 10.1080/17499510802087155.
  22. **Haldar, S.** and Sivakumar Babu, G.L. (2007). "Effect of soil spatial variability on the response of laterally loaded pile in undrained clay." *Computers and Geotechnics, Elsevier*, Vol. 35, 537-547. DOI: 10.1016/j.compgeo.2007.10.004.

#### **Geotechnical Special Publications (ASCE)**

1. **Haldar, S.** and Basu, D. (2016). "Effect of Climate Change on the Reliability of Offshore Wind Turbine Foundations." Proceedings of Geo-Chicago 2016, Chicago, 407-417.
2. Saha, R., Pal, A., and **Haldar, S.** (2016). "Appraisal of the In Situ Variability and Modeling Uncertainty of Dynamic Soil-Piled Raft-Structure Interaction on Seismic Response: A Probabilistic Approach." Proceedings of Geo-Chicago 2016, Chicago, 621-630.
3. Das, B., Saha, R., and **Haldar, S.** (2015). "Probabilistic Seismic Design of Soil-Pile Raft-Superstructure System." Proceedings of *IFCEE 2015 (GSP 256)*, San Antonio, Texas, 217-226.
4. **Haldar, S.,** and Basu, D. (2015). "Response of Beams on Nonlinear Foundation." Proceedings of *IFCEE 2015 (GSP 256)*, San Antonio, Texas, 289-298.
5. **Haldar, S.,** and Basu, D. (2014). "Resistance Factors for Laterally Loaded Piles in Clay." Proceedings of *Geo-Congress 2014: Geo-Characterization and Modeling for Sustainability (GSP 234)*, Atlanta, Georgia, 3333-3342.
6. **Haldar, S.,** and Basu, D. (2012). "Response of Strip Foundation on Spatially Random Elastic Foundation under Variable Column Loads." Proceedings of *Geo-Congress 2012: State of the Art and Practice in Geotechnical Engineering (GSP225)*, Oakland, California, 2806-2815.
7. **Haldar, S.,** and Basu, D. (2011). "Beam on spatially random elastic foundation." Proceedings of *Georisk 2011: Risk assessment and management (GSP224)*, Atlanta, Georgia, 1157-1164.

#### **National**

1. Shetty, M., **Haldar, S.** and Sivakumar Babu, G.L. (2005). "Behaviour of laterally loaded piles - A case study." *Indian Geotechnical Journal*, Vol. 35, No. 5, 131-143.
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2. Shetty, M., **Haldar, S.** and Sivakumar Babu, G.L. (2004). "Statnamic load test on working piles– A case study." *Indian Geotechnical Journal*, Vol. 34, No.4, 339-357.

