MANOJ KUMAR MOHARANA

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Department of Mechanical Engineering
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https://sites.google.com/site/mkmoharana/
https://www.facebook.com/Drmkmoharana

Fields of interest
- Micro-scale heat transfer
- Cryogenic Engineering
- Two-phase heat transfer
- Renewable energy systems

Academic qualification
Ph.D (Mechanical Engineering, IIT Kanpur)
Thesis title: Thermo-hydrodynamics of internal convective flows in mini/microchannels.

M.Tech (Thermal, Energy & Environmental Engineering, IIT Kharagpur)
Thesis title: Application of semi-analytical and approximate techniques for the solution of some typical conduction problems.

B.Tech (Mechanical Engineering, College of Engineering & Technology, Orissa University of Agriculture and Technology, Bhubaneswar, Odisha)
Project title: Design and development of a concentrating type compound parabolic solar collector.

Academic achievements
- DAAD fellowship to carryout research at IKE, University of Stuttgart, Stuttgart, Germany.
- International travel grant from CSIR, New Delhi to visit Heidelberg, Germany.
- Shastri Scholar Travel Subsidy Grant award 2010-11 to visit University of Alberta, Edmonton, Canada
- International travel grant from Department of Science and Technology, GOI to visit Xi'an, China, and Chicago, USA.
- International travel grant offer from CSIR, New Delhi to visit Xi'an, China.
- J. B. Benu Memorial Award 1992.

Present job experience:
Assistant Professor, Department of Mechanical Engineering, NIT Rourkela, Odisha (30 April 2012 onwards)
Courses taught:
- Computational Fluid Dynamics, ME 653 (1st Year PG, Spring 2012-13(38), 2013-14(26), 2014-15(22), 2015-16(26))
- Computational Fluid Dynamics and Heat Transfer, ME 450 (UG Open Elective, Spring 2012-13(45), 2013-14(48))
- Computational Fluid Flow Laboratory, ME677 (1st Year PG, Spring 2012-13(38), 2013-14(21), Autumn 2014-15(22))
- Conduction and Radiation, ME650 (1st Year PG, Autumn 2012-13(41), 2013-14(45), 2014-15(xx))
- Power Plant Engineering, ME451 (4th Year UG, Autumn 2012-13(78), 2013-14(78), 2014-15(90), Spring 2014-15(93), 2015-16(102))
- Heat Transfer and Fluid Flow Laboratory, ME774 (1st Year PG, Autumn 2012-13(38), Spring 2014-15())
- Fluid Mechanics and Fluid Machines Lab, ME372 (3rd yr UG, Spring 2016-17 (94))
- Heat Transfer, ME451 (4th yr UG, Autumn 2017-18 (112))

E-learning content development (Classroom video recording):
Autumn (2015-16):- Conduction and Radiation, PG (30 classes)
Spring (2015-16):- Computational Fluid Dynamics, PG (31 classes)
Autumn (2017-18):- Heat Transfer, UG (ongoing)

Past experience:
Research:
Project Engineer (14 Jan – 27 April 2012), Department of Mechanical Engineering, IIT Kanpur
Project Title: Pulsating heat pipe based heat exchanger
Teaching:
Worked as a faculty member (Lecturer; 15 November 2001 to 26 July, 2004). Was responsible to teach and guide undergraduate engineering students of Biju Patanaik University of Technology, Rourkela, Orissa and

Fakir Mohan University, Balasore, Orissa at Balasore College of Engineering and Technology, Balasore, Odisha.

- Course instructor
  - Fluid Mechanics (Undergraduate compulsory course)
  - Engineering Thermodynamics (Undergraduate compulsory course)
  - Engineering Mechanics (Undergraduate compulsory course)
- Laboratory Instructor
  - Engineering Drawing (Undergraduate compulsory course)
  - Basic Workshop Technology (Undergraduate compulsory course)
- Teaching Assistant during M. Tech. Program at IIT Kharagpur
  - Gas Turbine and Jet Propulsion (Undergraduate compulsory and post graduate elective course)
  - Applied Thermodynamics (Undergraduate compulsory course)
- Teaching Assistant during Ph.D Program at IIT Kanpur
  - Manufacturing Processes Lab, Fluid Mechanics Lab, Heat Transfer Lab

Administrative experience/Position of responsibility:

