

**CURRENT LOCATION:-**

**Dr. NATRAJ MISHRA**  
**ASSOCIATE PROFESSOR**

Adamas University, Kolkata- 700126, India

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**PROFESSIONAL QUALIFICATION:-**

- **Ph.D (Design Specialization) from IIT Delhi**
- **Date of Award of Ph.D: 7/11/2020**
- **Ph.D thesis topic: Dynamic Modelling and Control of Two Link Flexible Arm Robotic Manipulator**
- **M.Tech. in Robotics and Automation (Gold Medalist) from ITM (Autonomous), Gurgaon under Maharishi Dayanand University, Rohtak (CGPA 9.48 eqv. to 85.5 %) (2011)**

**EDUCATIONAL QUALIFICATION:-**

- **B.E. Hons. in Mechanical Engineering from ITM Gurgaon, MDU Rohtak (70.4 %) (2008)**
- **12<sup>th</sup> from M.V.N. Sr. Secondary School, Sec-17 Faridabad, C.B.S.E. (87.4 %) (2004)**
- **10<sup>th</sup> from D.A.V. Public School, Sainik Colony Faridabad, C.B.S.E. (91.4 %, TOPPER) (2002)**

**Objective**

To be a leader in performing my duties and to utilize my skills in Robotics and Mechanical Engineering in innovative ways for the welfare of the organization and society as a whole

**Experience: (14 Years)**

**Academic Experience (13 Years)**

**(1 Dec 2022- till date)**

Working as Associate Professor at Adamas University, Kolkata

*Subjects:* Kinematics of Machines, Design of Machine Elements, Engineering Mechanics, Advanced Structural Analysis, Mechanics of Solids

*Administrative duties:* **Overall NAAC Coordinator at School of Engg. & Tech.**

**(15 July 2013- 14 Oct 2022)**

Worked as Assistant Professor (Selection Grade) at UPES Dehradun

*Subjects-*

Rapid Prototyping and Tooling; Engineering Graphics; Engineering Mechanics; Mechanical Vibrations; Robotics and Control; MEMS; Material Handling; FEM; Rotordynamics & Condition Monitoring; Automatic Controls; Robotics-based Industrial Automation (4-0-2); Microprocessor-based Control Systems (3-0-2); Advanced Robotics; Mechatronics System Design

*Administrative Duties:*

Activity Coordinator/ Course Coordinator of B.Tech. Mechatronics; Lab incharge of Theory of Machines Lab; Time table coordinator of Mechanical Engineering Department; **Curriculum Design; Proctor**

**(Jan. 2012- June 2013)**

Worked as Assistant Professor at ITM University, Gurgaon (now NCU)

*Subjects-*

Instrumentation and Control (B.Tech. VIth Sem); Engineering Drawing (B.Tech. 1st Sem); Product Lifecycle Management (M.Tech. 2<sup>nd</sup> Sem.); Thermodynamics; Mechanics of Solids; Energy Conversion;

*Administrative Duties:*

Member of M.Tech. Coordination Committee; Time table coordinator of Mechanical Engineering Department

**(July 2011- Dec. 2011)**

Worked as Assistant Professor at Manav Rachna College of Engineering, Faridabad

*Subjects-*

Mechanical Vibrations (B. Tech. 7<sup>th</sup> Sem.); Mechatronics (M. Tech. 1<sup>st</sup> year.); Engineering Drawing (B. Tech. 1<sup>st</sup> Sem.); Workshop Technology Lab. (B. Tech. 1<sup>st</sup> Sem.); PRO- E (M. Tech. 1<sup>st</sup> year)

*Administrative Duties-*

M. Tech Coordinator for Mechatronics; B. Tech Coordinator for Mechanical Vibrations; Training and Placement Incharge; Industry interface interaction; Admission of students

### OTHER QUALIFICATION:-

- Cleared GATE 2012 with GATE score of 518 (AIR = 3598) (96 percentile)
- Cleared GATE 2009 with 89.68 percentile

### PERSONAL DETAILS:-

Mother : Smt. Sushma Mishra  
(Housewife)

Father : Shri R.K. Mishra  
(Accountant & Tax Consultant)

Date of Birth : 21 September 1987

Sex : Male

Marital Status : Married

Occupation : Assistant Professor-SG  
(UPES, Dehradun)

**Address : F.C.A. 848B C-Block  
S.G.M. Nagar  
Faridabad- 121001,  
Haryana,**

**Contact No. : 7895330769**

**E-Mail : natrajmishra@gmail.com**

Religion : Hindu

Hometown : Ghazipur (U.P.)