### Conference Papers

1. Bisoi, S. and **Haldar, S.** (2015). "Effect of climate change on dynamic behavior of monopile supported offshore wind turbine structure." Japanese Geotechnical Society Special Publication Vol. 2, No. 33, 1189-1193.
  2. Bisoi S. and **Haldar S.** (2014). "Dynamic behavior of monopile supported offshore wind turbine system." Proceedings in Computer Methods and Recent Advances in Geomechanics (14 IACMAG), Kyoto, Japan, CRC Press, 923–928
  3. Bisoi, S. and **Haldar, S.** (2014). "Sustainable design of monopile supported offshore wind turbine system." Proceedings of International Conference on Sustainable Civil Infrastructure, ASCE India Section, Oct 17-18, 2014, Hyderabad, India ICSCI.
  4. **Haldar, S.** and Basu, D. (2013). "Load resistance factor design of laterally loaded piles." International Symposium on Advances in Foundation Engineering (ISAFE 2013), 5-6 December 2013, Singapore, CD ROM
  5. Saha, R., Dutta, S. C., and **Haldar S.** (2013). "Influence of SSI on soil-pile raft-structure System: an experimental study." International Symposium on Advances in Foundation Engineering (ISAFE 2013), 5-6 December 2013, Singapore 2013, CD ROM
  6. Saha, R., Shankar, L. T., Ranjeet, K., Dutta, S.C. and **Haldar, S.** (2012). "Effect of Non-linear Behavior of Soil on Seismic Response of Soil-Pile Foundation-Structure System." *In joint Proc. of the 9<sup>th</sup> International Conference on Urban Earthquake Engineering and 4<sup>th</sup> Asia Conference on Earthquake Engineering*, March 6-8, 2012, Tokyo, Japan (CD ROM).
  7. **Haldar, S.** and Sivakumar Babu, G.L. (2010). "Analysis of Failure Mechanisms of Piles in Liquefied Soil." In joint Proc. of the *International Symposium on Forensic Approach to Analysis of Geohazard Problems*, Bombay, India (CD ROM).
  8. Saha, R., **Haldar, S.** and Dutta, S.C. (2010). "Seismic Response of Soil-Pile Foundation-Structure System." In Proc. of *Indian Geotechnical Conference, Geotrendz*, Bombay, India, 143-146 (CD ROM)
  9. **Haldar, S.** (2010). "Reliability Based Design of Slopes under Seismic Load: Load Resistance Factor Design (LRFD) Approach." In Proc. of *Indian Geotechnical Conference, Geotrendz*, Bombay, India, 1049-1052 (CD ROM).
  10. **Haldar, S.** and Sivakumar Babu, G.L. (2010). "Response characteristics and failure mechanisms of pile foundations in liquefiable soil." *In joint Proc. of the 7<sup>th</sup> International Conference on Urban Earthquake Engineering (7CUEE) & 5<sup>th</sup> International Conference on Earthquake Engineering (5ICEE)*, Tokyo, Japan, 499-506 (CD ROM).
  11. **Haldar, S.** and Sivakumar Babu, G.L. (2008). "Reliability based design of laterally loaded pile: load resistance factor design (LRFD) approach." *In Proc. of the Indian Geotechnical Conference (GEOAGE)*, Bangalore, India, 538-542.
  12. **Haldar, S.**, Sivakumar Babu, G.L. and Bhattacharya, S. (2008). "Probabilistic Approach of Design of Pile Foundations in Non-Liquefiable Soils under Seismic Loading," *In Proc. of 12<sup>th</sup> International Conference of International Association for Computer Methods and Advances in Geomechanics (IACMAG)*, Goa, India (CD ROM).
  13. **Haldar, S.**, Vasudevan, A. K. and Sivakumar Babu, G.L. (2008). "Simulation of randomly oriented coir fiber reinforced soil with FLAC<sup>3D</sup>" *In Proc. of the 1<sup>st</sup> Intl. FLAC/DEM Symposium on Numerical Modeling*, Minneapolis, MN USA (CD ROM).
  14. **Haldar, S.** and Sivakumar Babu, G.L. (2007). "Ultimate capacity of pile foundation on spatially random cohesive soil." *In Proc. of 10<sup>th</sup> International Conference on Application of Statistics and Probability in Civil Engineering ( IACSP10)*, Tokyo,
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Japan (CD ROM).

15. **Haldar, S.**, Sivakumar Babu, G.L. and Bhattacharya, S. (2007). “Buckling and Bending of Slender Piles in Liquefiable Soils during Earthquakes: A Probabilistic Analysis.” *In Proc. of International Workshop on Earthquake Geotechnical Engineering to commemorate the 150<sup>th</sup> Anniversary (1856 to 2006) of the Civil Engineering Department of Bengal Engineering and Science University, Shibpur, India*, 319-343.
16. **Haldar, S.** and Sivakumar Babu, G.L. (2007). “Reliability Based Design of Pile Foundations Based on Cone Penetration Test Data.” *In Proc. of First Indian Young Geotechnical Engineers Conference (FIYGEC) Hyderabad, India*, 306-313.
17. **Haldar, S.** and Sivakumar Babu, G.L. (2005). “Reliability analysis of single pile subjected to lateral random excitation.” *In Proc. of 9<sup>th</sup> Intl. Conference on Structural Safety and Reliability*, Rome, Italy, 939-945.
18. Dasaka, S.M., Rajaparthi, S.R. and **Haldar, S.** (2004). “Load-Resistance factored design of shallow foundation.” *In Proc. of GEORISK-2004: International Workshop on Risk Assessment in Site Characterization and Geotechnical Design*, Bangalore, India, 231-240.

