

Personal Information

Dr. Bishakh Bhattacharya

Date of Birth 14.09.1967

Nationality

Indian

Education

Ph.D. (1998), Department of Aerospace Engineering, Indian Institute of Science Bangalore

- Thesis Title: Vibration Suppression of Smart Laminated Composite Beams and Plates
- Advisors: Professors A. V. Krishnamurthy and M. S. Bhat
- Area of Study: Control-Structure Interaction in Smart Structures

M. E. (1991), Department of Mechanical Engineering, Jadavpur University, Calcutta

- Thesis Title: Finite Element Analysis of Axisymmetric Structures under Non-axisymmetric Loading
- Advisor: Professor A. Datta
- Area of Study: Applied Mechanics

B. E. (1988), Department of Civil Engineering, Jadavpur University, Calcutta

- Project Title: Finite Element Analysis and Design of Portal Structures

Professional/Research Experience

2012 - continuing: Professor in the Department of Mechanical Engineering, IIT Kanpur

2008-2011: Associate Professor in the Department of Mechanical Engineering, IIT-Kanpur.

2000-2007: Assistant Professor in the Department of Mechanical Engineering, IIT-Kanpur.

2002-2015: Joint Faculty, Design Programme, IIT-Kanpur.

2015-cont.: Joint Faculty, Cognitive Science and Technology, IIT-Kanpur

1997-2000: Research Associate in the Department of Mechanical Engineering, University of Sheffield, project funded by DERA (Defense Evaluation and Research Agency), UK on Dynamic Analysis & Performance Estimation of Energy Absorbing Composite Joints.

1994-1997: Project Associate in an AR & DB (Aeronautical Research and Development Board) sponsored project for the study of Vibration Suppression Feasibilities in Laminated Composite Plates, in the Aerospace Engineering Department, Indian Institute of Science, Bangalore.

1991-1992: Assistant Engineer, EMC SteelAl Limited, Calcutta, India; in the Structural Analysis and Design of Transmission Tower (EHV) Lines.

1988-1989: Engineer Trainee, Simplex Concrete Piles (I) Ltd, Calcutta, India, in the Design and Construction of Turbo Generator Deck for two 500 MW thermal power stations at Chandrapur Super Thermal Power Station, Maharashtra, India.

Teaching Experience

2000-continuing: Department of Mechanical Engineering, IIT-Kanpur;

Courses Taken:

As Instructor

Principles of Vibration Control
Dynamics & Control of Machines
Automation and Control
Applied Dynamics & Vibration
Composite Materials
Material Selection in Mechanical Design
Smart Materials and Structures
Vibration and Control Laboratory

As Tutor

Engineering Dynamics
Engineering Graphics
Design of Machine Element

2002-continuing: Design Programme, IIT-Kanpur, Courses taken:

As Instructor

Design Practice
Intelligent Product Design
Design Projects on Embedded System Design
New Product Development
Topics in Design [Design Research & Axiomatic Design]

As Tutor

Design Projects on Embedded System
New Product Development

M Tech/M S/ M Des Thesis Supervision

M Tech Thesis [66]:

[2017]

Abhinav Ranjan, *Design and Development of Assisted Thyroid Retractor*

Ayush Poddar, *Design and Development of Modular Pipeline Inspection Crawling Robot*

Sachin Umrao, *Structural Health Monitoring of Gas-Pipe Network Based on Machine Learning Techniques*

Jai Prakash Singh, *Analytical study of Active and Smart Cabin Pressure Control System for variable flight profile*

[2016]

Shubham Agarwal, *Modeling and System Identification of Viscoelastic Material and Inflated Structure using Frequency Response Transmissibility*

Hanit Bansal, *Design and development of a modified eddy current damper for improved high frequency isolation*

Kanhaiya Lal Chaurasia, *A Novel and Robust Cabin Pressure Control System (CPCS) for Combat Aircraft using Active Smart Valve System*

[2015]

Matin Ahmed, *Gas Path Simulation and Fault Diagnosis Model for an Aero Engine Gas Turbine*

Sharad Katiyar, *Modelling of the Electro-Thermo-Mechanical behaviour in a laminated composite beam with externally attached SMA actuator and its application in delamination detection*

Anirudhdha A Kulkarni, *Vibration transmissibility based identification of viscoelastic systems*

Anil K Meena, *Identification of mechanical system through impulse excitation*

Vaibhav Verma, *Design and development of pipe health monitoring robot*

Ajinkya Jain, *Two design challenges in exoskeleton system: optimal gait control and optimal gripper system design*

[2014]

Shikhar Pradhan, *Analysis and Design Optimization of a Seven Link Robot Gripper with an Integrated Actuation System.*

Vaibhav Chaturvedi, *Optimal Design of Smart Stiffener for Vibration Damping of a Parabolic Space Antenna*

Ajay K Jain, *Shape Memory Alloy (SMA) based Sensor for Two-Phase Flows*

Akshay Chawla, *Optimal Actuation of SMA-wire Network for Adaptive Shape Control of a Space Antenna System*

[2013]

Praveen D Kumar, *Active shape control of parabolic antenna using shape memory alloy wires.*

Partha Pratim Paul, *Development of a Coupled Thermo-Electro Mechanical and Temporal Model of SMA Wire using a Hybrid approach.*

Anmol Pandey, *Topology Optimization of Compliant Systems using Constructive Solid Geometry through Multi-objective Genetic Algorithm.*

[2012]

Chetan Ingale, *Design of a Passive Vibration Isolation System using Magnetic Damper.*

Gokul Khairnar, *Damage identification in composite structures using dynamic response and machine learning techniques.*

Shriram Kulkarni, *Muscle powered piezoelectric energy harvesting system for implantable medical devices.*

Nitesh Kurmar Shah, *Investigation of Damping in Viscoelastic Nanocomposite for Large Frequency Band.*

Faez Ahmed, *Topology Optimization of Compliant Systems using Constructive Solid Geometry.*

Dipak Kumhar, *Dynamic Response based Damage Detection in Turbine Blades.*

[2011]

Ramchandra Lad, *Studies on the Active Shape Control of Parabolic Antenna Model Using Shape Memory Alloy (SMA) Wire based Actuators.*

Saurabh Agrawal, *Studies on Damage Detection in Laminated Composite Structure Based on Dynamic Response Analysis.*

Nitish Kumar, *Studies on Friction Induced Oscillations of Disc Brake Idealized as Cantilever Beam with End Mass in Contact with Rotating Disk.*

Subhash Yadav, *Modelling and Development of broad band damping layer for flexible links.*

[2010]

Satish Satpal, *Development of passive vibration isolation device using Shape Memory Alloy (SMA) wire.*

Prashant Kumar, *Application of 3D Laser Doppler Vibrometer for Damage Detection in Composite Plates.*

Shashank S Pande, *Analysis and Control of Friction Induced Oscillations in an idealized Brake Model.*

[2009]

Sudhir Varanasi, *Finite element Model updating for Damage detection and Damping Identification in Composites using Dynamic Responses from Laser Scanning Doppler Vibrometer.*

Lalit Lahuti, *Partially compliant 4-bar manipulator for control of coupler curve and energy harvesting.*

Rahul. Verma, *Studies on Directional Damping of Laminated Composite Plates using Laser Doppler Vibrometer.*

[2008]

J. Durgam, *Application of 3D Laser Doppler Vibrometer for Vibration Analysis and Damage Detection in Composite Plate.*

Nurul Huda Shaik, *Control of Instabilities in Pipes Conveying Pulsating Fluid using Shape Memory Alloy Based Actuation.*

M. Duttatreudu, *Kineto-elastodynamic Analysis of Flexible Manipulator and Vibration Suppression using Ionic Polymer Metal Composite.*

Rajesh. Kudikala, *Multi-objective Optimization of Actuator Placement for Static Shape Control of Plates using Genetic Algorithm.*

N. S. R. Prasad, *Shape Memory Alloy based Actuation of Composite Beams and Shape Control of Parabolic Space Antenna.*

[2007]

Prasad Misri Kotkar, *Modeling and Development of Shape Memory alloy Based Actuator with an application to Parabolic Space Antenna.*