At NIT Rourkela

- Head, AN Khosla Centre for Technology Enabled Learning (ANKCTEL) (01 July 2017 onwards)
- Member, Curriculum and Development and Monitoring Committee (01 July 2015 onwards)
- Prof in Charge, Central Air Conditioning, NIT Rourkela (28 Nov 2014 to 30 June 2017)
- Prof in Charge, M.Tech(R) & Ph.D program, Mechanical Engineering, NIT Rourkela (July 2014 onwards)
- Faculty Advisor (July 2012–June 2014), M. Tech (2012-14), Cryogenics and Vacuum Tech., NIT Rourkela
- Professor-in-Charge, Heat Transfer Laboratory, NIT Rourkela (July 2012 onwards)

At other than NIT Rourkela

- Vice President (2008 - 2011), Shiksha Sopan (An NGO run by IIT Kanpur students and faculties) http://www.shiksha-sopan.org/
- General Secretary (2008 - 2009), Utkal Parishad (Odia Society), IIT Kanpur, Kanpur https://sites.google.com/site/utkalparishad/
- Faculty Advisor (May 2003 - July 2004), ISTE Student's Chapter, Balasore College of Engineering and Technology, Balasore, Odisha, India
- Secretary cum Treasurer (September 2003 - July 2004), ISTE Chapter, Balasore College of Engineering and Technology, Balasore, Odisha, India

List of publications:

For full list please visit **http://scholar.google.co.in/citations?user=sAuWerUAAAAJ**

Referred Journal:

7. Moharana MK, Khandekar S, 2013, Effect of aspect ratio of rectangular microchannels on the axial back-conduction in its solid substrate, International Journal of Microscale and Nanoscale Thermal and Fluid Transport Phenomena, 4(3-4) 1-19.
6. Moharana MK, Khandekar S, 2013, Generalized formulation for estimating pressure drop in fully-developed laminar flow in singly and doubly connected channels of non-circular cross-sections, Computer Methods in Applied Mechanics and Engineering, 259 64–76.
5. Moharana MK, Das PK, 2012, Heat conduction through eccentric annular space: An appraisal of analytical, semi analytical and approximate techniques, ASME Journal of Heat Transfer, 134(9) 091301(1-9).
4. Moharana MK, Singh PK, Khandekar S, 2012, Optimum Nusselt number for simultaneously developing internal flow under conjugate conditions in a square microchannel, ASME Journal of Heat Transfer, 134(7) 071703(1-10).
3. Moharana MK, Agarwal G, Khandekar S, 2011, Axial conduction in single-phase simultaneously developing flow in a rectangular mini-channel array, International Journal of Thermal Sciences, 50(6) 1001-1012.
2. Moharana MK, Peela NR, Khandekar S, Kunzru D, 2011, Distributed hydrogen production from ethanol in a microfuel processor: Issues and challenges, Renewable and Sustainable Energy Reviews, 15(1) 524-533.
1. Moharana MK, Das PK, 2008, Heat conduction through heat exchanger tubes of noncircular cross section, ASME Journal of Heat Transfer, 130(1) 011301(1-8).

Book Chapter:

3. Moharana M. K., and Khandekar S., Effect of Aspect Ratio of Rectangular Microchannels on the Axial Back Conduction in its Solid Substrate, Chapter in Progress in Microscale and Nanoscale Thermal and Fluid Sciences, Nova Science Publishers Inc., 2015.
2. Khandekar S. and Moharana M. K., Axial Back-Conduction through Channel Walls during Internal Convective Microchannel Flows, Chapter in Microscale and Nanoscale Phenomena: Fundamentals and Applications, Springer Tracts in Mechanical Engineering, 2015.

1. Khandekar S., Moharana M. K., Some Applications of Micromachining in Thermal-Fluid Engineering, Chapter in: Introduction to Micromachining, 2nd Edition, Editor: Dr. V. K. Jain, Narosa Publishing House, 2014.

