Dr. SOUMEN MANDAL

Principal Scientist (Scientist E2),
Material Processing and
Microsystems Laboratory
Central Mechanical Engineering
Research Institute,
Council of Scientific and
Industrial Research, India-
713209

E-mail: somandal88@gmail.com
Website: www.soumenmandal.in
Phone: +91 9476326532

WORK EXPERIENCE

CSIR Central Mechanical Engineering Research Institute
Nov 2021 — Till date

Principal Scientist

Research Work Presently Engaged in:

1. Biosensors and micro device development.
2. Development of hybrid manufacturing machines.
3. Applications of 3-D printing in sensor development.

Academy of Scientific and Innovative Research, Chennai
June 2013 — Till Date

Associate Professor (Honorary)

Academy of Scientific and Innovative Research which is an institute of national importance established by Act of Parliament emphasizes on collaboration with CSIR laboratories for conduction of Masters and Doctoral Programs. Researchers actively involved in teaching activity at CSIR laboratories are entrusted with the position of Assistant/ Associate/ Professor (Honorary) at AcSIR. I have conducted following activities being a faculty member at AcSIR.

(1) Teaching Course on "Instrumentation and Industrial Controls" for M.Tech students of Indian Institute of Engineering Science and Technology, Shibpur, Howrah enrolled in M.Tech program in Mechatronics.

(2) Supervised 01 M.Tech thesis (Completed) and 01 M.Tech thesis (Ongoing).

(3) Developed the laboratory curriculum of Instrumentation and Industrial Controls for M.Tech program in Mechatronics..

(4) Conducted Hands on Training programs (40 hour courses) for Diploma/ B.Tech/ Industry Personnel on (1) PCB design and manufacturing (2) Training program on CNC controls including micro CNC.

CSIR Central Mechanical Engineering Research Institute
Nov 2016 — Nov 2021

Senior Scientist

Duration: 05 years 0 months.
Position status: Regular under norms of Govt. of India.
Technology developed and licensed: (Number of technologies developed and licensed- 02 nos)

(1) Multi-Fab micro machining technology was licensed at INR 1.5 million in December 2017. The Multi-Fab machine is a CNC micro fabrication facility which can

conduct four different machining operations namely micro milling/ micro turning/ micro drilling/ micro patterning within a small footprint of 60 sq cm area. The technology was intended to make the Indian manufacturing sector stronger and substitute import of such machines. The manufacturing cost of the machine is 2 hundred thousand INR as opposed to INR 2 Million for imported machines. I have worked as the Principal Investigator in development and commercialization of the system. The developed controller was indigenous and I have conducted R&D for the same.
(2) Nano-Lase micro machining technology was licensed to two different industries at INR 0.5 million in September 2019 and November 2019 to two different Indian companies. The Nano-Lase machine is a CNC micro-nano scale fabrication facility which can conduct laser micro machining. The machine has an unprecedented accuracy of 0.5 micron and can machine metals, polymers, ceramic and wood. I have worked as the Principal Investigator in development and commercialization of the system.
Total external cash flows (ECF) generated from technology licensing and machine deployment- INR 2.8 million.

Research Work Presently Engaged in:
Involved in translational as well as exploratory research pertaining to-
1. Micro Nano sensor and micro device development.
2. Development of micro machining centres.
3. Sensor Development for biomedical applications and intelligent systems.
4. Micro-Nano scale manufacturing and devices.
5. Controls and instrumentation of CNC micro machining platforms.