Seshu K Mahankali, *Optimal Distribution of Piezoelectric Actuators for Static Shape Control - Multi-objective Approach.*

Gaddam Raju, *Dynamic Analysis of Damaged Plate Structure and Experimental Validation using PVDF based Sensory Network.*

Pankaj Agarwal, *Design of a Robotic Gripper for Safe Handling of Nuclear Fuel Pellets Using PVDF Slip Sensors.*

Gaurav Bansal, *Development of an Autonomous Inspection System Based on PVDF based Cantilever Sensory Probe for Closed Conduits and Barrels.*

Vishal Kausal, *Design of a Compliant four Bar Pick and Place Mechanism Using SMP Rocker.*

M. Srinivasulu, *Comparison of Single Objective and Multi-Objective Based Form and Force Closure Grasp of 2D Prismatic Objects.*

[2006]

Manoj Katare, *Development of PVDF and Terfenol-D based Shear Force Sensors for Robotic Fingers.*

Badrinath Mekap, *Active Shape Control of Parabolic Antenna Reflector using SMA based binary segmented actuation.*

Nitin K Galpat, *Nonlinear System identification using neural networks.*

S K Nijamuddin, *Analysis of electromechanical deformations.*

[2005]

Abhijit Banerjee, *Measurement of Aerodynamic Forces and Flow Visualization Study of Butterfly sized elliptic wing flapping models.*

[2004]

Vikram S Choudhuri, *Finite Element Analysis of Particulate Composite with PVDF Sensor.*

Arvind K Jaiswal, *Development of Smart High Precision Finite Element for Vibration Control and Health Monitoring of Composite Laminates.*

Srikant Shekhar Padhee, *Modelling, Simulation and Analysis of Single Link Flexible Manipulator.*

[2003]

Suman Basu, *Analysis of Flow Structure & Heat Transfer in Tube Banks and a tube in Rotating Configuration.*

Pavan Pachuri, *Finite Element Modelling of Electromechanical System using ATILA.*

Manish Sinha, *Vibration Generation and Shape Control of Composite Structure using SMA wire.*

[2002]

Ankur Gupta, *Modelling, Simulation and Damping of Flexible Manipulators.*

[2001]

Tarun Kumar, *Studies on the effectiveness of Magnetostrictive Sensors for Sensing Delamination in Composites.*

Lalit Sharma, *Elastic behaviour of 3D Model Cellular Solids.*

M S Thesis [1]

Jatin Gupta, *Dynamic Modeling and Optimal Control of a Simple Lower Limb Exoskeleton System*

M Des Thesis [28]

[2017]

Vamshi Beeravelly, *To Design and Develop an Innovative Remotely Operable Mixing System for Medical Applications*

[2016]

Rohit K Singh, Design and Development of an Energy Harvesting System from Vortex Induced Vibration

Pankaj Rathoure, Design and Development of Pipe Health Monitoring System

[2015]

Asif Mohammad, A Novel Multifunctional and Deployable Mobile Solar Energy Harvesting Bicycle Basket

Chandan K Behera, Automatic Sleep Arousal Detection and Analysis of Therapeutic techniques for Sleep Disorders

[2014]

Basava K Mukkundi, Design of an Interactive Walking Stick for Elderly People

Rajesh Ranjan, Design and Development of Networked Health Monitoring and Drug Control System

[2013]

Priyanka Bharti, *Quality education over quantitative education at primary level in India.*

Jivtresh Singh Aulakh, *Engineering Design of Aluminium Composite Material with Rice Husk.*

Anshuman Karmakar, *Design of an Egocentric Display for Low Cost Collision Alerting Systems for Sport Aviation.*

[2012]

Reshma Maurya, *Design of a muscle power based energy harvesting device.*

Aravind Sanmuga Sundaram Muthuswamy, *Autonomous Play-Robot to Facilitate Learning in Children.*

[2011]

Sandipan Das, *Urban Mobility Solution.*

Rohit Raghuvanshi, *Development of an India-Centered Inspiration Process for Automobiles.*

Prithu Paul, *Studies in Asynchronous Web-Based Learning*.

[2010]

Atul R Sultane, *Design and development of a new energy harvesting device for mobile phones*.

Umang Shah Arvindkumar, *Concurrent Engineering and Industrial Design for the development of an Edutainment Product*.

Vimal Kumar, *Smart Drug Infusion: A New Product design*.

[2009]

M Arun, *Aesthetic explorations of advanced automobile design and balanced interior design of an intermediate public transport*.

Sneha Singh, *Discourse on Holistic Strategic Packaging Design*.

[2008]

V S Haveesh, *A new design solution for reducing scratches in small Indian cars*.

[2007]

Dharmendra K Gadaria, *Design of a Sitting Module for R129*.

[2006]

Rajendra Patsute, *Information Visualization and Design for Ancient Nalanda University*.

Abhishek Upadhya, *Virtual reconstruction of Architecture of Nalanda University based on Information Visualization*.

Mayank Tiwari, *Web based interaction Design Modal to help reading disabled children in India*.

[2005]

Manish K Nema, *Intelligent Product Design Using SMA based technology*.

[2004]

Adesh K Singh, *User Interface Design for Touch-screen Based Navigation System*.

Vijay K Jaiswal, *Design of a Kiosk Enclosure for an Interactive Navigation System*.

PhD Supervision

PhD Thesis [6+1 (Open Completed)]:

Sahil Kalra, Active Control of Electromagnetic Radiation Pattern from Reconfigurable Parabolic Antenna actuated by using Shape Memory Alloy based Smart Actuators – Thesis Open Presented.

Mohan K Misra, *Modelling and Adaptive Control of Layer Hardening of Steel Beams subjected to Electromagnetic Induction* [2016]

Ashesh Saha, *Analysis and control of friction-induced vibrations by time-delayed position feedback* [2013]

Anand Kumar, *Structural Health Monitoring of Composites using Smart Sensing and Actuation* [2010].

Atanu Banerjee, *Forward and inverse analyses of SMA actuated compliant links and mechanisms* [2009].

Ravindra K Patel, *Numerical Study of the Damping Behaviour of Polymer Matrix Composites* [2008].

Dibakar Bandopadhyay, *Active Vibration Control of Flexible Manipulator Using Terfenol-D and IPMC as Smart Actuator and an Application of IPMC in a Partially Compliant 4-bar* [2007].

Knowledge Dissemination

Book

Pipe Inspection Robots for Structural Health and Condition Monitoring, Harutoshi Ogai and Bishakh Bhattacharya, Springer, 2018

Book-chapters published:

Smart Material Based Micro-sensors and Actuators for Micromachining, Introduction to Micromachining , Narosa, 2010, 17.1-20.

Practical Applications in Constrained Evolutionary Multi-objective Optimizations, Springer, 2016, pp. 159-179.

Advances in Structural Engineering, Volume Three, 2016, pp.2621-2647.

NPTEL/MOOC Courses:

Video courses

- Principles of Vibration Control (<http://nptel.ac.in/courses/112104211/>)
- Nature and Property of Materials (<http://nptel.ac.in/courses/112104203/>)

Web courses

- Materials Selection and Design (<http://nptel.ac.in/courses/112104122/>)
- Modelling and control of Dynamic Electro-Mechanical System (<http://nptel.ac.in/courses/112104158/>)
- Principles of Vibration Control (<http://nptel.ac.in/courses/112104040/>)
- Smart Material, Adaptive Structures and Intelligent Mechanical Systems (<http://nptel.ac.in/courses/112104173/>)
- Structural Health Monitoring of Composites (<http://nptel.ac.in/courses/112104160/>)

GIAN Courses

- Structural Health Monitoring using Pipe Crawler Robot with Prof. Harutoshi Ogai, IPS Waseda University, Japan (2017)
 - Bio-inspired Robotics with Prof. Hiroaki Wagatsuma, Kyushu Institute of Technology, Japan (2017)
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Publications

International Journals & Proceedings [67]

1. Kalra S., Munjal B. S. and Bhattacharya B. (2018), Development of Shape Memory Alloy Actuator Integrated Flexible PEEK Antenna with Simultaneous Beam Steering and Shaping Ability, Accepted for Publication in the **Journal of Intelligent Material System and Structures**.
2. Srivastava R., Sharma A. K., Hait A. K. and Bhattacharya B. (2018), Design and development of active bimorph structure for deployable space application, Proc.