Conference (* presented by myself):

21. Tiwari N, Moharana MK, Sarangi SK, Conjugate heat transfer in racoon microchannel, 6th International and 43rd National Conference on Fluid Mechanics and Fluid Power (FMFP 2016), 15-17 December 2016, Allahabad, **India**.
20. Tiwari N, *Moharana MK, Sarangi SK, Conjugate heat transfer in single phase wavy microchannel, ASME 2016 MNHMT 5th Micro/Nanoscale Heat & Mass Transfer International Conference, 4-6 January 2016, Biopolis, **Singapore**.
19. Tiwari N, Moharana MK, Sarangi SK, Numerical investigation of heat transfer and pressure drop in raccoon type microchannels with varying amplitudes, 23rd National Heat and Mass Transfer Conference and 1st International ISHMT-ASTFE Heat and Mass Transfer Conference IHMTC 2015, 17-20 Dec 2015, Thiruvananthapuram, **India**.
18. Behera AN, *Moharana, MK, Heat transfer in pulsatile flow through square microchannels with wavy walls, 23rd National Heat and Mass Transfer Conference and 1st International ISHMT-ASTFE Heat and Mass Transfer Conference IHMTC 2015, 17-20 Dec 2015, Thiruvananthapuram, **India**.
17. Samal SK, *Moharana MK, Numerical study of Taylor bubble breakup by placing obstacle at the T-junction bifurcation, Proceedings of the Forty Second National Conference on Fluid Mechanics and Fluid Power, December 14-16, 2015, NITK Surathkal, Karnataka, **India**.
16. Yadav A, Tiwari N, *Moharana MK, Sarangi SK, Axial wall conduction in cryogenic fluid microtube, 5th International and 41st National Conference on Fluid Mechanics and Fluid Power (FMFP 2014), 12-14 December, Kanpur, **India**.
15. Rose B, Tiwari N, Moharana MK, Sarangi SK, Thermo-hydrodynamics of single phase flow in microchannel with obstacle, 5th International and 41st National Conference on Fluid Mechanics and Fluid Power (FMFP 2014), 12-14 December, Kanpur, **India**.
14. Moharana MK, Heat conduction through eccentric hollow prismatic cylinders, 15th International Heat Transfer Conference (IHTC15), 10-15 August 2014, Kanpur, **Japan** (Accepted for presentation).
13. Thippavathini S, *Moharana MK, Flow of Taylor Bubble in Microchannel Having an Obstacle, 12th International Conference on Nanochannels, Microchannels, and Minichannels, 3-7 August 2014, Chicago, **USA**.
12. Mishra P, *Moharana MK, Axial Wall Conduction in Pulsating Laminar Flow in a Microtube, 12th International Conference on Nanochannels, Microchannels, and Minichannels, 3-7 August 2014, Chicago, **USA**.
11. Kumar M, *Moharana MK, Axial wall conduction in partially heated microtube, 22nd National and 11th International ISHMT-ASME Heat and Mass Transfer Conference, 28-31 December 2013, Kharagpur, **India**.
10. Tiwari N, Moharana MK, Sarangi SK, Axial wall conduction in partially heated microtube, 40th National Conference on Fluid Mechanics and Fluid Power (FMFP2012), 12-14 December 2013, Hamirpur, **India**.
9. Moharana MK, Nemade RM, Khandekar S, Phase-change heat transfer of ethanol-water mixtures: Towards development of a distributed hydrogen production, ASME 2013 Summer Heat Transfer Conference, 14-19 July 2013, Minneapolis, MN, **USA**.
8. *Moharana MK, Khandekar S, Effect of channel shape on axial back conduction in the solid substrate of microchannels, 3rd European Conference on Microfluidics 2012 (μFlu-2012), 03-05 December 2012, Heidelberg, **Germany**.
7. *Moharana MK, Khandekar S, Numerical study of axial back conduction in microtubes, 39th National Conference on Fluid Mechanics and Fluid Power (FMFP2012), 13-15 December 2012, Surat, **India**.
6. * Moharana MK, Boundary collocation technique for heat conduction in eccentric systems, Fourth International Congress on Computational Mechanics and Simulation (ICCMS 2012), 09-12 December 2012, Hyderabad, **India**.
5. *Moharana MK, Das PK, Heat conduction through eccentric polygonal tubes: Solution by one dimensional approach, 21st National and 10th International ISHMT-ASME Heat and Mass Transfer Conference, 27-30 December 2011, Chennai, **India**.
4. *Moharana MK, Singh PK, Khandekar S, Axial conduction in the context of developing flow in microchannels, ASME 9th International Conference on Nanochannels, Microchanels and Minichannels, 19-22 June 2011, Edmonton, **Canada**.
3. *Agarwal G, Moharana MK, Khandekar S, Thermo-hydrodynamics of developing flow in a rectangular mini-channel array, 20th National and 9th International ISHMT-ASME Heat and Mass Transfer Conference, 04-06 January 2010, Mumbai, **India**.
2. *Moharana MK, Peela NR, Khandekar S, Kunzru D, Producing hydrogen from ethanol in a microfuel processor: Recent developments and challenges, Proceedings of the 6th International Symposium on Multiphase Flow, Heat Mass Transfer and Energy Conversion, 11-15 July 2009, Xi'an, **China**.