Hobbies : Reading books (religious)

Interests : Listening music, playing  
basketball, poetry

Languages known : Hindi (Mother Tongue),  
English (Fluent),  
Sanskrit (Reading)

### SOFTWARE AWARENESS:

#### **Computer Packages:**

- a) Knowledge of MATLAB/SIMULINK
- b) Basic knowledge of AutoCAD, Inventor-2010, SolidWorks, PRO-E Wildfire 5.0 (Part Modeling)
- c) Knowledge of MS Office
- d) Basic knowledge of ANSYS 15.0 (Workbench- Static Structural)

### Industrial Experience (1 Year)

(June 2008 to Aug. 2009)

One year and two months work experience at Paul Wurth India (P) Ltd. (world leader in blast furnace technology, Head Office- Luxembourg, Europe) as a Project Engineer in the department of Project Management and Execution.

#### Duties

1. Project planning using MS- Project
2. Working in SAP
3. Execution- On site installation of tuyere stocks at TSL Jamshedpur, site supervision at Bokaro
4. Assisting Engineering Department in the development of blast furnace parts and working out on Engineering problems that occur at site for feasible solutions
5. Assisting Quality Department in Quality Control
6. Vendor Relations

#### Projects Undertaken

1. Project Planning and Cost Analysis of Tuyere Stocks for Bokaro Blast Furnace #3

*Description:* The project involved Project Management of Tuyere Stocks through MS Project, SAP, communicating with engineering department and site engineers, extracting quotations from different vendors, placing order for manufacturing, tracking project development at different stages mentioned in the purchase order, preparation of technical specifications and QAPs.

2. Project Management and Execution of Tuyere Stock (Spares) for TSL, Blast Furnace C
3. Involved with other team members in the project management of other projects like- Bokaro BF #2, JSPL, JSW, Vizag.

#### Site Work

1. Worked out a plan for replacing old Russian type of tuyere stocks installed at BSL BF3 with the new Paul Wurth design
2. On-site fixing of problem during installation of tuyere stocks at TATA BF C
3. Assisted the Quality team in inspection of tuyere stocks for TATA BF C at a vendor in Chennai
4. Assisted the Quality team in inspection of material hopper for BSL BF 2 at a vendor in Ghaziabad
5. Assisted the Quality team in inspection of wire screen mesh for slag granulation tank of Vizag blast furnace at New Delhi

**REFERENCES:**

1. **Prof. S.P. Singh**  
Professor, Dept. of Mechanical Engg., IIT Delhi, Hauz Khas- 110016, New Delhi.  
Phone: 09818287249  
Email: [spsingh100@gmail.com](mailto:spsingh100@gmail.com);
2. **Prof. J.K. Dutt**  
Professor, Dept. of Mechanical Engg., IIT Delhi, Hauz Khas- 110016, New Delhi.  
Phone: 09968284097  
Email: [jkdutt@gmail.com](mailto:jkdutt@gmail.com);  
[jkdutt@yahoo.co.in](mailto:jkdutt@yahoo.co.in)
3. **Prof. N.K. Tewari**  
Senior Professor, Dept. of Mechanical Engineering, NSUT, Dwarka Sector-3, Delhi- 110078  
Phone: 09810922810  
Email: [nktewari72@hotmail.com](mailto:nktewari72@hotmail.com)
4. **Prof. K.K. Chaudhary**  
Retd. Professor,  
Dept. of Applied Mechanics, IIT Delhi, Hauz Khas- 110016, New Delhi.  
Phone: 09810254362  
Email: [kkc\\_55@hotmail.com](mailto:kkc_55@hotmail.com)  
[chaudhrykk@gmail.com](mailto:chaudhrykk@gmail.com)  
Home address: 831 Sec-14, Gurgaon-122007, Haryana
5. **Late Prof. B.C. Nakra**  
Professor of Eminence,  
Department of Mechanical, Engineering, IIT Delhi