About the organization: Central Mechanical Engineering Research Institute is an organization under Council of Scientific and industrial Research, Govt. of India.
Web: www.cmeri.res.in

Projects where I am involved as Principal Investigator (PI) or Co-PI:
1. Field deployment of indigenous four axis controller for Multi process micro machine- Funded under CSIR-Fast Track Translation Project. Total outlay- INR 5.4 million. Technology developed and licensed- Multi Fab machine technology. Duration- 2016 to 2018. Role- Principal Investigator.
2. Development of an intelligent micro- milling machine prototype- Funded by CSIR-12th FYP Network Project. Total outlay- INR 7.0 million. Duration- 2012 to 2017. Technology Developed- Intelligent micro machine controller employing Fiber Bragg Grating (FBG) sensors. Role- Principal Investigator.
3. Development of a nano-EDM machine- Funded by CSIR-12th FYP Network Project. Total outlay- INR 11.0 million. Duration- 2012-2017. Role- Co-Principal Investigator.
4. Development of process technology for large area (10 cm X 10 cm) manufacturing of micro nano patterned (300 nm-300 microns) hydrophobic surfaces- Funded under CSIR- Fast Track Translation Project. Total outlay- INR 3.13 million. Duration- 2018-2020. Role- Principal Investigator. The laser micro manufacturing center was developed under this project and the technology was licensed to two different organizations.
5. A low cost micro factory with magnetic levitation based actuation for micro machining- Funded under Department of Science and Technology- Advanced Manufacturing Technology call. Total outlay- INR 2.12 million. Duration- 2018-2020. Role- Principal Investigator.
6. Inkjet printed electrodes of Graphene oxide- Metal oxide hierarchical

nanostructured nanocomposites for improved energy density and power density thin flexible supercapacitors- Funded under Department of Science and Technology- Materials for Energy Storage call. Total outlay- INR 1.1 million. Duration- 2018-2020. Role- Co-Principal Investigator.
7. Development of screw extruder based additive manufacturing system for developing ceramic core to be used in turbine blade casting- Funded by Aeronautical Research Development Board, Ministry of Defense. Total Outlay- INR 19.5 million. Duration-2021-2021. Role-Co-Prinicpal Investigator.
8. Intelligent pulse flow respiratory device based on photoplethysmogram (PPG) and surface electromyogram (sEMG) sensory fusion for optimized delivery of oxygen in COVID19 dyspnea- Funded by SERB Special Call on Oxygen Concentrators. Total outlay- INR1.2 million. Duration- 2022-2023. Role- Principal Investigator.
9. Development and deployement of hybrid (additive-subtractive) micro machine for MSME Industries and Skill Development- Funded by CSIR Fast Track Translation Scheme. Total outlay: INR 5 million. Duration- 2022-2024, Role: Principal Investigator.

CSIR Central Mechanical Engineering Research Institute — November 2012 — November 2016

Scientist

Duration: 04 years
Position status: Regular under norms of Govt. of India.
Work Conducted: Process control and condition monitoring of Mechanical Systems using Fibre Bragg Grating Sensors.
Facilities created: Optical sensing facility, printed circuit board development facility.

Central Mechanical Engineering Research Institute — Aug 2010 — Oct 2012

Scientist (Trainee)

Duration: 02 years.
Position status: Tenure (2 years).
Work Conducted: Worked on process control and system integration of micro nano systems, design and development of optical sensors for NDT.

Consultancy Development Centre — Nov 2009 — Feb 2010

Fellow

Work Done: Developed a design plan for consultancy regarding hospital database monitoring systems.

TATA STEEL — Apr 2009 — Jul 2009

Intern

Work Done: Design and implementation of programmable logic control for disaster mitigation in a coal beneficiation plant.

Center for Development of Telematics — Mar 2008 — Jun 2008

Project Trainee

Work Done: Design, simulation and testing of microcontroller architecture on FPGA platforms.

EDUCATION

Doctor of Philosophy (Ph.D) — Jan 2013 — August 2019

Academy of Scientific and Innovative Research (AcSIR) India

Ph.D Thesis Title: Intelligent process control system for monitoring temperature and strain in micro cutting tool using fiber Bragg grating sensor.
Date of thesis submission: 19 June 2018
Date of defense: 9 August 2019.
Date of degree: 23 August 2019.
University: AcSIR, India.
Supervisor- Dr Nagahanumaiah, Director, Central Manufacturing Technology Institute (CMTI), Bengaluru, India.