1. Moharana MK, Das PK, One dimensional heat conduction through arbitrary shaped tubes: Sector method, Proceedings of the 3rd BSME-ASME International Conference on Thermal Engineering, 20-22 December 2006, Dhaka, **Bangladesh**.

Research Project:

As principal investigator:

- "Design and development of novel two and three-dimensional oscillating heat pipes with connected headers for space applications" sponsored by Science and Engineering Research Board, India (INR 2.88 Million) 2017-20.

As Co-Principal Investigator:

- "Development of KW Class Cryogenic Helium Turboexpander-Phase-1: Design and Modelling" sponsored by Board of Research in Fusion Science & Technology, India (INR 1.03 Million) 2015-16.
- Ultrasonic Vibration Assisted Turning of Difficult to Cut Materials: Design and Development of a Tool Holding System & Parametric Analysis of the Process" sponsored by Science Education Research Board, India (INR 3.5 Million) 2016-19.

Ph. D Theses Advising:

- Ongoing students: 06
- 02 (as sole supervisor): Mr Sameer Ranjan Sahu, Mr Sangram Kumar Samal
- 01 (principal supervisor) jointly with Prof. SK Sarangi (co-supervisor): Mr Nishant Tiwari
- 03 (co-supervisor) jointly with Prof. SK Sahoo (principal supervisor): Mr Tapas Ranjan Mohanty, Mr V.B. Shaibu, Mr Ananda Kumar Sahoo

M. Tech Theses Advising:

- ***Ongoing students: 06***
- ***Completed: 22***

2016-17:

- **I Mishra:** Thermal analysis of stave cooler near tap hole zone
- **KD Koshti:** Numerical study for subcooling of liquid nitrogen in GM Cryocooler
- **Ashita KB**: Design and optimization of heat exchanger for cooling of supercritical Helium using boiling liquid helium

2015-16:

- **PP Shevkar:** Thermo-hydrodynamics of heat transfer enhancement during a gas-liquid Taylor bubble flow in a mini/microchannel (Present position: Research scholar, IIT Madras)
- **R Pratap:** Design of turbine blade of turboexpander for helium liquefaction
- **R Behera**: CFD analysis of aerostatic bearing for cryogenic turboexpander
- **D Kumar:** Thermal analysis of blast furnace stave cooling
- **RK Pal:** Thermo-hydrodynamic study of subcooled and critical heat flux flow boiling
- **PBS Lahare:** Analysis of rectangular channel printed circuit heat exchanger (PCHE)

2014-15:

- **S K Samal:** Numerical study of Taylor bubble breakup by placing obstacle at T-junction bifurcation
- **A N Behera:** Heat transfer in pulsatile flow through square microchannels with wavy walls
- **M K Janghel**: An experimental study of hydraulic jump due to moving jet impingement
- **M R Farooqui:** A numerical study on effect of rectangular shaped ribs arranged in different patterns on thermal performance of a solar air heater duct
- **S S Sahu:** Axial back conduction in cryogenic fluid microtube (Present position-Centurion University)
- **R Biswal:** Conjugate heat transfer analysis in cryogenic microchannel heat exchanger

2013-14:

- **P Mishra:** Thermo-hydrodynamics of pulsating laminar flow in a microtube: A numerical study (Present position- Research scholar, IIT Bhubaneswar)
- **T Sudhakar:** Taylor bubble flow in microchannel having an obstacle (Present position-Asst. Prof., NIT Uttarakhand)
- **R R Prasad**: Axial conduction in a partially heated microchannel subjected to isothermal boundary condition (Present position-SAIL, Durgapur)
- **B Rose:** Thermo-hydrodynamics of single phase flow in microchannel with obstacles
- **A Yadav:** Numerical study of axial wall conduction in fully heated microtubes for cryogenic fluid
- **G H Raghav:** Numerical analysis of hydraulic jump by an impinging jet