**Project Work****Industrial Projects**

1. Silencer development for Blast Furnace, Danieli-Corus India Pvt. Ltd., completed October 2024

**Ph.D Research**

<b>Research Title</b>	Dynamic Modelling and Control of Two Link Flexible Arm Robotic Manipulator
<b>Aim</b>	To achieve the position control of the end effector of a Two-Link Flexible robot using active and passive vibration control methods
<b>Objectives</b>	<ol style="list-style-type: none"> <li>1. To prepare a dynamic model of a Two-Link Flexible manipulator considering both flexural and torsional vibrations of the <i>links</i> using Lagrangian ‘assumed modes method’ and Lagrangian ‘finite elements method’</li> <li>2. To control the position of the tip of the Two-Link Flexible manipulator using both passive and active vibration control techniques</li> <li>3. To perform the trajectory control of the Two-Link manipulator.</li> </ol>
<b>Remarks</b>	The tip position control of a two-link flexible manipulator having link flexibility was achieved through active and passive control means. The flexible links were modelled as Euler-Bernoulli beam. The governing equations of the manipulator were obtained using both Lagrangian-AMM and Lagrangian-FEM methods. Piezoelectric sensors and actuators were employed for active control of vibrations while viscoelastic damping was incorporated using the Kelvin-Voigt model. Besides that, effect of trajectory planning on tip vibrations was also studied. A novel approach of Coupled-Error Dynamics was developed to obtain the PID control gains for effective trajectory control of the flexible manipulator. Its performance was found close to that of CTC.
<b>Project Supervisors</b>	<ol style="list-style-type: none"> <li>1. Prof. S.P. Singh, Department of Mechanical Engineering, IIT Delhi</li> <li>2. Prof. (Late) B.C. Nakra, Department of Mechanical Engineering, IIT Delhi (formerly, Head Mechanical Engg. Deptt., IIT Delhi)</li> </ol>

**M.Tech. Project**

<b>Project Title</b>	Design of an expert system for an electric muffle furnace
<b>Remarks</b>	The aim of this project was to design an expert system for an electric muffle furnace for optimizing and controlling the simple heat treatment processes like annealing and normalizing in case of plain carbon steels. The project was made keeping in view its future industrial applications.
<b>Project Supervisors</b>	<ol style="list-style-type: none"> <li>1. Eminent Prof. B.C. Nakra, Deptt. of Mechanical Engineering, ITM University, Gurgaon (formerly, Head Mechanical Engg. Deptt., IIT Delhi)</li> <li>2. Prof. Parameshwar Sathyanarayan, Deptt. of Mechanical Engg., ITM University</li> </ol>

**Certifications:**

- Certificate Training in “Embedded System (using AVR)” from CETPA
- “Programming for Everybody (Getting Started with Python)” from University of Michigan, Coursera
- “Neural Networks and Deep Learning” from DeepLearning.AI, Coursera
- **Reviewed paper in Advances in Space Research, Elsevier (IF 2.6)**
- **Editorial Member in Edwin Group of Journal**
- Designing course-outcomes and outcomes-focused questions, InPods Ed-Tech, 2023
- FDP on “Revised NAAC Framework”, 2023

**Administrative Tasks**

1. Acted as one of the editors in National Conference on Emerging Trends in Mechanical Engineering, June 01, 2012, ITM University, Gurgaon
2. Served as member of Proctorial Board at UPES in School of Engineering at UPES Dehradun
3. Curriculum Design of B.Tech. Mechatronics as per AICTE and NBA guidelines at UPES Dehradun
4. Participation in NAAC and NBA documentation at UPES, Dehradun
5. Co-convenor in ROBOCON Bootcamp organized at Adamas University, Kolkata on 09/03/2023
6. Overall NAAC Coordinator in School of Engineering and Technology at Adamas University, Kolkata
7. Member IQAC, Adamas University, Kolkata
8. **Member, Planning & Monitoring, Adamas University**

