Santanu Kumar Karmakar
Ph. D (IIT Delhi), MME (JU), BE (CU)

Professor, Mechanical Engineering
Dean, International Relations and Alumni Affairs

Santanu Kumar Karmakar joined the Institute in 1996

Contact Addresses

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Research Areas

- Tribology and Bio-Tribology
- Friction and Wear Modeling
- Machine Design and Contact Mechanics

Courses Undertaken

Undergraduate Courses:

- Tribo-Design of Machine Elements (ME-701)
- Fundamental of Tribology (ME-821/3)

Postgraduate Courses:

- Engineering Tribology (ME-711D/ME-911)
- Industrial Tribology (ME-811D/ME-1011)

Publications

Journal Papers

- Santanu Sardar, Santanu Kumar Karmakar and Debdulal Das, "High stress abrasive wear characteristics of Al 7075 alloy and 7075/Al2O3 composite", Measurement, 127(2018), 42-62.
- Santanu Sardar, Santanu Kumar Karmakar and Debdulal Das, "Evaluation of Abrasive Wear Resistance of Al2O3/7075 Composite by Taguchi Experimental Design Technique", Transactions of Indian Institute of Metals, 19.04.2018.
- Santanu Sardar, Santanu Kumar Karmakar and Debdulal Das, "Tribological properties of Al 7075 Alloy and 7075/Al2O3 Composite under Two-Body Abrasion: A Statistical Approach", Journal of Tribology, ASME Publication, 03.04.2018, Vol. 140, September, 2018; pp 051602-(1-23).
- Jayanta Kumar Biswas, Masud Rana, Santanu Majumder, Santanu Kumar Karmakar, Amit Roychowdhury, "Effect of two-level pedicle-screw fixation with different rod materials on lumbar spine: A finite element study", Journal of Orthopaedic Science, 23(2018) 258-265.
- Jayanta Kr. Biswas, Sandipan Roy, Santanu Majumder, Santanu Kr. Karmakar, Subrata Saha & Amit Roychowdhury, "Artificial Intervertebral Disc Replacement to Provide Dynamic Stability to the Lumbar Spine: A Finite Element Study", Journal of Long-Term Effects of Medical Implants; 28(2): 1-9 (2018).
- Banerjee Partha Sarathi, Pradhan Rururaj, Roychowdhury Amit and Karmakar Santanu Kumar; "Investigation of Stresses Developed in Natural and Implanted Human Cervical Spine by Finite Element Method", Journal of Advanced Medical and Dental Sciences Research, Vol. 3, No. 1, pp 9–18 (2015).
- Santanu Sardar, Santanu Kumar Karmakar, Debdulal Das; “Ultrasonic cavitation based processing of metal matrix nanocomposites: an overview”; Journal of Advanced Materials Research, 2014 vol.1042, pp 58-64.
- Jayanta Biswas, Santanu Karmakar, Santanu Majumder, Partha Sarathi Banerjee, Subrata Saha & Amit Roychowdhury; “Optimization of Spinal Implant Screw for Lower Vertebra through Finite Element Studies”; Journal of Long-Term Effects of Medical Implants; 24(2–3): 99-108 (2014)
- Parthasarathi Sarathi Banerjee, Amit Roychoudhury and Santanu Kumar Karmakr; “Morphological and Kinematic Aspects of Human Spine – As Design Inputs for Developing Spinal Implants”; Journal of Spine; vol. 2, issue 4, pp 1-4 (2013).
- Parthasarathi Sarathi Banerjee, Amit Roychoudhury and Santanu Kumar Karmakar; “Biomechanical Remedies for Degeneration of Cervical Spine – A Review of Literature”; Journal of Medical Imaging and Health Informatics (JMIHI); vol. 2, pp 343-351, 2012
- Parthasarathi Sarathi Banerjee, Amit Roychoudhury and Santanu Kumar Karmakr; “Morphometric analysis of the cervical spine of Indian population by using computerized tomography”; Journal of Medical and Allied Sciences (JMAS), 2012; 2(2), pp. 66-76.

- Chatterjee, S., Singha T. K. and Karmakar, S. K., "Effect of high-frequency low-amplitude vibration on the performance of a class of semi-active base isolation system with on-off damping", Journal of Sound and Vibration, Vol. 274 (2004), pp.893-914.
- Chatterjee, S., Singha T. K. and Karmakar, S. K., "Effect of high-frequency excitation on a class of mechanical systems with dynamic friction", Journal of Sound and Vibration, Vol. 269 (2004), pp.61-89.
- Chatterjee, S., Singha T. K. and Karmakar, S. K., "Non-trivial effect of fast vibration on the dynamics of a class of non-linearly damped mechanical systems", Journal of Sound and Vibration, Vol. 260 (2003), pp.711-730.
- Karmakar, S. and Sethuramiah, A.., "Response of dynamically stressed material in sliding", Wear, 1991, Vol.151, pp.269-278.
- Karmakar, S., Rao, U.R.K. and Sethuramiah, A., "Characterization of sliding wear in dynamically stressed material", Wear, 1993, Vol.162, pp.1081-1090.
- Karmakar, S., Rao, U.R.K. and Sethuramiah, A., "An approach towards fatigue wear modelling", Wear, 1996, Vol.198, pp..242-250.