SPIE 10595, Active and Passive Smart Structures and Integrated Systems XII, 105953E (15 March 2018); doi: [10.1117/12.2296547](https://doi.org/10.1117/12.2296547)

3. Kalra, S., Bhattacharya, B. and Munjal, B. (2017), Design of Shape Memory Alloy Actuated Intelligent Parabolic Antenna for Space Applications, **Smart Materials and Structures**, <https://doi.org/10.1088/1361-665X/aa7468>.
4. Singh, K., Kant, R., Kulkarni, A., Shridhar, A., Bhattacharya, B. and Bhattacharya, S. (2017), Directional Vibration Suppression of Viscoelastic Dampers using Oil filled Helical Micro-channels, **Journal of Vibration and Control**.
5. Jaipurkara, T., Kanta, P., Khandekar, S., Bhattacharya, B. and Paralikar S. (2017), Thermo-Mechanical Design and Characterization of Flexible Heat Pipes, **Journal of Applied Thermal Engineering**, <http://dx.doi.org/10.1016/j.applthermaleng.2017.01.036>.
6. Kuponu, O. S., Kadiramanathan, V., Bhattacharya, B., Pope, S. A. (2017), Integrated Sensing, Monitoring and Healing of Composite Systems. **Advances in Science and Technology** 101, pages 62-68.
7. Oluwafemi, K., Visakan, K., Bhattacharya, B. and Pope, S. (2016), Using feedback control to actively regulate the healing rate of a self-healing process subjected to low cycle dynamic stress, **Smart Materials and Structures**, Vol. 25, No. 5.
8. Saha, A., Wahi, P. and Bhattacharya, B. (2016), Characterization of friction force and nature of bifurcation from experiments on a single-degree-of-freedom system with friction-induced vibrations, **Tribology International**, Volume 98, 1 June 2016, pages 220-228.
9. Ahmed, F., Deb, K. and Bhattacharya, B. (2016), Structural Topology Optimization using Multiobjective Genetic Algorithm with Constructive Solid Geometry Representation, **Applied Soft Computing**, Vol. 39, pages 240-250.
10. Datta, R., Jain, A., Bhattacharya, B. (2015): A piezoelectric model based multi-objective optimization of robot gripper design, **Structural and Multidisciplinary Optimization**, DOI 10.1007/s00158-015-1340-y.
11. Pandey, A., Datta, R., Bhattacharya, B. (2015): Topology optimization of compliant structures and mechanisms using constructive solid geometry for 2-d and 3-d applications, **Soft Computing**, DOI 10.1007/s00500-015-1845-8.
12. Datta, R., Pradhan, S., Bhattacharya, B. (2015): Analysis and Design Optimization of a robotic gripper using multi-objective Genetic Algorithm, **IEEE Transactions on Systems, Man and Cybernetics: Systems**, DOI 10.1109/TSMC.2015.2437847.
13. Roy, K., Bhattacharya, B., Ray-Chaudhuri, S., (2015): ARX model-based damage sensitive features for structural damage localization using output-only measurements, **Journal of Sound and Vibration**, Vol. 349, pp. 99-122.
14. Jain, A. Datta, R., Bhattacharya, B., (2015): Unified minimalistic modeling of piezoelectric stack actuators for engineering applications, **Advances in Intelligent Systems and Computing**, Vol.345, pp. 459-473.
15. Misra, K. M., Bhattacharya, B., Singh, O., and Chatterjee, A. (2015): A New Case-Depth Estimation Technique for Induction Hardened Plates Based on Dynamic

- Response Studies using Laser Doppler Vibrometer, **Journal of Systems and Control Engineering**, Vol. 229, No. 1, pp 49-62.
16. Paul, P., Ingale, C., and Bhattacharya, B. (2014): Design of a Vibration Isolation System using Eddy Current Damper Part C, **Journal of Mechanical Engineering Science**, Vol. 228, No. 4, Pages 664-675.
 17. Misra, M.K., Bhattacharya, B., Singh, O., Chatterjee, A.(2014): A Portable Induction Hardening System with New Dynamic Response based Characterization of Hardened Samples. **Journal of Experimental & Applied Mechanics** 5 (1).
 18. Anderson, S. R., Aram, P. and Bhattacharya, B. and Kadiramanathan, V (2014): Analysis of composite plate dynamics using spatial maps of frequency-domain features described by Gaussian processes. **IFAC Proceedings Volumes** 47 (1).
 19. Chawla, A., Bhattacharya, B., Munjal, B. S. (2014): Optimal actuation of SMA-wire network for adaptive shape control of a space antenna system. Proceedings **Control Automation Robotics & Vision (ICARCV)**, Pages 306-311.
 20. Sharma, S. K., Gaur, H., Kulkarni, M., Patil G., Bhattacharya, B. and Sharma, A. (2013): PZT-PDMS Composite for Active Damping of Vibrations, **Composites Science and Technology**, Vol 77, Pages 42-51, 2013.
 21. Singh R. K., Ghosh A., Kant, R., Asfer, M., Bhattacharya, B., Panigrahi P.K. and Bhattacharya S. (2013): Passive vibration damping using polymer pads with micro-channel arrays, **IEEE/ASME Journal of Microelectromechanical Systems, JMEMS**, Vol. 22, NO. 3, Pages 695-707, 2013.
 22. Roy, K., Ogai, H., Bhattacharya, B., Roychoudhuri, S. and Qin, J. (2012) Damage Detection of Bridge using Wireless Sensors, **Proc. IFAC MMM-2012**, Vol. 2 Part1, Pages 107-111.
 23. Ahmed, F., Bhattacharya, B. and Deb, K. (2012); Constructive Solid Geometry based Topology Optimization using Evolutionary Algorithm, **Proc. BICTA-2012**; Vol. 201, Pages 227-238.
 24. Saha, A., Pandey, S., Bhattacharya, B. and Wahi, P. (2012): Analysis and control of friction-induced oscillations in a continuous system, **Journal of Vibration and Control**, Vol. 18 No. 3 467-480, 2012.
 25. Bhattacharya, B. and Patel, O.P. (2011): A New Shape Memory Alloy based Smart Encoder for Sensing of Direction and Angular Motion, **Sensors and Transducers**, Vol. 4, No. 127, Pages 45- 56.
 26. Agarwal, V., Ogai, H., Nishijima, K. and Bhattacharya, B. (2011): Inspection of Pipe Inner Surface using Advanced Pipe Crawler Robot with PVDF Sensor based Rotating Probe, **Sensors and Transducers**, Vol. 4, No. 127, 2011, pp.45-56.