International Linkage Degree — June 2018 — July 2018

Hiroshima University, Higashi-Hiroshima, Japan

Conducted research worked under Sakura Science Program (SSP) funded by JST (Japan Science and Technology Agency).
Research work conducted- High speed vision system for tool condition monitoring for CNC systems.
Date of degree: 09 July 2018.
Supervisors- Prof. Idaku Ishii and Prof. Takeshi Takaki, Department of System Cybernetics, Graduate School of Engineering, Hiroshima University. Japan.

Master of Technology — Aug 2010 — Aug 2012

Academy of scientific and innovative research (AcSIR), India

Completed the degree with distinction and CGPA of 8.89 out of 10.
Degree in: Mechatronics.
Thesis title- Multi-sensory approach for dynamic health monitoring in micro turning. The work deals with condition monitoring of micro turning process using multiple sensors in order to prevent tool breakage, improve accuracy of the process and enhance the surface integrity of work.
Project conducted at Microsystem Technology Laboratory CSIR-CMERI.
Date of degree: 26 September 2012.
Activities:

1. Won First runners up in Technical Quiz organized at CSIR.
2. Won top 100 designer entry for best design in TechBriefs create the future design contest.

Bachelor of Technology — May 2006 — April 2010

KIIT University, India

Completed the degree with distinction and with a CGPA of 9.15 out of 10.
Degree in: Electronics and Electrical Engineering.
Completed the project "Direct Vector Control of Permanent Magnet Synchronous Motor using Fuzzified PI control" in the Department of Electrical Engineering.
Date of degree: 05 December 2010.
Activities and Societies:

1. Served as Class representative of the branch.
2. Served as a sergeant in National Cadet Corps (Army Wing) and achieved B

certificate standard with A grade.

Higher Secondary — April 2004 — March 2006

Central Board of Secondary Education, India

Passed AISSCE under CBSE board with distinction and 91.60% marks from D.A.V. Model school Durgapur, India.
Activities and Societies: Prefect of the literary society

Secondary — — March 2004

Central Board of Secondary Education, India

Passed AISSE under CBSE board with distinction and 90.00% marks from TATA D.A.V. School, Jamadoba, Dhanbad, Jharkand, India.

PUBLICATIONS

Total citations: 251, h-index: 09, i-10 index: 09 (Source- Google Scholar)
(* Corresponding Author)
Journal Papers-

1. **S. Mandal***, S. Paul, S. Mukhopadhyay, R. K. Arun, D. Dutta, N. Chanda, Gold nanoparticle embedded microchannel array for enhanced power generation, Lab on a Chip, Royal Society of Chemistry, DOI: 10.1039/D0LC00552E, 2020. Impact Factor- 6.799.
2. **S. Mandal***, V.K. Sharma, A. Kumar, Nagahanumaiah, Tool strain–based wear estimation in micro turning using Bayesian networks, Journal of engineering manufacture, SAGE, DOI: 10.1177/0954405416654420, 2016. Impact Factor- 2.61.
3. R. Vinodkumar, A. Pal, S. Saha, **S. Mandal***, A stepper-piezo based co-actuation paradigm for tool positioning in parallel spark micro-EDM, Journal of engineering manufacture, SAGE, DOI: 10.1177/0954405415625926, 2016. Impact Factor- 2.61.
4. D. Roy, P. Singh, S. Halder, N. Chanda,**S. Mandal***, 3-D printed electrode integrated sensing chip and a PoC device for enzyme free electrochemical detection of blood urea, Bioelectrochemistry, Elsevier, 142, 2021, 107893. DOI: 10.1016/j.bioelechem.2021.107893. Impact Factor-5.373
5. P. Singh, **S. Mandal***, D. Roy, N. Chanda, Facile Detection of Blood Creatinine Using Binary Copper–Iron Oxide and rGO-Based Nanocomposite on 3D Printed Ag-Electrode under POC Settings, ACS Biomaterials Science and Engineering, ACS, 2021. DOI: 10.1021/acsbiomaterials.1c00484. Impact Factor- 4.749
6. N. Priyadarshini, **S. Mandal***, S. Ganesan, S. Halder, D. Roy, N. Chanda, Printed oxygen gas sensor using Copper-DTDTPA solid electrolyte, Analyst, RSC, 2021. DOI: 10.1039/D0AN02391D. Impact Factor- 4.616.
7. R. Seema, **S. Mandal***, P. Singh, S. Paul, N. Chanda, Fiber Bragg grating sensors for in-situ temperature measurement on bending a flexible planar supercapacitor, Sensors and Actuators A: Physical, Elsevier, 314, Article ID: 112266, 2020. DOI: 10.1016/j.sna.2020.112266. Impact Factor- 3.407.
8. D. Dutta, D. Natta,**S. Mandal***, N. Ghosh, MOOnitor: An IoT based multi-sensory intelligent device for cattle activity monitoring, Sensors and Actuators A-Physical, Elsevier, 333, 2022, Article ID: 113271, DOI: 10.1016/j.sna.2021.113271. Impact Factor-3.407
9. D. Dutta, S. Aruchamy, **S. Mandal**, S. Sen*, Poststroke Grasp Ability Assessment using an Intelligent Data Glove based on Action Research Arm