Conference Papers

- Santanu Sardar, Santanu Kumar Karmakar, Debdulal Das, "Ultrasonic Assisted Fabrication of Magnesium Matrix Composites: A Review", 5th ICMPC 2016, Gokaraju Rangaraju Institute of Engineering and Technology, Hyderabad, March 12-13, 2016
- Arindam Roy Goswami, Santanu Sardar and Santanu Kumar Karmakar; "Temperature rise and wear of sliding contact of alloy steels", AIP Conference Proceedings, 1754, 030004, pp 1-6 (2016); doi: 10.1063/1.4958348
- Banerjee, P. S., Roychoudhury, A., Karmakar, S. K., "Morphological and Kinematic aspects of Human Spine – as Design Inputs for developing Spinal Implants", National Conference on Mechanical Engineering (NCMERP – 2013), Birbhum Institute of Engineering and Technology, Suri – February 2nd – 3rd, 2013
- Jayanta Kr Biswas, Santanu Kr Karmakar, Santanu Majumder, Amit Roychowdhury; "Spinal Implant Design for Lower Vertebra through Finite Element studies"; Proceedings of 57th Congress of ISTAM Defence Institute of Advanced Technology (DIAT), Girinagar, Pune; pp 97-104 (Dec 17-20, 2012).
- Shubhadeep Dey, Jayanta Biswas, Subhomoy Chatterjee, Santanu Karmakar, Santanu Majumder, & Amit Roy Choudhury; "Design & Simulation of Lumber Artificial Intervertibral Disc"; International Conference on Advances In Mechanical Engineering & Its Interdisciplinary Areas; pp 414-420 (Dec 27-28, 2012).
- S. Roy, S. K. Karmakar, S. Banerjee and A. Bhattacharyya, "Stochastic analysis of sliding friction by data dependent system", All India Manufacturing Technology, Design and Research (AIMTDR) Conference, held at Vellore Institute of Technology, TN, India, December 20-22, 2004.
- Sudipto Ray, S. K. Karmakar and S. K. Roy Chowdhury, "Effect of interface temperature on the microstructure and wear of steels in sliding contact, International Conference of

Industrial Tribology – "Tribology for Equipment Reliability" held at Mumbai, India, December 15-18, 2004.

- Karmakar, S. and Sethuramiah, A., "Fatigue Wear Modelling in sliding and Rolling/Sliding Contacts", Proceedings of the International Conference on Industrial Tribology, December 1997, pp.319-325.

Sponsored Projects Completed

- **Project Title:** DST-FIST Project,
  Fund: Rs. 168 Lakh, **Duration:** 2009 - 2014
  Principal Investigator: Santanu Kumar Karmakar, Programme Coordinator, Project Implementation Group, Mech. Engg.
  Sponsor: DST, Govt. of India
- **Project Title:** Indo-US Centre for Research Excellence in Fabrionics, BESUS
  Fund: Rs. 90 Lakh, **Duration:** 2008 - 2012
  Principal Investigator: Santanu Kumar Karmakar
  Sponsor: Indo-US Science & Technology Forum (IUSSTF)
- **Project Title:** Development of Wear Maps of Various Materials under Different Environmental and Operating Conditions
  Fund: Rs. 9 Lakh, **Duration:** 1999 - 2002
  Principal Investigator: Santanu Kumar Karmakar
  Co-Principal Investigator: Shyamal Chatterjee
  Sponsor: AICTE
- **Project Title:** Development of a Rule-Base for Fault-Diagnostic System
  Fund: Rs. 8 Lakh, **Duration:** 2000 - 2003
  Principal Investigator: Shyamal Chatterjee
  Co-Principal Investigator: Santanu Kumar Karmakar
  Sponsor: AICTE

Books/Monographs/Book Chapters

- Editor & an article's author of "Proceedings of Tribology Frontiers Workshop", held on August 03-04, 2016.

Institutional Development Works

- Dean, International Relations and Alumni Affairs, IIEST Shibpur - 10.05.2018 to till date.
- Dean, Alumni Affairs and External Relations, IIEST Shibpur - 03.03.2015 to 09.05.2018.
- Professor-in-Charge, International Relations and Alumni Affairs Cell, BESU Shibpur - 03.09.2009 to 02.03.2015.
- Former Head of Department of Mechanical Engineering - 01.12.2005 to 17.12.2008.