### Book Chapter

1. Haldar, S., Babu, G.L.S., and Bhattacharya, S. (2007) “Buckling and bending of slender piles in liquefiable soils during earthquakes: A probabilistic analysis”, *Design of Foundations in Seismic Areas: Principles and Applications*, National Information Centre of Earthquake Engineering (NICEE).

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### Sponsored Research Grants

#### Project Completed

**Project title** - Investigation of Cyclic Behaviour of Offshore Wind Turbine Mono-Pile Foundation Considering the Effect of Climate Change

**Sponsoring agency** – SERB, Department of Science and Technology

**Research grant** – 13.82 Lakh (PI)

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### Consultancy Projects

- Vetting of structure and superstructure of international standard sports climbing wall at Kalinga Stadium, Bhubaneswar (**Agency: Department of Sports & Youth Services, Completed, PI**)
- Assessment of structural safety of construction of balance six floor of IDCOL office building (**Agency: IDCO, Completed, PI**)
- Assessment and strategy for repair and rehabilitation of runway taxiway and aprons of ARC Charbatia (**Agency: AAI, Completed, Co-PI**)
- Design and stability analysis of an embankment for new BG rail line from Haridaspur to Paradeep in the Khurda district, Odisha (**Agency: Tracks & Tower Infratech (P) Ltd., Completed, Co-PI**)
- Proof checking of design and drawing of three no. box bridges under railway loading in connection with construction of railway siding to serve Koderma Thermal Power Plant. (**Agency: RITES Ltd., Completed, Co-PI**)
- Design of rock socketed pile foundations for 220KV transmission line towers between Kantapali to Hindalco in the Mahanadi river bed, Orissa. (**Agency: Hindalco Industries Ltd., Completed, Co-PI**)
- Proof checking of proposed residential quarters at HAL, Sunabeda, Orissa. (**Agency: Hindustan Aeronautics Ltd., Completed, Co-PI**)
- Proof checking of design of river bed pile foundations for location no. 10, 12 and 15 of 220 KV transmission line from Bidanasi Grid substation to Cuttack Grid substation, Orissa (**Agency: Orissa Power Transmission Corporation Limited, Completed, PI**).
- Proof checking of design of pile foundations for location no. 16A and 24 of 220 KV transmission line tower from Bidanasi (Cuttack) near the bank of Kathajodi to Nuapada (Cuttack), in the spill zone, Orissa (**Agency: Orissa Power Transmission Corporation**

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**Limited, Completed, PI).**

- Design of chimney and pad foundations for OPTCL 220KV Budhipadar to Burla DC Transmission line towers, Orissa (**Agency: Hindalco Industries Ltd., Completed, Co-PI**).
- Remedial measures for horizontal and vertical cracks developed in hospital building, Orissa (**Agency: ESIC, Bhubaneswar, Completed, Co-PI**).

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**Thesis Guidance**

**PhD Thesis Guidance**

**Title** – Seismic response of soil-pile raft-superstructure system

**Name of student** – Mr. R. Saha

**Co-supervisor** – Prof. S. C. Dutta

**Status** – Awarded

**Title** – Dynamic behaviour of offshore wind turbine tower-monopile system

**Name of student** – Ms. S. Bisoi

**Co-supervisor** – None

**Status** – Ongoing

**Title** – Behaviour of offshore wind turbine under extreme loading

**Name of student** – Mr. S. K. Patra

**Co-supervisor** – None

**Status** – Ongoing

**M. Tech. Thesis Guidance**

**Title** – Uncertainty analysis and dynamic behavior of offshore wind turbine subjected to scour

**Name of student** – Mr. P. Bhaskara Rao

**Co-supervisor** – Dr. A. Sarkar

**Status** – Awarded

**Title** – Probabilistic analysis of scour at downstream of apron

**Name of student** – Ms. Krishna Biswas

**Co-supervisor** – Dr. A. Sarkar

**Status** – Awarded

**Title** – Design strategy of low rise buildings on slope

**Name of student** – Mr. P. Vattikuti

**Co-supervisor** – Dr. G. Mondal

**Status** – Ongoing

**B. Tech. Project Guidance**

Total number of thesis guided : 11; Ongoing: 4

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**Administrative and Development Works**