Test: Development, Algorithms, and Experiments, IEEE Transactions on Biomedical Engineering, IEEE, In press. DOI: 10.1109/TBME.2021.3110432. Impact Factor-4.538

10. R. Seth, S. Halder, K. Chatterjee,**S. Mandal***, Nagahanumaiah, Magnetically levitated X-Y plane actuator for micro manufacturing, Journal of Micromanufacturing, SAGE , 3(1), 13-19, 2020.
11. S. Paul, S. Mukhopadhyay, **S. Mandal***, P. Agarwal, N. Chanda, Fabrication of durable hemophobic surfaces on cast acrylic sheets using UV laser micromachining, IET Micro and Nano Letters, IET, DOI: doi: 10.1049/mnl.2019.0192, 2019. Impact Factor- 0.975.
12. **S. Mandal***, Nagahanumaiah, Investigations on size-effect dependent strain and temperature in micro turning near to the cutting edge, Journal of Micromanufacturing , SAGE, 2(1), 25-34, 2019.
13. P. B. Agarwal, B. Alam, D. Sharma, S. Sharma,**S. Mandal***, A. Agarwal, Flexible NO2 gas sensor based on singlewalled carbon nanotubes on polytetrafluoroethylene substrates, Flexible and Printed Electronics , IOP Science, DOI: 10.1088/2058-8585/aacc8f, 2018. Impact Factor- 3.588.
14. **S. Mandal***, R. Vinod Kumar, Nagahanumaiah, Silver and molybdenum disulfide nanoparticles synthesized in situ in dimethylformamide as dielectric for micro-electro discharge machining, Journal of Engineering Manufacture , SAGE, DOI: 10.1177/0954405417733019, 2017. Impact Factor- 2.61.
15. **S. Mandal***, A. Pal, Nagahanumaiah, Time varying process model for intelligent prediction of strain and temperature in micro turning process, Journal of Engineering Manufacture , SAGE, DOI: 10.1177/0954405417708223, 2017. Impact Factor- 2.61.
16. D. Dutta, S. Modak, A. Kumar, J. Roychowdhury,**S. Mandal**, Bayesian Network Aided Grasp and Grip Efficiency Estimation using a Smart Data Glove for Post-stroke Diagnosis, Biocybernetics and Biomedical Engineering, Elsevier, 37(1), 2017, 44-58. Impact Factor- 4.314.
17. P. Singh, P. Nath, R.K. Arun,**S. Mandal**, N. Chanda, Novel synthesis of mixed Cu/CuO-reduced graphene oxide nanocomposite with enhanced peroxidase-like catalytic activity for easy detection of glutathione in solution and using paper strip , RSC Advances, Royal Society of Chemistry, DOI: 10.1039/C6RA20882G, 2016. Impact Factor- 3.361.
18. **S. Mandal***, A. Pal, R.K. Arun, N. Chanda, Gold nanoparticle embedded paper with mechanically exfoliated graphite as supercapacitor electrodes, Journal of electroanalytical chemistry, Elsevier, 755, 2015, 22-26. Impact Factor- 4.464.
19. **S. Mandal**, S. Roy, K. Chatterjee, S. Halder, Vijay, Nagahanumaiah, Fiber Bragg grating sensor for cutting speed optimisation and burr reduction in micro-nano scratching, Procedia Technology, Elsevier, 19, 2015, 327-332.
20. S. Roy, **S. Mandal***, Nagahanumaiah, Tool-workpiece contact detection in micro-milling using wireless aided accelerometer sensor, Journal of engineering manufacture, SAGE, DOI:10.1177/0954405415573850, 2015. Impact Factor- 2.61.
21. S. Roy, **S. Mandal***, Nagahanumaiah, MEMS accelerometer: From engineering to medicine, IEEE Potentials, IEEE, 35(2), 2015, 30-33.
22. **S. Mandal***, R.K. Arun, N. Chanda, Nagahanumaiah, S. Das, P.B. Agarwal, J. Akhtar, P. Mishra, Silver nanoparticles in comparison with ionic liquid and rGO as gate dopants for paper pencil based field effect transistors, Journal of electronic materials, Springer, 44(1), 2015, 6-12. Impact Factor- 1.774
23. **S. Mandal***, A. Kumar, K. Chatterjee, A. Kumar, Nagahanumaiah, Feasibility study on the use of 2-dimensional penalized splines for smooth curve