- Founder Honorary Secretary of Global Alumni Association of Bengal Engineering and Science University, Shibpur (GAABESU) - 2005 to 2009.
- Founder Honorary Secretary, Society for Promotion of Indian Classical Music and Culture Amongst Youth (SPICMACAY), BESUS Chapter - since 2001.
- Former Secretary, B. E. College Model School (Secondary & Higher Secondary) - 1998 to 2001.
- Former Secretary of Teachers' Association of BECDU/BESUS - 2001 to 2005.
- Professor-in-Charge, Society of Mechanical Engineers - 1998 - 2013
- Superintendent of D. Banerjee Hall (formerly Hostel No. 8) - since 1997
- Taken initiative for upgradation of BESUS to an Institute of National Importance - 2003 to 2014.

International Conferences/Workshops/Symposia Participated

- "Solid-Solid Interactions" arranged by the Royal Society-Unilever Indo-UK Forum, Imperial College, U.K., 1994
- "International Conference on Industrial Tribology", Tribology Society of India and Balmer Lawrie & co. Ltd, 1997
- "Experimental Methods of Stress Analysis", QIP (AICTE), IIT Kharagpur, 1999
- "Design of Experiments", QIP (AICTE), ISI Kolkata, 2000
- "Sikkim International Nanotribology Symposium", IISc, Bangalore, 2001
- "Human Resource Perspective for Core Sector Industries in India", RDCIS Ranchi, 2006
- "AICTE Sponsored Staff Development Program", BHU UP, 2006
- "Curriculum Development in the Area of Mech. Engg.", Bhubaneswar Orissa, 2006
- "Rolling Element Bearings", CMERI Durgapur, 2006
- Visiting Faculty, University of Windsor, Canada; University of Michigan, Ann Arbor, USA; University of Illinois, Urbana Champaign, USA, 2008
- Visiting Faculty, Northwestern University, Evanston, USA, 2010
- Indo-US International Workshop on Fabrionics at Alaska, 2010
- Indo-US Workshop on Fabrionics 2010: Science of Advanced Fabrication at MGM JNE College, Aurangabad, Maharashtra, 2010
- Indo-US Workshop on "Fabrionics for Healthcare" CMERI, Durgapur, December 23-24, 2012
- ICME 2015, BUET Dhaka, Bangladesh, December 18-20, 2015
- Invited Speaker on "Biotribology - its relevance in healthcare" at Department of Biomedical Physics and Technology, Dhaka University, Bangladesh, December 24, 2015
- Invited Speaker, National Workshop on "Recent trends in electromechanical system" (RTEMS, 2016), Bankura Unnayani Institute of Engineering, Bankura, West Bengal, October 18-22, 2016

- Keynote speaker for National Conference on "Recent Advances in Tribology and Maintenance (RAITM2017)", at Dept. of Mechanical Engineering, NIT Rourkela, Odisha, February 10-11, 2017.

International Conferences/Workshops/Symposia Organized

- "Exergy Analysis on Photosynthesis", Speaker – Prof. Richard Patela, Technology Scientific Ltd., Calgary, Alberta, Canada at Seminar Room, Mech. Engg. Dept. BESUS on 18th September, 2006.
- "Biomimetic MEMS & NEMS Sensing Platform – Icarus Revited?" Speaker – Prof. Marc J. Madou, University California, Irvine, at Alumni Seminar Hall, BESUS on 5th January, 2007.
- "Indo-US Seminar on Microfluidics & Fabrionics" Speakers - Prof. Kuniaki Dohda, Nagoya Institute of Technology, Japan, Prof. Kornell Ehmann, Northwestern University, USA, Prof. Shiv Gopal Kapoor, University of Illinois, Urbana-Champaign, USA and Prof. Suman Chakraborty, IIT-Kharagpur , at Conference Hall, Mech. Engg. Dept., BESUS on 8th January, 2009.
- International Colloquium on "Engineering in Aid of Society", Speakers - Prof. Jyoti Mazumder, University of Michigan, USA, Dr. Debranjan Sarkar, VECC, Kolkata, Prof. Nihar Biswas, University of Windsor, Canada, Prof. Arun Kr. Deb, Vice President Weston Solutions Inc., USA at Alumni Seminar Hall, BESUS on 3rd November 2009.
- "Short Term Course on Mechanics over Micro and Nano Scales", Speakers - Prof. Howard Stone, Princeton University, Prof. Animangsu Ghatak, IIT Kanpur, Dr. M. S. Bobji, IISc Bangalore, Prof. Amitabha Ghosh, BESUS, Prof. Suman Chakraborty, IIT Kharagpur, Prof. Siddhartha Roy, IICB at Alumni Seminar Hall, BESUS on December 21-22, 2009.
- "The Challenges of Neurosciences in The Current Century", Speakers – Prof. David Bates & Prof. Robin Sengupta, at Alumni Seminar Hall, BESUS on February 17, 2010.
- "Indo-US Workshop on Fabrionics: Micro and Nano Scale Dynamics", Speakers - Prof. Amitabha Ghosh, BESUS, Prof. Ashutosh Sharma, IIT Kanpur, Prof. G. K. Ananta Suresh, IISc Bangalore, Prof. Sunando Dasgupta, Prof. Suman Chakraborty & Prof. Rabibrata Mukherjee of IIT Kharagpur, Prof. Gautam Biswas, CMERI Durgapur at Alumni Seminar Hall, BESUS on August 18-19, 2012.
- "Tribology Frontiers Workshop", Speakers - Prof. Khondkar Siddique-e-Rabbani, University of Dhaka, Prof. Satish Vasu Kailas, IISc Bangalore, Dr. M. S. Bobji, IISc Bangalore, Prof. Satish C. Sharma, IIT Roorkee, Dr. Barun Chakrabarti, L&T Hydrocarbon Engineering Limited, Prof. Prasanta Sahoo, Jadavpur University, Prof. S. K. Karmakar, IIEST Shibpur at Dept. of Mechanical Engineering, IIEST Shibpur on August 03-04, 2016.