27. Kumar A., Fleming P. and Bhattacharya B. (2011): Vibration suppression and damage detection in smart composite laminate using high precision finite element, **Proc. SPIE**, Vol. 7982, pp. 1-16.
28. R Oyabu, K Nishijima, Z Wang, H Ogai, B Bhattacharya (2011): Advanced Pipe Inspection Robot using rotating probe and Image processing. **16th International Symposium on Artificial Life and Robotics, AROB'**
29. Banerjee, B Bhattacharya, AK Mallik (2011): Forward and inverse analyses of an SMA actuated compliant link. **Journal of Mechanisms and Robotics 3 (2)**.
30. Banerjee A., Bhattacharya B. and Mallik A.K. (2010): Optimum discrete location of a shape memory alloy wire for discrete actuation of a compliant link, **Journal of Mechanical Design**, Vol.132, Issue 2.
31. Banerjee A., Bhattacharya B. and Mallik A.K. (2009): Forward and inverse analyses of smart compliant mechanism for path generation, **Mechanism and Machine Theory**, Vol. 44, pp. 369-381.
32. Kudikala R., Deb K. and Bhattacharya B. (2009): Multi-objective Optimization of Piezoelectric Actuator Placement for Shape Control of Plates using Genetic Algorithms, **Journal of Mechanical Design**, Vol. 131, pp. 1-11.
33. Saha A., Bhattacharya B. and Wahi P. (2009): A comparative study on the control of friction-driven oscillations by time-delayed feedback, **Journal of Nonlinear Dynamics**, Vol. 60, pp. 15-37.
34. Bhatnagar R.M., Bhattacharya B. and Biswas G. (2009): Analysis of Pilot Valve and Taper Groove Based Damper, Proceedings of I Mech E London Part C, **J. Mechanical Engineering Science**, Vol. 223 (C4), pp 859-871.
35. Bandyopadhyay D., Bhattacharya B. and Dutta A. (2009): Pseudo-rigid Body Modelling of IPMC for a Partially Compliant Four-bar Mechanism for Work-volume generation, **Intelligent Material Systems and Structures**, Vol. 20, No.1, pp. 51-62.
36. Bandopadhyay D., Bhattacharya B. and Dutta A. (2009): Characterization of IPMC as passive and active damper as an alternative novel smart actuator, **Journal of Reinforced Plastics and Composites**, Vol. 28, 2: pp. 183 - 200.
37. Banerjee A., Bhattacharya B. and Mallik A.K. (2008): Large deflection of cantilever beams with geometric non-linearity: Analytical and numerical approaches. **International Journal of Non-Linear Mechanics**, Vol. 43, pp. 366-376.
38. Bandopadhyay D. and Bhattacharya B. (2008): Design and Development of a Partially Compliant 4-bar using IPMC for Work Volume Generation, **Proceedings of AIP**, Vol. 1029, pp. 171-182.
39. Jaiswal V., Anand K. and Bhattacharya B.(2008): Structural Health Monitoring of Ribbon Reinforced Composite Laminate using Piezoelectric Sensory Layer. **International Journal of COMADEM**, Vol. 11, No. 1 pp. 09-17.
40. RK Patel, B Bhattacharya, S Basu (2008): Effect of interphase properties on the damping response of polymer nano-composites. **Mechanics research communications 35 (1)**
41. A Banerjee, J Badothiya, B Bhattacharya, AK Mallik (2008): Optimum Discrete Location of Shape Memory Alloy Wire for Enhanced Actuation of Slender Fixed-

- Free Beam. Proc. ASME. 43314; Smart Materials, Adaptive Structures and Intelligent Systems, Volume 1:701-708.
42. A Kumar, B Bhattacharya (2008): Real-time integrity monitoring of composite laminates with magnetostrictive sensory layer. **Proc. SPIE 7268, Smart Structures, Devices, and Systems IV, 72680N; doi: 10.1117/12.810614**
 43. Bhattacharya B., Ahalwat S. and Vidyashankar B. R. (2007): Closed Form Studies of a New Hybrid Damping Technique Using Active Magnetostrictive Composite and Hard Coated Damping Alloys. **Smart Materials and Structures**, Volume 16, 2007, pp. 1-8.
 44. Vidyashankar B. R. and Bhattacharya B. (2007): A New Hybrid Vibration Control Methodology Using a Combination of Magnetostrictive and Hard Damping Alloys. **Smart Structures and Systems**, Vol.3, No.2.
 45. Bandopadhyaya D., Bhattacharya B. and Dutta A. (2007): Active Vibration Control Strategy for a Single Link Flexible Manipulator Using Ionic Polymer Metal Composite. **Journal of Intelligent Material Systems and Structures**, Vol. 19, No. 4, pp. 487-496.
 46. Bandopadhyaya D., Bhattacharya B. and Dutta A. (2007): Modeling of Hybrid Damping Scheme Using Smart Magnetostrictive Composites for Flexible Manipulator. **Journal of Reinforced Plastics and Composites** Vol. 26 No. 9, pp. 487-496.
 47. Patel R. K., Bhattacharya B. and Basu S. (2007): A Finite Element Based investigation on obtaining high material damping over a large frequency range in Viscoelastic Composites. **Journal of Sound and Vibration**, Vol. 303, pp.753-766.
 48. Bandyopadhyaya D., Bhattacharya B. and Dutta A. (2007): An Active Vibration Control Strategy for a Flexible Link Using Distributed Ionic Polymer Metal Composites. **Smart Structures and Systems**, Vol. 16, pp. 617-625.
 49. Bandopadhyaya D., Bhattacharya B. and Dutta A. (2006): Active vibration control using Terfenol-D with H-infinity filter. **International Journal of Engineering Modeling**, Vol.19, No. 1-4, pp. 33-44.
 50. Kulkarni M. M., Bandyopadhyaya R., Bhattacharya B. and Sharma A. (2006): Microstructural and Mechanical Properties of Silica - PEPEG Polymer Composite Xerogels. **Acta Materialia**, Vol. 54, No. 19, pp. 5231-5240.
 51. B Bhattacharya. (2004): Vibration damping system and a method of damping vibrations, The Journal of the Acoustical Society of America 116, 623 (2004); <https://doi.org/10.1121/1.1775014>
 52. Mani Pandey, K. K., Prakash O. and Bhattacharya B. (2003): Variation of activation volume with temperature for Fe, Si and Ge. **Materials Letters**, Vol 57, pp. 4319-4322.
 53. A Gupta, B Bhattacharya. (2003): Hybrid damping of smart flexible rotating beam [5062-79]. Proceedings-SPIE, the International Society for Optical Engineering.
 54. Bhattacharya B., Tomlinson G. R. and House J. R. (2002): Vibration suppression of structures with viscoelastic inserts. **Proc, IMechE**, Vol. 216, Part-C, pp. 983-995.

55. Gupta A. and Bhattacharya B. (2002): Hybrid damping of smart flexible rotating beam. **Proc. SPIE** - Vol 5062, pp.590-598.
56. B Bhattacharya, AV Krishnamurty, M Anjanappa, YF Wu, MS Bhatt (2002): Agarwal BD and Broutman L J, Analysis and Performance of Fiber Composites, John Wiley & Sons Inc., 1990. **Aerospace Science and Technology** 6 (3).
57. Buravalla V.R., Bhattacharya B., and Tomlinson G. R. (2001): Hybrid vibration control of laminated composite structures using magnetostrictive and hard damping materials. **Proc. SPIE**, Vol. 4331, pp. 386-395.
58. Bhattacharya B., House J. R. and Tomlinson G. R. (2000): Low and High Frequency Energy Absorbing Composite Joints. **Proc. SPIE**, Vol. 3989, pp. 152-158.
59. Bhattacharya B., Vidyashankar B. R., Patsias S. and Tomlinson G. R. (2000): Active and passive vibration control of flexible structures using a combination of magnetostrictive and ferro-magnetic alloys. **Proc. SPIE**, Vol. 4073, pp. 204-214.
60. Bhattacharya B., House J. R., Mercy S.E. and Tomlinson G. R. (1999): Finite Element Modelling and Performance Estimation of Energy Absorbing Composite Joints. **Proc. SPIE**, Vol. 3672, pp. 310-316.
61. Bhattacharya B., Tomlinson G. R. and House J. R. (1999): Effect of Shapes of Viscoelastic Inserts on Vibration Absorption in Laminated Composites. **Proc. SPIE**, Vol. 3672, pp. 316-324.
62. Bhattacharya B., Rongong J. A. and Tomlinson G. R. (1999): Vibration Suppression Performance of Piezoceramic and Magnetostrictive Materials in Hybrid Constrained Layer Damping. **Proc. SPIE**, Vol. 3672, pp. 242-250.
63. Krishna Murty, A. V., Anjanappa, M., Wu, Y., Bhattacharya, B. and Bhat, M.S. (1998): Vibration Suppression in Laminated Composite Beams Using Embedded Magnetostrictive Layers. **Journal of the Institution of Engineers (India)**, Vol 78, pp. 38-44.
64. Bhattacharya, B., Krishna Murty A. V. and Bhat M. S. (1998): Vibration Analysis of Unsymmetric Laminated Composite Plates Using High Precision Triangular Elements. **Mechanics of Composite Materials**, Vol 5, pp. 5-23.
65. Bhattacharya B., Krishna Murty A. V. and Bhat M. S. (1998): Finite elements for vibration analysis of unsymmetric laminated composite plates, **Mechanics of Advanced Materials and Structures**, Vol. 12.
66. Krishna Murty A. V., Bhat M. S., Bhattacharya B., and Maiti S. (1998): Vibration control of composite laminates using distributed smart layers, **Proceedings of SPIE**, Vol.3321, 158-169.
67. Bhattacharya, B., Krishna Murty, A. V., Bhat, M. S. and Anjanappa, M. (1996): Vibration Suppression in Slender Composite Beams Using Magnetostrictive Actuation, **Journal of Aeronautical Society of India**, Vol.48, No. 2.