2012-13:

- **M Kumar:** Numerical study of axial wall conduction in partially heated microtubes (Present position- Mineral Exploration Corporation Limited)

Reviewer/ Community Activities:

Journal Paper:

- Sustainable Energy Technologies and Assessments (Elsevier)
- Energy & Fuels (ACS Publications)
- Heat Transfer Engineering (Taylor & Francis)
- Experimental Thermal and Fluid Science (Elsevier)

PhD Thesis:

01 (BITS Pilani), 01 (Osmania University, Hyderabad)

M.Tech Thesis:

03 (BPUT, Odisha)

Conference/Seminar/Workshop/Short Term Courses (STC) Organized:

- A Three Day Short Term Course (STC) on "**Fundamentals of Computational Fluid Dynamics: A Practical Approach**" at Department of Mechanical Engineering, National Institute of Technology Rourkela, Rourkela 769008, Odisha, India during 22-24 Dec, 2014.
- A Two Day Short Term Course (STC) on "**Research Methodology in Engineering**" at Department of Mechanical Engineering, National Institute of Technology Rourkela, Rourkela 769008, Odisha, India during 23-24 Dec, 2013.
- A Three-Day Workshop on "**Large Air-Conditioning Systems: Design and Construction**" at Department of Mechanical Engineering, National Institute of Technology Rourkela, Rourkela 769008, Odisha, India during 22-24 July, 2013 (Jointly with Prof. S Murugan).

Conference/Seminar/Workshop Participation:

- Indo-French Workshop on Phase-Change Thermal Systems, November 29 - December 01, 2016, Khajuraho (MP), India.
- 26th International Cryogenic Engineering Conference & International Cryogenic Materials Conference 2016, 7–11 March 2016, New Delhi, India.
- ASME 2016 MNHMT 5th Micro/Nanoscale Heat & Mass Transfer International Conference, 4-6 January 2016, Biopolis, Singapore.
- 23rd National Heat and Mass Transfer Conference and 1st International ISHMT-ASTFE Heat and Mass Transfer Conference IHMTC 2015, 17-20 December 2015, Thiruvananthapuram, India.
- 42nd National Conference on Fluid Mechanics and Fluid Power (FMFP), 14-16 December 2015, NIT Surathkal, India.
- One day "MIT Open edX Workshop" for designing and running online courses at Amrita University, Kochi Campus during 17 Dec 2014.
- 5th International and 41st National Conference on Fluid Mechanics and Fluid Power (FMFP), 12-14 December 2014, IIT Kanpur, India.
- Workshop on "Formulation of Research & Development Initiatives for Scientists and Technologists" at Engineering Staff College of India, Hyderabad during 24-27 November 2014.
- Workshop on "Internal Quality Assurance Mechanisms" at Teaching Learning Centre, IIT Madras, India, during 28-30 October 2014.
- 12th International Conference on Nanochannels, Microchannels, and Minichannels (ICNMM2014), 03-07 August 2014, Chicago, Illinois, USA.
- 11th International and 22nd National ISHMT-ASME Heat and Mass Transfer Conference, 28-31 December 2013, IIT Kharagpur, India.
- 39th National Conference on Fluid Mechanics and Fluid Power (FMFP), 13-15 December 2012, Surat, India.
- Fourth International Congress on Computational Mechanics and Simulation (ICCMS), 09-12 December 2012, Hyderabad, India.
- 3rd European Conference on Microfluidics 2012, 03-05 December 2012, Heidelberg, Germany.
- "Indo-German Grand Science Slam" at the Indo-German Urban Mela, New Delhi on the occasion of the inaugural event of German House for Research and Innovation (DWIH) New Delhi, 27 Oct 2012.
- Workshop on "Phase-change Thermal Systems" organized by Department of Mechanical Engineering, Indian Institute of Technology, Kanpur, and BARC, Mumbai, 19–20 March 2012.
- 10th International and 21st National ISHMT-ASME Heat and Mass Transfer Conference, 27-30 Dec 2011, IIT Chennai, India.