**B.E. Project**

<b>Project Title</b>	Design and development of an all terrain vehicle- MINI BAJA.	
<b>Project Type</b>	B.E. final year project made with the assistance of SAE India	
<b>Project Supervisor</b>	Prof. K.K. Chaudhary, Deptt. of Mechanical Engg. , ITM University, Gurgaon (formerly, Professor in Department of Applied Mechanics, IIT Delhi)	
<b>Team Information</b>	<u>Team Name</u>	<i>The Techie Tyros</i>
	<u>Team Size</u>	<i>19 members</i>
	<u>My Role</u>	<i>Project Coordinator</i>
<b>Remarks</b>	The event MINI BAJA was organized for the first time by SAE India in December 2007 at Pithampur (Madhya Pradesh). We stood second in the north zone with an AIR of 10. The endeavour is still inspiring the future generations of I.T.M.	

**Summer Training Industrial Projects**

S.No.	Year	Name of Company	Project Undertaken
1	2006	Innova Techno Products (P) Ltd., Faridabad, Haryana	Design of hot air furnace for converting liquid milk into skimmed milk
2	2006	Faridabad Heat Treaters (P) Ltd., Ballabgarh, Haryana	Calculation of efficiency of batch furnace
3	2016	L&T Hydrocarbon Engineering, Powai, Mumbai	Training on ANSYS Workbench 15.0 (Static Structural)

**Academic Identity**

1. ORCID Id:  
0000-0001-7637-3872
2. Scopus Id:  
55657395200
3. Google Scholar Id:  
wWUIFNMAAAAJ
4. Vidwan Id:  
96372

**Conferences/ Seminars/ Papers**

1. Presented a paper- "A review on effect of heat treatment processes on mechanical properties of steel" in a national seminar on Innovations and Applications in Engineering & Applied Sciences held at FET Gurukula Kangri Vishwavidyalaya, Haridwar on November 9-10, 2011.
2. Natraj Mishra, Parameshwar Sathyanarayan and B.C. Nakra, "Comparison between the performance outputs of fuzzy and neuro-fuzzy based controllers used for temperature control in an electric muffle furnace" IEEE, ICECT 2012, Kanyakumari, 06/04/2012 to 08/04/2012.
3. Bhaskar Chandra, Natraj Mishra, "A study on effect of heat treatment processes on mechanical properties and microstructure of steels" *International Journal of Advanced Materials Science*, Volume 3 November 2012, pp. 41-55, <https://www.ripublication.com/Volume/ijamsv3n1.htm>
4. Natraj Mishra, B.C. Nakra, "Speed Control of a D.C. Motor using Conventional and Intelligent Control Techniques", Proceedings National Conference on Emerging Trends in Mechanical Engineering (ASME & ISME) June 01, 2012, ITM University, Gurgaon, pp. 233-243
5. Natraj Mishra, Parameshwar Sathyanarayan, "Cruise Control Using Fuzzy Logic and PID Controllers", Proceedings- National Conference on Emerging Trends in Mechanical Engineering (ASME & ISME) June 01, 2012, ITM University, Gurgaon, pp. 244-251.
6. Natraj Mishra, Parameshwar Sathyanarayan, "Modelling of an expert system for an electric muffle furnace for simple heat treatment processes", IEEE, 3<sup>rd</sup> Nirma University International Conference on Engineering, 06-08 December, 2012, pp. 136.
7. Natraj Mishra, Deepak Bharadwaj, "Modelling and Simulation of an Expert Heat Treatment system for Plain Carbon Steels", IEEE, 4<sup>th</sup> Nirma University International Conference on Engineering, 28-30 November, 2013, Ahmedabad.
8. Natraj Mishra, S.P. Singh, B.C. Nakra, "Dynamic analysis of a single link flexible manipulator using Lagrangian Assumed-modes approach", IEEE, International Conference on Instrumentation and Control, 28-30 May 2015, College of Engineering Pune.
9. Natraj Mishra, S.P. Singh, B.C. Nakra, "Dynamic Modelling of Two Link Flexible Manipulator Using Lagrangian Assumed Modes Method", *Global Journal of Multidisciplinary Studies*, Vol. 4, No. 12, Nov. 2015, pp. 93-105.
10. N. Mishra, S.P. Singh, "Dynamic modeling of a two-link flexible manipulator using the Lagrangian finite elements method", *Technology Drivers: Engine for Growth*, Proceedings of the 6<sup>th</sup> Nirma University International Conference on Engineering (NUiCONE 2017), November 23-25, 2017, Ahmedabad, India, CRC Press, pp. 167-172. (Book chapter, Published in 18/12/2020)
11. Hemkumar, M., Ahilan, S. and Mishra, N., "A review paper on major causes and diagnosis of vibration in centrifugal pumps", *Indian Journal of Scientific Research*, March 2018, pp. 318
12. Natraj Mishra, S.P. Singh, "Hybrid vibration control of a Two-Link Flexible manipulator", *SN Applied Sciences*, 2019, 1:715.