Selected Published contributions to academic conferences [39]

A Narrative Speech, Gaze and Gesturing Robot Accessing to Human Emotion and Memory Which is Investigated by Using a Simultaneous Recording of Electroencephalogram and Eye-Tracker System, A. Muthusamy, G. Kaur, R. Gupta, V. Agarwal, B. Bhattacharya, S. Nakayama, M. Ichiki, J. Maniamma and H. Wagatsuma, 12th International Conference on Innovative Computing, Information and Control (ICICIC2017), August 28-30, 2017, Kurume, Japan.

Transmissibility based Parameter Identification of Polymers using Multi-Objective Genetic Algorithm, R. Datta, S. Agarwal, A. K. Sharma and B. Bhattacharya, ICOVP-2017, (2017), IIT Gowhati, India.

Thermo-Mechanical Characterization of Flexible Heat Pipes, T. Jaipurkar, S. Khandekar and B. Bhattacharya, Joint 18th IHPC and 12th IHPS, 2016, Jeju, Korea.

Dynamic Properties of Waste Tyre Rubber Composites, B. K. Chaurashia, J. K. Bhaskar, B. Bhattacharya, COPEN-9, 2016, IIT Bombay, India.

Studies on a Smart Reconfigurable Parabolic Space Antenna, S. Kalra, B. S. Munjal and B. Bhattacharya, 9th International Collaboration on Information, Production and Systems (ISIPS 2015), 2015, Waseda University, Japan.

An overview of Smart Material Exploration in Texture Recognition: Comparative analysis with contemporary techniques, H. Panday, H. Mathur, M. Singh, B. Bhattacharya, ISSS National Conference on MEMS Smart Materials, Structures and Systems, 2015, Kochi, India

An Active Non-Destructive Technique for Structural Health Monitoring of Laminated Composites, S Katiyar and B Bhattacharya, National Conference on Condition Monitoring, 2015, DRDO, Vishakhapatnam, India.

Design and Development of a Networked Health Monitoring and Control System
Rajesh Ranjan, Basava Kumar Mukkundi, Bishakh Bhattacharya, Om Prakash Bhatt, IEDEC 2014, Santa Clara, California, USA.

Design and Analysis of a Vibration Isolation System based on Four-bar Mechanism Integrated with Shape Memory Alloy Wire, Vaibhav Chaturvedi, Rituparna Datta, Bishakh Bhattacharya, CSCI 2014, Las Vegas, USA.

Analysis of composite plate dynamics using spatial maps of frequency-domain features described by Gaussian processes, S. R. Anderson, P. Aram, B. Bhattacharya, V. Kadiramanathan, ACOBS 2014, IIT Kanpur.

Multi response Optimization of Induction Hardening Process - a New Approach

Mohan K Misra, Bishakh Bhattacharya , Onkar Singh and A Chatterjee, ACODS 2014, IIT Kanpur.

Design and experimentation on passive vibration isolation systems using PZT-PDMS composite and a shape memory alloy wire integrated mechanism, S. B. Satpal, R. Datta, V. Chaturvedi, B. Bhattacharya, ACODS 2014, IIT Kanpur.

Earthenware water filter – a double edged sustainable design concept for India, A. S. S. Muthusamy and B. Bhattacharya, ICORD – 13, IIT Madras.

Aquatic Multi-Robot System for Lake Cleaning, P. Agarwal and B. Bhattacharya, CLAWAR-2013, University of Melbourne, Australia.

Active Shape Control of Parabolic Antenna Systems Using Shape Memory Alloy (SMA), Praveen Kumar D, B. S Munjal and Bishakh Bhattacharya, ICIUS – 2013, India.

Development of a Coupled Thermo-Electro Mechanical and Temporal Model of SMA Wire Using A Hybrid Approach, Parth P Paul and Bishakh Bhattacharya, ICIUS-2013, India.

Constructive Solid Geometry based Topology Optimization using Evolutionary Algorithm, Proc. BICTA-2012; F. Ahmed, B. Bhattacharya and K. Deb, Indore, India.

Experimental Modal Analysis for Damage Detection in Composite Plates using Laser Doppler Vibrometer, A. Kumar and B. Bhattacharya, AROB, International Conference on Research in Structural Health Monitoring, IPS Waseda, 2011, Japan.

Cultural Influence in Aesthetic Design: A Case Study based on Intermediate Public Transport Vehicle , M. Arun. and B. Bhattacharya, ICROD-11, International Conference on Research in Design, IISc Bangalore, 2011.

Pipe health Monitoring using PVDF Sensor, G. Bansal and B. Bhattacharya, International Conference on Research in Structural Health Monitoring, IPS Waseda, 2010, Japan.

Energy Harvesting from a combination of solar, wind and vibrational energy, A. Sultane and B. Bhattacharya, International Conference on Research in Structural Health Monitoring, IPS Waseda, 2010, Japan.

Advanced Pipe Inspection Robot using Rotating Probe, K. Nishijima, Y. Sun, R. K. Srivastava, H. Ogai and B. Bhattacharya, AROB-2010, Waseda, Japan, 2010.

Shape Memory Alloy Wire Based Actuation of Beam Stiffener and Optimal Shape Control of Parabolic Space Antenna, N.Prasad,R.Lad, B.S.Munjal, A.C.Mathur and B. Bhattacharya, International, Conference on Smart Materials and MEMS, ISSS-2010, Nagpur, 2010.

User study and design modifications of a CNG based intermediate public transport vehicle, Indo-Us Workshop on Designing sustainable Products, Services and Manufacturing Systems, M Arun, K. Vimal and B. Bhattacharya , August 2009.

Optimum offset of SMA wires for discrete actuation of cantilever beams, A Banerjee, B. Bhattacharya and A. K. Mallik, ASME International Conference, SMASIS2008, Maryland, USA, October 2008.

Multi-objective Optimization of Piezoelectric Actuator Placement for Shape Control of Plate using Genetic Algorithm, R. Kudikala, K. Deb and B. Bhattacharya, SMASIS2008, Maryland, USA, October 2008.

Modeling and Development of SMA wire based actuators with an application to Parabolic Space Antenna, N.S.R Prasad Ndevara, P. K. Mishrikotkar and B. Bhattacharya, International, Conference on Smart Materials and MEMS, ISSS-2007, Bangalore, 2007.

Cooperation between a 4 DOF robotic hand and a human for carrying an object together Pankaj Aggarwal, Ashish Dutta and Bishakh Bhattacharya, SICE, Kagwa University, Japan, 2007.

Information Design of a more usable web-site based on Human Computer Interaction Studies, M. Tiwari and B. Bhattacharya, International Conference on Human Computer Interfacing, Hyderabad, 2007.

Bandopadhyaya, D., Bhogadi, D.B., Bhattacharya, B. and Dutta, A. (2006) Active Vibration Suppression of a Flexible Link using Ionic Polymer Metal Composite, CISRAM 2006, IEEE International Conference on Robotics, Automation and Mechatronics, IEEE Catalogue Number: 06EX1247C , ISBN: 1-4244-0025-2.

Bandopadhyaya, D.B. and Bhattacharya, B. (2006) A Dynamic Performance Evaluation of Flexible Manipulator with Active Proportional Damping and Estimation Algorithm, CISRAM 2006, IEEE International Conference on Robotics, Automation and Mechatronics, IEEE Catalogue Number: 06EX1247C, 2006.

Bhattacharya, B. and Barlingay, R. (2005) Integrated Damage and Damping Monitoring of Flexible Composite Manipulators using TEDS based Smart Sensors, ACIAR'05, 4th Asian Conference on Industrial Automation and Robotics, Paper No. F85, ISBN: 974-8208-58-3.