- ASME 2011 9th International Conference on Nanochannels, Microchannels, and Minichannels, 19-22 June 2011, Edmonton, Canada.
- 20th National and 9th International ISHMT-ASME Heat and Mass Transfer Conference, 04-06 January 2010, Mumbai, India.
- 6th International Symposium on Multiphase Flow, Heat Mass Transfer and Energy Conversion, 11-15 July 2009, Xi'an, China.
- Indo-US Workshop on "Microfluidics and Fabrionics (Micro-fabrication)' 09", 09-11 January 2009, Indian Institute of Technology Kharagpur, Kharagpur, India.
- 2nd Joint NTUS-IITK Workshop in Mechanical, Aerospace, and Industrial and Management Engineering, 5-6 April 2008, Indian Institute of Technology Kanpur, India.
- "Low carbon technologies for decentralized power production" an Indo-UK Workshop, 17 – 18 March 2008, Indian Institute of Technology Madras, Chennai, India.
- International Workshop on "Engineering fundamentals and applications of fuel cells", 9–10 January 2008, Jadavpur University, Kolkata, India.
- National Conference of Research Scholars in Mechanical Engineering (NCRSME'07) 23-24 March 2007, Indian Institute of Technology Kanpur, Kanpur, India.

Countries Visited Abroad:

- Singapore (Jan 2016)
- USA (Aug 2014)
- Canada (June 2011)
- Germany (Oct-Dec 2009, Dec 2012)
- China (July 2009)

Short Term Training Programs (STTP) attended:

- Short term QIP course on "Computational Fluid Dynamics" at IIT Bombay, 29 May – 02 June 2017.
- 21st National Training Course on "Wind Energy Technology" at National Institute of Wind Energy, Chennai, 20-24 Mar 2017.
- Short term course on "Vacuum Technology and Process Applications" at Cryogenic Engineering Centre IIT Kharagpur, 14-23 April 2015.
- Continuing Professional Development Programme on "Formulation of R&D Initiatives for Scientists and Technologists" at Engineering Staff College of India, Hyderabad, 24-27 Nov 2014.
- Workshop on "Internal Quality Assurance Mechanisms" at Teaching Learning Centre, IIT Madras, 28-30 October 2014.
- Short term training program on "Pedagogy-Enhancing Teacher Effectiveness" organized by Effective Quality Upgradation Assistance for Technical Education (EQUATE), New Delhi, 10th – 13th March 2014.
- Short term course on "Transport Phenomena in Phase-change and Reacting Systems" organized by Department of Mechanical Engineering, Indian Institute of Technology, Kanpur, 10th – 14th January 2011.
- AICTE sponsored short term course on "Interpersonal communication" organized by Department of Humanity and Social Sciences, Indian Institute of Technology, Kharagpur, 13th – 18th February 2006.
- AICTE – ISTE sponsored short term training program on "Advances in Aerospace Engineering and Rocket Propulsion" organized by the Department of Space Engineering and Rocketry, Birla Institute of Technology, Mesra, Ranchi, 28th June -10th July, 2004.
- AICTE – ISTE sponsored short term training program on "Tribology, Engine Technology and Fuel Economy" Organized by the Department of Production Engineering & Management, National Institute of Technology, Jamshedpur, 15th – 26th March, 2004.
- AICTE sponsored ISTE-QIP Short Term Course on "Recent Trends in Human Resource Development" organized by Department of Humanity and Social Sciences, Indian Institute of Technology, Kharagpur, 21st -26th Sept. 2003.
- ISTE-AICTE sponsored short term training program on "Renewable energy technology and management" organized by the Department of Mechanical Engineering, Sant Longowal Institute of Engineering and Technology (SLIET), Longowal, Dist-Sangrur, Punjab, 16th – 27th June 2003.

Membership of Professional Organizations:
Life Member:

- Indian Society of Heating, Refrigerating and Air Conditioning Engineers (ISHRAE)
  (Membership Number: 34565)
- Indian Society for Heat and Mass Transfer (Membership Number: 643)
- National Society of Fluid Mechanics and Fluid Power (India) (Membership Number: 531)
- Indian Society for Technical Education (Membership Number: LM36572)

- International Association for Engineers (IAENG) (Membership Number: 127423)
- The IAENG Society of Mechanical Engineering (Membership Number: 127423)

Associate Member:

- The Institution of Engineers (India) (Membership Number: AM126392-5)

Note: This document was last updated on 17 Oct 2017.

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