PhD Theses supervised

- Ph.D degree awarded to Sri Jayanta Kumar Biswas on 21st February, 2018 on the thesis titled “Design and Development of Patient Specific Lumbar Implant" ” which was jointly supervised by Dr. Amit Roy Chowdhury and Dr. S. K. Karmakar.
- Ph.D degree awarded to Sri Partha Sarathi Banerjee on 4th March, 2016 on the thesis titled “Conceptual Design of a Novel Spinal Implant: A Biomechanical Study of Artificial Cervical Plate and Intervertebral Disc" ” which was jointly supervised by Dr. S. K. Karmakar and Dr. Amit Roy Chowdhury.
- Ph.D degree awarded to Sri Tarun Kumar Singha on 16th February, 2007 on the thesis titled “Response of nonlinear systems under high frequency dynamic excitations – Theory and Applications” which was jointly supervised by Dr. S. K. Karmakar and Dr. S. Chattejee.

PG Theses supervised

- Aravind Kumar Bukka, “Application of FEM in modeling of surface fatigue wear in rolling/sliding contacts, BITS-Pilani, May 1996.
- Suday Kumar Ghosh, “Approach Towards Sliding Wear Modelling”, 1999.
- Dipankar Das, “Contact Temperature and Wear for dry sliding”, 2000.
- Dilip Kumar Sonar, “Wear under dynamic loading”, 2000.
- Sudipto Ray, “Microstructure and Wear of steels in sliding contact”, 2002.
- Biplab Chatterjee, “An approach towards modeling of wear of steels under dynamic load”, 2004.
- Guruvayur Appan Parige, “ Characterization of Tribomaterials by Nanoindentation”, 2005.
- Sakhamuri Venkata Ratnam, “Microstructures and Wear of alloyed steel in sliding”, 2006.
- Jhumpa De, “Tribo-Design of Piston Ring”, 2009.
- Saumen Mallick, “Tribological Characteristics of Microsystems”, 2011.
- Jayanta Kumar Biswas, “Stress and Tribo-analysis of Spine Implant”, 2011.
- Subhadeep Dey, “Tribo-Characterisation of Spine Implant Materials”, 2012.
- Amit Das, “Tribological Behaviour of Aluminium Composite at High Temperatures”, 2013.
- Sourav Dutta, “Tribo-Characterization of Aluminium Based Composite at Elevated temperatures”, 2014.
- Arindam Roy Goswami, "Modeling of Surface Temperatures in Sliding Contact ", 2015.
- Masud Rana, "Stress and Range of Motion Analysis of Lumbar Implants", 2015.
- Shambo Bhattacharya, " Design of a Cervical Intervertebral Disc Prosthesis based on Biomechanical Analyses and Tribological Experiments", 2017.
- Pranesh Kumar Das, "Tribo-Response of Aluminium Metal Matrix Composites", 2017.
- Mamidala Gopi Krishna, "Temperature Rise, Friction and Wear of Biomaterials in Sliding Contact", 2018.

Member of Professional Bodies

- Life Member: Tribology Society of India (TSI)
- Life Member: Indian Society of Technical Education (ISTE)
- Fellow: The Institution of Engineers (India) (IEI)