Bhattacharya, B. and Jaiswal, A. (2004): Damage Detection in Ribbon Reinforced Composite Laminate using Piezoelectric Sensory Layer", International Conference on Advances on Structural Integrity, ICASI/SH- C89, July; Bangalore, India.

Asthana, C.B., Bhattacharya, B., Bhat, M.S. and Krishnamurthy, A.V. (1999): Static Output Feedback Design to Control a Smart Cantilever Beam', ISSS-SPIE'99, pp.472- 477.

Krishna Murty, A.V., Bhat, M.S., Bhattacharya, B. and Maiti, S. (1996): Vibration Control of Composite Laminates Using Distributed Smart Layers, SPIE Conference on Smart Structures, Materials and MEMS, 12-14 December, 1996, India.

Bhattacharya, B., Krishna Murty, A.V., Anjanappa, M. and Bhat, M.S. (1994): Dynamic Modelling of Smart Composite Beams', National Symposium on Developments in Advanced Composites and Structures, India, 15 Sept. (1994). pp. 25-30.

Bhattacharya, B., Bhat, M.S., and Krishna Murty, A.V. (1994): Dynamics and Control of Laminated Composite Structures with Surface Bonded/Embedded Sensors and Actuators, Discussion Meetings on Aerodynamic Testing and Structural Dynamics, 20- 21 Oct. (1994). pp. 141-156.

Bhattacharya, B., Krishna Murty A.V. and Bhat, M.S. (1994): Free Vibration Study of Laminated Composite Plates Using High Precision Triangular Elements, National Seminar on Aero Structures, India, 7-9 Dec. (1994). pp. 483-493.

Development

List of Technology Development:

1. Energy Absorbing Composite Joint Technology for Vibration Damping, TU Sheffield
2. Non-contact Magnetostrictive Damper for Rolls Royce UTC, TU Sheffield
3. Hybrid Damping for Flexible Rotor, IIT Kanpur
4. Dynamic Response based Structural Health Monitoring System in Laser Doppler Vibrometer, IIT Kanpur
5. Laser Doppler Vibrometer based Hardness Estimation System, IIT Kanpur
6. Portable Induction Hardening System, IIT Kanpur
7. Smart Flexible and Mechanically Reconfigurable Antenna System, IIT Kanpur
8. Energy Harvesting System from Vortex Induced vibration, IIT Kanpur
9. Pipe Health Monitoring System based on Smart Sensors, IIT Kanpur
10. Shape Memory Alloy based Auto-turn Indicator Mechanism, IIT Kanpur
11. A Smart Cabin Pressure Control System Simulator, IIT Kanpur
12. A Generic Scanning and Fault Detection System for Axisymmetric Metallic Structure, IIT Kanpur
13. Eddy Current Damper for Vibration Control, IIT Kanpur
14. A Carbon-di-oxide sensing system for Bronchoscope

List of Patents:

US/Intl. Patents:

A Novel Non-contact damping technique using magnetostrictive particulate Coatings , GB2365376, Bishakh Bhattacharya, Geof Tomlinson and Jem Rongong, The Patent and Design Journal No 5986 .

Vibration damping system and a method of damping vibrations, United States Patent 6688439, Bishakh Bhattacharya, Geof Tomlinson and Jem Rongong

Indian Patents:

S.No.	Inventors	Title	IPA	Date	Type
1	Dr. Bishakh Bhattacharya (ME), Mr. Atul R Sultane (DP)	A green harvesting device for low power electronic equipment	232707	18/11/2010	Design
2	Dr. Bishakh Bhattacharya, (Mechanical Engg.), Mr. Ankur Agarwal, Student, (Mechanical Engg.)	A modular robotic System	2307/DEL/2011	08.08.2011	Product
3	Ms. Shanu Sharma, Student (DP), Dr. Bishakh Bhattacharya, (DP), Mr. Arvind Shanmuga Sundaram M, Student, (DP) & Dr. J Ramkumar (DP)	A Versatile tube-well hand pump with energy harvested water filtration	2727/Del/2012	04.09.2012	Product
4	Mr. Rajesh Ranjan (M.Des), Mr. Basava Kumar M (M.Des), Prof. Bishakh Bhattacharya (DP)	Drug Flow Control Device	3847/DEL/2013	31.12.2013	Product
5	Mr. Rajesh Ranjan (M.Des), Mr. Basava Kumar M (M.Des), Prof. Bishakh Bhattacharya (DP)	Medical Actuator	3846/DEL/2013	31.12.2013	Product
6	Mr. Rajesh Ranjan (M.Des), Mr. Basava Kumar M (M.Des), Prof. Bishakh Bhattacharya (DP)	Methods and Systems for Health Monitoring	5/DEL/2014	01.01.2014	Product
7	Mr. Rohit Kumar Singh (Student) and Prof. Bishakh Bhattacharya (ME)	Vibration Energy Harvesting Device	823/DEL/2014	21.03.2014	Product
8	Mr. Basav Kumar M and Dr. B Bhattacharya (ME)	Multifunctional interactive walking stick	1954/DEL/2014	11.07.2014	Product

9	Dr. Bishakh Bhattacharya and Mr. Jivtesh Singh Aulakh (Research Scholar)	Composite Panels With Rice Husk Core	3386/DEL/2014	20.11.2014	Product
10	Mr. Himanshu Panday, Ms. Vaishnavi Bhope and Prof. Bishakh Bhattacharya (ME & Design)	Home Automation System Utilizing Digital Waste	212/DEL/2015	23.01.2015	Product
11	Prof. Bishakh Bhattacharya (ME), Prof. Nachiketa Tiwari (ME), Mr. Nayan Jyoti Baishya (Project Engineer), Mr. Himanshu Panday (Student), Mr. Vaibhav Verma (Student), Mr. S Barathy (GAIL), Mr. Raj Kumar Kashyap, Mr. Parivesh Chugh (GAIL), Mr. T P Yuvaraj	A Novel Self Powered, Intelligent Pipe Health Monitoring Robot (PHMR) for Inspecting Gas Pipe line	441/DEL/2015	16.02.2015	Product
12	Dr. S Khandekar (ME), Dr. B Bhattacharya (ME) and Mr. Ajay Kumar Jain (Student)	Shape memory alloy (SMA) wire as sensor for Taylor bubble flow regime of two-phase flows	903/DEL/2015	31.03.2015	Product
13	Prof. Sameer Khandekar, ME and Prof. Bishakh Bhattacharya, ME	An Integrated Solar Energy Harvesting and Storage Device	201611002574	22.01.2016	Product
14	Prof. Bishakh Bhattacharya, Prof. Nachiketa Tiwari, Dr. J Ramkumar, Mr. Girijesh Mathur (Design) , Mr. Shivyansh Tandon (Mathematics), Mr. Chetan Lodhi (BSBE)	Packaging System for Large Caliber Ammunition	280638	18.02.2016	Design
15	Prof. Bishakh Bhattacharya, Prof. Nachiketa Tiwari, Dr. J Ramkumar, Mr. Girijesh Mathur (Design) , Mr. Shivyansh Tandon (Mathematics), Mr. Chetan Lodhi (BSBE)	A PACKING CASE FOR ONE OR MORE LARGE-CALIBER AMMUNITION SHELLS	201711043201	01.12.2017	Product