generation in precision machining, Journal of control automation and electrical systems, Springer, 25(5), 2014, 576-584.

24. **S. Mandal**, Applicability of Tool Condition Monitoring Methods Used for Conventional Milling in Micromilling: A Comparative Review, Journal of Industrial Engineering, Volume 2014 (2014), Article ID 837390, http://dx.doi.org/10.1155/2014/837390
25. **S. Mandal**, Superlens based nano scale imaging, IEEE Potentials, IEEE, 33(2), 2014, 17-20.
26. **S. Mandal***, S.K. Singh, S. Mandal, A. Kumar, Nagahanumaiah, Residual jerk reduction in precision positioning stages using sliding micro step based switching, Journal of control, automation and electrical systems, Springer, 25(3), 2014, 311-318.
27. S.K. Singh, **S. Mandal**, Nagahanumaiah, Motion and force analysis in pantograph mechanism for micro-nano patterning, Procedia Engineering, Elsevier, 64, 2013, 1445-453.
28. **S. Mandal**, Suitability assessment of ethylene vinyl-acetate as a material for dynamic photoelastic coating, A-Z of materials journal, DOI: 10.2240/azojomo0321, 2012.
29. **S. Mandal**, A. Kumar, Nagahanumaiah, Dynamic shear stress evaluation on micro-turning tool using photoelasticity, Advanced Materials Research journal, 569, 2012, 376-379.
30. S.K. Singh, A. Chebolu, **S. Mandal**, Nagahanumaiah, Development of a pantograph based micro machine for nano scratching, Production Engineering, Springer, 7 (5), 2013, 517-525.
31. **S. Mandal***, V. Mishra, U. Tiwari, Nagahahanumaih, R.G.V. Sarepaka, Fiber Bragg grating sensor for temperature measurement in micro turning of optical surfaces with high surface integrity, International Journal of Optomechatronics, Taylor and Francis, 7(4), 2014, 244-252. Impact Factor- 0.882.
32. **S. Mandal***, Nagahanumaiah, Assessment of thermally induced shear stress and its effect on pattern waviness in CO2 laser ablation of birefringent polymers, Journal of Process Mechanical Engineering, SAGE, 228(2), 2014, 97-103. Impact Factor- 1.6.
33. **S. Mandal**, A. Kumar, Nagahanumaiah, Assessment of micro turning machine stiffness response and material characteristics by fuzzy rule based pattern matching of cutting force plots, Journal of Manufacturing Systems, Elsevier, 32(1), 2013, 228-237. Impact Factor- 8.633.