## Conferences/ Seminars/ Papers

13. Natraj Mishra, S.P. Singh, "Dynamic Analysis of Two-Link Flexible manipulator using FEM undergoing Bending-Torsional Vibrations", *Acta Technica Napocensis Series: Applied Mathematics, Mechanics and Engineering*, Vol. 62(3), 2019, pp. 431-448.
14. Natraj Mishra, S.P. Singh, "Dynamic modelling and control of flexible link manipulators: methods and scope- Part-1", *Indian Journal of Science and Technology*, Vol. 14 (43), 2021, pp. 3210:3226.
15. Natraj Mishra, S.P. Singh, "Dynamic modelling and control of flexible link manipulators: methods and scope- Part-2", *Indian Journal of Science and Technology*, Vol. 14 (48), 2021, pp. 3494:3508.
16. Natraj Mishra, S.P. Singh, "Determination of modes of vibration for accurate modelling of the flexibility effects on dynamics of a two link flexible manipulator", *International Journal of Non-Linear Mechanics*, Vol. 141, 2022, pp. 1:22.
17. Presented paper in the webinar: *International Webinar on Smart Materials* titled: "Tip vibration control of a Two-Link Flexible manipulator using passive and active control methods", organized by Coalesce Research Group, November 18-19 2021.
18. Deepak Bharadwaj, Natraj Mishra, Maheshwar Pathak, "Kinematic and Singularity Analysis of 10 DOF Lower Body of Humanoid Robot", *Mathematical Modelling of Engineering Problems*, Vol. 9, No. 2, April, 2022, pp. 484-490.
19. Natraj Mishra, "Coupled Error Dynamic Formulation for Modal Control of a Two Link Manipulator having Two Revolute Joints", *Global Journal of Researches in Engineering: G Industrial Engineering*, Vol. 22, Issue 1, 2022, pp. 56-73.
20. Natraj Mishra, S.P. Singh, "Independent Modal Space Control based Trajectory Control for an Articulated Planar Manipulator with Flexible Links" *IEEE 3rd International Conference for Emerging Technology (INCET)*, Jain College of Engineering, Belgaum, India. May 27-29, 2022.
21. Presented paper in: *International Conference on Global Practice of Multidisciplinary Scientific Studies- IV* titled: "Dynamic Modelling and Control of Two Link Flexible Arm Robotic Manipulator" organized by Turkish Republic of Northern Cyprus, April 28-30, 2023.
22. Natraj Mishra, "Investigating the effects of rigid-flexible coupling and flexural-torsional oscillations on the dynamics of a two-link flexible manipulator", *The Journal of Oriental Research, Madras*, Vol. XCVII, No. 1, 2024, pp. 107-128, ISSN: 0022-3301
23. Natraj Mishra, "Review on Seed Sowing Methods for Improved Agricultural Productivity", *Ekansh: Annual Multidisciplinary Journal for Engineering, ICT and Management*, Issue: 23, 2024, pp. 26-30, ISSN: 2230-9756
24. Bhaskar Chandra Kandpal, Gaurav Sharma, Nitin Johri, Natraj Mishra, Ajay Kumar, "Evaluation of mechanical properties of Mg/CNT/Al<sub>2</sub>O<sub>3</sub> based Metal Matrix Nanocomposites using Stir Casting Process", *Composites: Modeling, and Manufacturing*, First Edition, CRC Press, 2024, eISBN: 9781003564355.