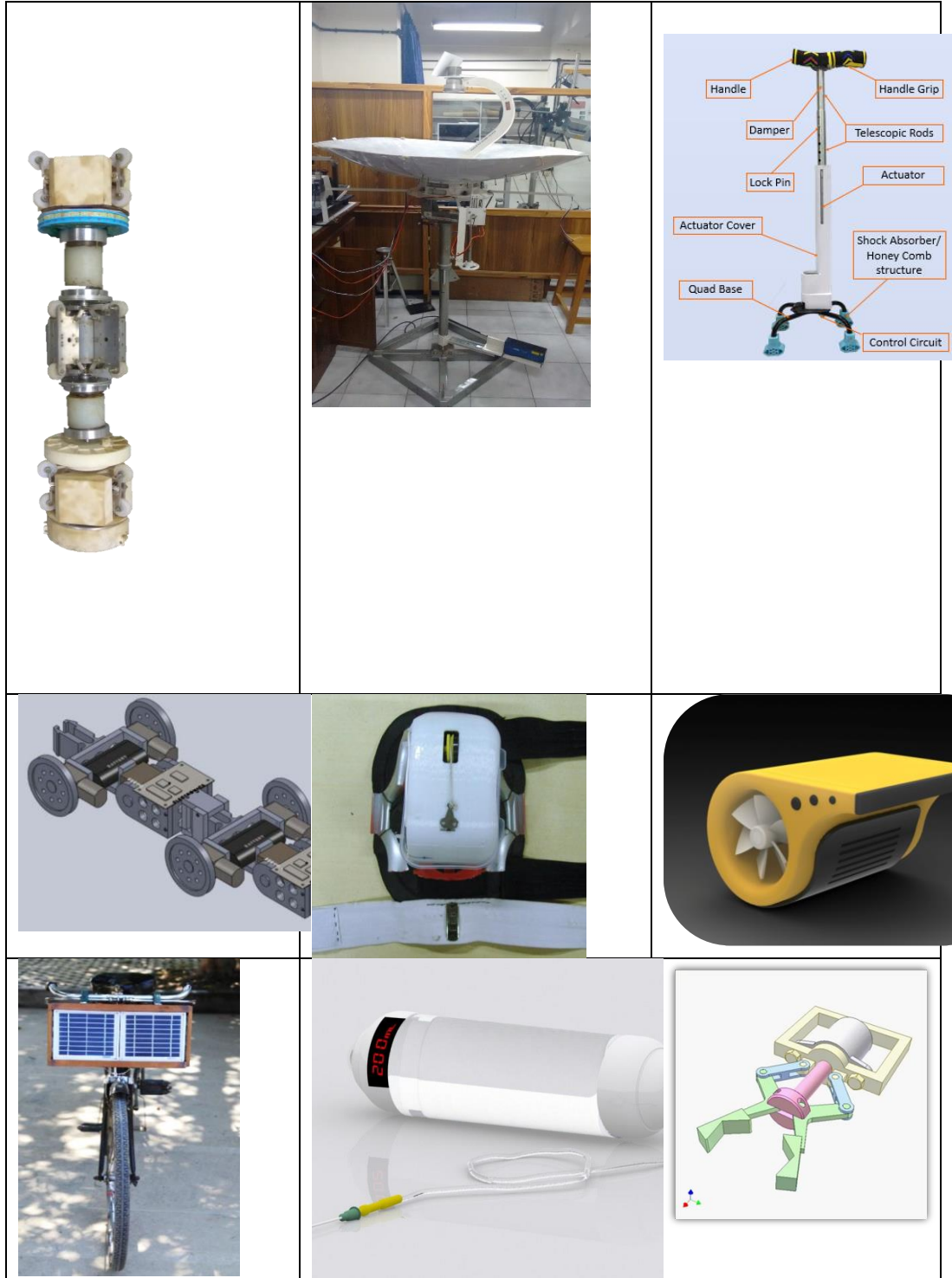
16	Dr. Bishakh Bhattacharya (ME), Mr. Shubham Kumar(Student, ME), Mr. Dhruval R Shah(Student, ME), Mr. Harshit Kumar Sankhla(Student, LNMIIT, Jaipur)	A SMART STICK for Sit to Stand Motion Transfer	201711043515	05.12.2017	
17	Mr. Kaniska Biswas (PhD Student, DP), Mr. Pushpal Dey (RA,DP), Ms. Esha Ray (Student, Earth Sciences), Dr. B. Bhattacharya (ME), Dr. Tarun Gupta (CE)	Ergonomic Retractable Novel Stair (Open and Closed view)	301960/301961	02.02.2018	Design

Brief List of Products

1. Design of a Kiosk Enclosure for an Interactive Navigation System
2. User Interface Design for Touch-screen Based Navigation System
3. Design of a Sitting Module for R129
4. Design and development of a new energy harvesting device for mobile phones.
5. Autonomous Play-Robot to Facilitate Learning in Children.
6. Design of a muscle power based energy harvesting device
7. Design of an Egocentric Display for Low Cost Collision Alerting Systems for Sport Aviation
8. Engineering Design of Aluminium Composite Material with Rice Husk.
9. Design and Development of Networked Health Monitoring and Drug Control System
10. Design of an Interactive Walking Stick for Elderly People
11. Automatic Sleep Arousal Detection and Analysis of Therapeutic techniques for Sleep Disorders
12. A Novel Multifunctional and Deployable Mobile Solar Energy Harvesting Bicycle Basket
13. Energy Harvesting System from Vortex Induced Vibration
14. Pipe Health Monitoring Robot
15. Smart Antenna System
16. SMA based Auto-locking System
17. SMA based Turn-Indicator System
18. Adjustable Surgical Support System
19. A smart 7 Link Gripper Mechanism
20. A Pond Cleaning Robot

21. Design and Development of a Pipe Scanning System for Fault Detection and Sensor Calibration
22. Design and Development of Bicycle with Energy Harvesting Device

Images of a few Selected Products



Funding (Sponsored and Consultancy)

Sponsored Projects (PI)					
Sr. No.	Project Name	Project Title	Duration	Funding	Status
1	MHRD /ME /20020027	Development of Smart Composite Prosthetic Limbs	2 Years	10,00,000	Completed
2	ARDB /ME /20030189	Smart Hybrid Damping Of Vibration On Rotating Flexible Links	2 Years	7,73,000	Completed
3	ISRO /ME /20060030	Control of Flexible And Reconfigurable Parabolic Antenna Using SMA Based Smart Actuators	2 Years	14,50,000	Completed
4	DST /ME /20060263	Design of A Smart Fully Compliant Mechanism Of Trajectory Tracking	3 Years	21,93,000	Completed
5	ARDB /ME /20070188	Modelling And Development Of Multiphase Micro-Structured Damping Layer For Broadband Vibration Damping In Flexible Links	2 Years	8,80,000	Completed
6	DST /ME /20090154	Optimal Vibration Control of	3 Years	12,11,175	Completed

		Composite Structure			
8	UKIERI/MDES/20120045	Integrated Sensing, Monitoring and Healing For Complex Autonomous Systems	3 Years	11,43,100	Completed
9	STC /ME /20120326	Phase-Ii Expanded Proposal on Design of Active Flexible And Re-Configurable Parabolic Antenna Using Sma Based Smart Actuators	2.5 Years	21,91,200	Completed
10	GAIL /ME /2015079	Development Of Compressed Air Based Test Bed For Pipe-Line Health Monitoring Robot	2.5 Years	71,06,000	Completed
11	MHRD /DOFA/2015298D	Pipe Inspection Robots For Structural Health Monitoring (GIAN)	3 Months	8,16,000	Completed
12	MHRD /SIIC/2015371	Make In India Event (Mumbai)	1 Year	10,00,000	Completed
14	MSDE /ME /2017174	National Entrepreneurship Awards Scheme 2017	1 Year	20,00,000	Completed
15	MHRD /ME /2017245	Fundamentals Of Bio-Inspired Robotics	3 Months	6,19,400	Completed
16	STC /ME /2018044	Shape Memory Alloys Actuated Mechanically Active Reconfigurable	2 Years	36,78,400	Ongoing

		Lightweight PEEK material Based Parabolic Reflector For Active Control On RF Patterns for high Frequency Micro/Nano Spacecraft Application			
17	IUSSTF/ME /2017400	Design & Development of Aquatic Autonomous Observatory (Niracara Svayamsasita Vedhshala-Nsvs) For In Situ Monitoring, Real Time Data Transmission & Web Based Visualization	5 Years	9,00,00,000	Ongoing
18	STC /ME /2017183	Design Validation Of Active Flexible And Reconfigurable Parabolic Antenna Using SMA Based Smart Actuator	1 Year	8,40,000	Ongoing
19	GAIL /ME /2017069	Design And Development Of Adoptive Intelligent PHMR For Fuel Transportation Systems	2 .5Years	2,01,48,000	Ongoing
20	MHRD /ME /2016142L	Design And Construction Of Computer Controlled Automated	2 Years	5,12,539	Ongoing