Conferences-

1. S. Mandal, S.K. Giri, Comparison of antennas for Radio frequency energy harvesting in 0.2-2.4 GHz range, 3rd International conference on electronics and computer technology IEEE, 8- 10 April 2011, 93-97.

2. S.K. Giri, **S. Mandal**, Development of a single stage C-band pulsed power amplifier for RADAR transmitter, 3rd International conference on electronics and computer technology IEEE, 8- 10 April 2011, 88-92.

3. A. Kumar, J. Choudhary, **S. Mandal**, Probabilistic duration of power estimation for Nickel-metal-hydride (NiMH) battery under constant load using Kalman filter on chip, International conference on advances in engineering, science and management IEEE, 30-31 March 2012, 648-653.

4. S. Mandal, Nagahanumaiah, A low cost wavelength sensor using dual layer

photodiode, International Conference on Advances in Electrical Engineering, IEEE, 9-11 January 2014.
5. S. Paul. S. Mukhopadhyay,**S. Mandal**, Quantification of tool wear in micro-milling using Fast Fourier transform of accelerometer data, IEEE 3rd International Conference on Electronics, Materials Engineering & Nano-Technology (IEMENTech), Kolkata, India. DOI: 10.1109/IEMENTech48150.2019.8981301.
6. D. Dutta, S. Sen, S. Aruchamy,**S. Mandal**, Development of a smart glove for affordable diagnosis of stroke-driven upper extremity paresis, International Conference on Computer, Electrical & Communication Engineering (ICCECE), IEEE, Kolkata, India. 17-18 January 2020.

Patents-

1.Four axis controller for multi process micro machine, Indian Patent, 2017, Patent ID: IN201711012000.
2. A single board computer based system and method for micro-nano scale positioning of lasers, 2019, Patent ID: IN 201911036156

Invited Talks and Chairs at committees-

1. Invited talk on “Paper pencil based field-effect transistors and their applications in gas sensing” at Mahatma Gandhi University, Kottayam, Kerala in the International Conference on Nanomaterials and Nanocomposites (ICNM-2014) during 19-21st Dec 2014.
2. Conference chair in the International Conference on Nanomaterials and Nanocomposites (ICNM-2014) during 19-21st Dec 2014.
3. Plenary lecture on “Materials and Manufacturing at micro-nano scale: The interdisciplinary approach” in National Seminar on “Recent trends in material research “on 11th September 2015 at Siliguri Institute of Technology (SIT), Darjeeling, West Bengal.
4. Biography selected for inclusion in “Marquis who’s who” biographical book of records in 2015.
5. Invited talk at NSHM Durgapur on “Intelligent manufacturing: Advancements and Challenges” in National Seminar on Recent Trends in computing held on 17th April 2016.
6. Invited talk at Jadavpur University, Kolkata on “Graphite clay composites and their breakthrough applications” in International Seminar on Recent Trends in composite materials held on 18th August 2016.
7. Invited talk on "Flexible Electronics and its emerging applications" in National Seminar on Recent Trends in Electronics at New Horizons Institute of Technology. Durgapur, WB, India on 4th May 2018.
8. Invited popular lecture at Institute of Infrastructure, Technology, Research and Management (IITRAM), Gujarat on Micro, nano systems- From the Mechatronics Perspective on 24th March 2022.
9. Invited talk at Central Manufacturing Technology Institute, Bengaluru at The Ministry of Heavy Industry Week on Micro Nano Systems: Design, Development and Applications on 10th January 2022.
10. Invited talk at Mallabhum Institute of Technology, Bishnupur, West Bengal on Micro Nano Systems and Devices: An additive Manufacturing Perspective on 6th August 2021.