- Prof. In Charge, web services (Ongoing)
- Chairman – Departmental Purchase Committee (2014 - 2016)
- Member of School Academic Committee (Ongoing)
- Member of School Administrative Committee (Ongoing)
- Faculty-in-charge of Computational Laboratory (Ongoing)
- Faculty advisor of Civil undergraduate students
- UG coordinator (2010 -13)
- Faculty-in-charge for soil mechanics laboratory (2009 - 2014)
- Member of departmental purchase committee
- Member of doctoral scrutiny committee (Ongoing)
- Departmental website and information coordinator (2010- 2011)

	<ul style="list-style-type: none"> <li>• Faculty-In-charge of Institute Annual Report (2009-2011)</li> <li>• Developed soil mechanics laboratory and transportation engineering laboratory</li> </ul>
<b>Invited Lectures</b>	<ul style="list-style-type: none"> <li>• Delivered three invited lectures on Dynamic soil-structure interaction, Numerical modeling of soil-structure interaction and Soil-piled raft-superstructure interaction at GIAN course on soil-structure-interaction at IIT Bhubaneswar, 28-12-2015 to 04-01-2016.</li> <li>• Delivered invited lecture on Seismic Design of Piled Raft Supported Structure: A Probabilistic Approach at Short Term course on Seismic Requalification of Pile Supported Structures, Department of Civil Engineering, IIT Guwahati, 7-9 January 2015</li> <li>• Delivered invited lecture on Role of soil-structure-interaction in design of structure at workshop on Soil-Structure Interaction, (SSI-2014), 22 –23 Nov, 2014, Department of Civil Engineering, GMR Institute of Technology, Andhra Pradesh, INDIA</li> <li>• Delivered invited lecture on Numerical methods of soil-structure interaction and analysis at workshop on Soil-Structure Interaction, (SSI-2014), 22 –23 Nov, 2014, Department of Civil Engineering, GMR Institute of Technology, Andhra Pradesh, INDIA</li> <li>• Delivered three invited lectures on Soil characterization, soil stabilization and expansive soil at PMGSY workshop, 2013, IIT Bhubaneswar</li> <li>• Delivered three invited lectures on Geotechnical Risk and Reliability at QIP Short Term Course on “Risk Assessment and Management in Geotechnical Engineering”, held in IIT Bombay, March 14-18, 2011.</li> </ul>
<b>Memberships</b>	<ul style="list-style-type: none"> <li>• Life member of Indian Geotechnical Society, New Delhi.</li> <li>• Life member of Institute of Engineers</li> <li>• Member of International Society of Soil Mechanics and Geotechnical Engineering</li> </ul>
<b>Professional Activities</b>	<ul style="list-style-type: none"> <li>• <b>Reviewer of NPTEL web based</b> course on Structural Reliability</li> <li>• <b>Position</b> - Member of Board of Studies in Civil Engineering of ITER (Siksha ‘O’ Anusandhan University), Bhubaneswar. <b>Activities</b> - Setting up course curriculum in UG curricula and PG curricula in Geotechnical Engineering</li> <li>• <b>Reviewer of journals:</b> Journal of Geotechnical and Geoenvironmental Engineering (ASCE), International Journal of Geomechanics (ASCE), Soil Dynamics and Earthquake Engineering, Geotechnical Testing Journal, Ocean Engineering, Journal of Structural Engineering and Georisk</li> </ul>
<b>Continuing Education</b>	<ul style="list-style-type: none"> <li>• Workshop on Indian Water Management and Symposium on Sustainable Infrastructure Development (IWMSID 2013), Role : Convenor</li> </ul>
<b>International Collaboration</b>	<ul style="list-style-type: none"> <li>• Dr. Dipanjan Basu, Department of Civil &amp; Environmental Engineering, University of Waterloo, Canada</li> <li>• Prof. Subhamoy Bhattacharya, Department of Civil &amp; Environmental Engineering, University of Surrey, U.K.</li> <li>• Prof. Jitendra Sharma, Department of Civil &amp; Environmental Engineering, York University, Canada</li> </ul>
<b>Personal Profile</b>	<p>Date of Birth : 02-10-1977</p> <p>Sex : Male</p> <p>Relationship status : Married</p> <p>Citizenship : Indian</p> <p>Languages Known : English, Bengali and Hindi.</p>