		Radio-Chemistry Synthesizer			
21	MHRD /ME /2016142M	Designing And Manufacturing Of Prototype Of Dynamic Endotracheal Tube Holder	2 Years	6,87,758	Ongoing
22	MHRD /ME /2016142N	Development Of A Fiber Optic Intubation Device With A Co-Sensor At Its Tip For Facilitation Of Endotracheal Intubation	2 Years	4,68,500	Ongoing
23	MHRD /ME /2016474	Design And Development Of Adaptive Intelligent PHMR For Fuel Transportation Systems MHRD(DST) UAY	3 Years	1,89,80,000	Ongoing
24	DBT/ME/2014172	Seamless Affordable Assistive Technology For Health (Saath)	3 Years	32,00,000	Ongoing
25	STC/ME/2014086	Design Of A Smart Inflated Torus And Antenna Membrane	4 Years	46,18,800	Ongoing
		Total		16,55,16,872	(INR)
Consultancy Projects (PI)					
1	HAL /ME /20030013	Calibration Of Portable Hardness Tested And Micro	1 Month	10,000	Completed

		Hardness Testing Of Steel Samples			
2	HAL /ME /20030304	Design And Establishing Parameters For Mechanical Test Samples	2 Weeks	7,500	Completed
3	GM /MDES/20040312	Development of a Novel Turning Indicator Mechanism Using Shape Memory Alloy Based System	9 Months	4,92,600	Completed
4	NAIK(N/ME /20070241	Feasibility Study Report For Development Of Digital Bore Measuring Instrument	9 Months	1,54,275	Completed
7	GAIL /ME /20080163	Deflection & Vibration Compensation Of Gas-pipe Line At Ramganga	1 Week	14,045	Completed
8	HAL /ME /20090015	Matlab Based Modeling, Simulation And Validation Of Lch Main And Tail Rotor Actuators	1 Year	2,13,700	Completed
9	GHANAR/MDES/20110256	Design Consultancy Of Steel Gates Of Ramganga Barrage	1 Year	2,89,538	Completed
10	GAIL /ME /20130112	Design And Development Of A Pipeline Health Monitoring Robot Based On Smart Sensor	2 Years	42,82,534	Completed

		Embedded Rotating Probes And An Efficient Data Communication			
11	OFKNP /ME /2014056	Modelling And Estimation Of Structure Capacity Of Eot Crane	1 Year	5,61,800	Completed
12	TECHNO/ME /2014362	Vetting Of Design And Drawings Of Vertical Lift Gates Of Pahari Dam In Dist Jhansi Of Uttar Pradesh	1 Year	4,80,760	Completed
13	HAL /ME /2015072	Development Of Cabin Pressure Control System For LCA	1 Year	14,26,000	Completed
		Total		79,32,752	(INR)

Peer Recognition

- DST-JSPS Fellowship, Kyushu Institute of Technology, Japan
- Sakura Fellowship, JSPS, Kyushu Institute of Technology, Japan
- Academic Representative, Mentor Council of DGET, Industrial Automation & Instrumentation [2014-]
- Empanelled Eminent Expert, National Manufacturing Competitiveness Program [2013-]
- UKIERI award by UK India Research Initiative Council [2012-2014]
- DST-UKIERI award by DST and UK India Research Initiative Council [2009-2011]
- Young Scientist's award for the year 2006 by the Systems Society of India
- Nominated as a special member in the Senate, IIT-Kanpur from 2003-2005
- Department of Science and Technology, India, Young Scientist Award, 2001
- Recipient of Best Thesis Award in the Department of Aerospace Engineering, 1998

- Senate Commendation for excellent teaching in the courses: *Principles of Vibration Control* and *Design Practice*
- Student Mentor in Design Program for the following National Awards
 - 2nd Runners up, Nokia Bhasha 2011 - Rahul, Madhavan, Meenakshi, Aravind, Nishant
 - 1st Prize|Design Challenge-08|Yahoo R&D, Bangalore for designing of a transportation system for the differently able people.
 - Display Selection in Auto Expo 2008
 - 1st Prize|Design Challenge-09|IISC, Bangalore for designing a sustainable mobile phone

Member of the Editorial Boards

International Journal of Low Frequency Noise, Vibration and Active Control

Associate Editor: ISSS Jl. of Micro and Smart Systems

Reason – a Technical Journal

Contributions to the Institute:

Administrative Experience

Coordinator, Space Technology Cell [2014-cont]

Head, Central Workshop [2014-2017]

Head, Design Programme [2011-2013]

Coordinator, Dynamics & Vibration UG Lab, Department of Mechanical Engineering, IIT Kanpur [2010-Continuing]

Coordinator, Automation & Control UG Lab, Department of Mechanical Engineering, IIT Kanpur [2007-Continuing]

Coordinator, Smart Materials, Structures & Systems Research Lab, Department of Mechanical Engineering, IIT Kanpur [2000-Continuing]

Coordinator, Living System Inspired Design Research Lab, Design Programme, IIT Kanpur [2013-Continuing]

Coordinator, Post-Graduate Association of Mechanical Engineers [2001-2003]

Coordinator Master of Design Programme [2002-2004]

Convener, Departmental Post Graduate Committee, MDES [2002-2004]

Convener, Solid Mechanics and Design Stream, Department of Mechanical Engineering Representative [2007]

Senate Library Committee & Programme Advisory Committee (PAC) member of Design Programme [2002-2007]

Coordinator, Experimental Stress Analysis Lab, Department of Mechanical Engineering, IIT Kanpur [2004-2007]

Convener, Departmental Post Graduate Committee, ME [2004-2005]

Governing Body Member, Campus School [2013-2017]

Other Academic Activities

Invited Speaker [2014-2013]

Smart Materials for Micro machining, in the Short Term School on "Micromanufacturing and Its Applications" April 05, IIT Kanpur [2014].

IITK-UKIERI Airbus seminar: 12th March, 2014, *Dynamic Response based Damage Detection and Adaptive Structural Control (Morphing)* [2014].

IPS 9th Symposium at Waseda University, Japan on *Adaptive Control of Parabolic Antenna System by SMA Actuators* [2013].

UKIERI Presentation at Sheffield University, UK on *Mechanical and Chemical Healing of Damaged Composites* [2013].

SAC, Ahmadabad (ISRO) on *Intelligent System Design* [2013].

IIT Patna on *Embodiment of Intelligence in Product Design: Inspirations from Nature* [2013].

Boeing India, Bangalore, *Smart Materials and Intelligent Systems Design at IIT Kanpur* [2013].

HBTI, Kanpur, *Future Directions in Material Selection for Advanced Design* [2013].

Seminar & Workshops

Chairman of the Organizing Committee of 7th ISSS National Conference on MEMS and Smart Materials, Structures and Systems, 2016

Convener of 1st National Workshop from Space Society of India on Inflated Space Structures, 2016

Convener of SAATH Workshop on Smart Stick and Exoleg System, 2015

Session-Chair: Dynamic System Modelling, Design and Optimization, ACODS-2014

UG Convener: IITK-INAE joint competition on *Innovation in Manufacturing Practice* [2014]

Coordinator: Design Clinic, December, 2012

Noise Vibration and Harshness 2012 – jointly with Dr. Nachiketa Tiwari and Prof. N. S. Vyas.

Continuing Education Workshops:

- (a) Material Selection for Engineering Design – 3 weeks short course offered on line.
- (b) Engineering Product Design jointly with IACT [2013 and 2012]

A Short Course in Noise and Vibration jointly with Dr. Nachiketa Tiwari and Prof. N. S. Vyas [2011].

Coordinator – National Workshop on Smart Materials for Design of Intelligent Systems and Industrial Application (SMDISA-2007)

Coordinator - National Workshop on Smart Materials and Structures (SMCS-2002)

Reviewer

Smart Materials & Structures

Journal of Vibration & Control

Journal of Vibration & Acoustics

Journal of Low Frequency Noise, Vibration and Active Control

Journal of the Institution of Engineers India: Series C

Scripta Physica

Transactions on Magnetics