TEACHING EXPERIENCE

Course coordinator and trainer under Govt. of India "Skill Development Initiative" for following courses.

1. Hands on training on printed circuit board (PCB) design and fabrication- 40 hours course designed and offered to Diploma/ Engineering students. Total students trained- ~1000 till date in 12 batches.
2. Hands on training program on CNC including micro-CNC- 40 hours course offered to Diploma/Engineering students. Total students trained- ~30 till date in 5 batches.

Achievements in the skill development programs-

1. Total external cash flows (ECF) generated for the institute Rs 300 thousand.
2. Primary contributor in setting up full fledged PCB fabrication and wave soldering facility in the laboratory.

Taught postgraduate course on "Instrumentation and Industrial controls" for 4 years at Academy for Scientific and Innovative Research, India during 2012-2016 as Honorary Faculty.

Taught postgraduate course on "Mechatronics and Robotics" for 1 yearat Academy for Scientific and Innovative Research, India during 2019 as Honorary Faculty.

Students guidance

02 M.Tech thesis.
06 students as Research Fellows in funded projects.
03 Ph.D thesis (Ongoing)

AWARDS

1. Young Engineers Award in Mechanical Engineering from "The Institution of Engineers, India" in year 2019.
2. Received travel grant under DST- International Travel support scheme (ITS) for presenting paper at “International conference on interdisciplinarity in engineering (Inter-ENG 2014)” at University of Petru Maior, Targu Mures, Romania from 8th to 12th October 2014 (Grant No: SB/ITS-Y/03437/2014-15).
3. Top 10 ideas in Future Ideas Worldwide Innovation contest for the idea: “Flexible electronic devices using pencil markings on paper: A technology for the future”- 2015

FELLOWSHIPS AND MEMBERSHIPS

1. Sakura Science Fellow, Japan Science and Technology Agency, Japan.
2. Fellow of Consultancy Development Center, Govt. of India.
3. Life Member of Indian Science Congress Association.
4. Member of IEEE.
5. Member of international association of engineers.
6. Member of Governing Council of Nanoscience and nanotechnology society, Kottayam, India.
7. Associate Member of Institution of Engineers, India.

SERVICES CATERED TO ORGANIZATION AND COMMUNITY

1. Executed 06 nos of National Projects successfully and developed two technologies which has brought importance to the home organization and the nation in terms of indigenous manufacturing promoting "Make in India".

2. Organized 17 skill development programs which promotes "Skill India".
3. Organized a workshop on "IoT Applications in Advanced Manufacturing" as Nodal Coordinator.
4. Convener of the institutional standing committee for furniture procurement and disposal.

SHORT BIOGRAPHY

Dr. Soumen Mandal is a Senior Scientist at The Central Mechanical Engineering Research Institute, Durgapur, West Bengal, India. He is an Assistant Professor (Honorary) at the Academy of Scientific and Innovative Research, New Delhi, India. He is a Visiting Researcher at Hiroshima University Japan under Sakura Science Program funded by Japan Science and Technology Agency. He is a fellow of Consultancy Development Center, Govt. of India. He is a member of various scientific bodies including IEEE, Indian Science Congress Association, Institution of Engineers India and International Institute of Engineers. He is the member of the Governing council of "Nanoscience and Nanotechnology Society, India". He is a recipient of IEI-Young Engineers Award from Institution of Engineers India in Mechanical Engineering Discipline in 2019. His research areas include micro-nano systems engineering, micro fluidics, nano sensor development for biomedical applications, intelligent controller development for micro machines and flexible electronics. He has pioneered development of indigenous micro fabrication machines named "Multi Fab" and "Nano Lase" in India and both the technologies are commercialized. He is also involved in skill development program under Govt of India, Skill Initiative and has conducted 15 training programs on Printed Circuit Board Manufacturing and Micromachining.

PERSONAL INFORMATION

Marital Status- Married.
Nationality- Indian.
Date of Birth- July 30, 1988.
Wife: Dr. Debeshi Dutta.
Son: Master Hiyansh Mandal.