## Books

1. Natraj Mishra, Bhaskar Chandra Kandpal, Subhasish Mohapatra, *Modelling and Simulation of an Expert Heat Treatment System- Plain Carbon Steels*, Edwin Incorporation, 2024, ISBN 978-93-92446-64-1

## Patents:

S. No.	Title	Applicants	Application/ Patent Number	Date of application/ grant	Status
1	Short distance telemetry system for elucidation	1. Jasjit Singh 2. Ankur Kohli 3. Dr. Natraj Mishra	202011007623	March 2020	Published
2	Cam-operated agricultural seeder	1. Adamas University 2. Dr. Natraj Mishra	393328-001	22/08/2023	Granted
3	A dynamic optimization system and method for electric vehicle charging infrastructure management	1. Dr. Santanu Koley 2. Dr. Mousumi Karmakar 3. Dr. Debasri Chakraborty 4. Subhajit Bhattacharyya 5. Subhadip Goswami 6. Somesubhra Panda	202431037157 A	24/05/2024	Published

		7. Dr. Abhik Banerjee			
		8. Dr. Natraj Mishra			
		9. Dr. Rajen Pudur			

**PG Projects Guided:**

S.No.	Name of Candidate	Title of Dissertation	Year of Award
1.	Jenson M. Alex	Experimental set-up for determination of critical speed of one rotor system with one disk	2016
2.	Ahilan Singaravelu	Vibration analysis of vertical pumps	2018
3.	Hemkumar M.	Vibration analysis of horizontal pumps	2018
4.	Nitin Dhariwal	Vibration analysis of overhung pump using FFT	2019
5.	Venkata Krishna Guntuka	Analysis and design of robotic limb implants for humans	2021
6.	Ujjaval Vyas	Hardware design of real time autonomous catering robot	2022

**UG Projects Guided:**

S.No.	Name of Candidate	Title of Dissertation	Year of Award
1	Tanmay Benjwal Indranil Kundu	Robot Prosthetic Arm	2022
2	Abhinab Dutta Abhinav Mudgal Vikramaditya Singh	Development and Implementation of Structured Machine Learning Algorithm in a Robot	2021
3	Abhinav Koundal Ankur Kohli Pronnati Ramtekkar Arjita Chaturvedi	Design of terrain rover: The Shrimp	2019
4	Anveshi Sharma Astha Choubey Rahul Singh Shubhankar Singh	Biped walking robot	2019
5	Amit Kumar Nikhil Jain Nilotpal Kalita Sudhanshu Pandey	Modelling and analysis of a multi-storeyed building related to seismic vibrations	2017
6	Harman Singh Kamlesh Kumar Lokesh Bansal	Vibrational and dynamic analysis of 2 Link flexible robotic arm	2017

	Nayab Siddiqui		
	Taru Rawat		
7	Sarthak Sethi	Semi-automatic slitting machine	2017
	Mayank Kr. Jhadi		
	Vishesh Kohli		
	Ayush Jindal		
8	Kashish Singla	Modeling of an automated micro-aquaponics system	2017
	Pratul Gupta		
	Shivanshu Goel		
	Shriya Negi		
	Shubhit Rastogi		
9	Ankur Ranjan	Damping of cantilever beam through viscoelastic material	2017
	Rishabh Sirvaiya		
10	Shivam	Simulation of cam and follower mechanism using MATLAB	2017
	Swatantra Tyagi		
	Ashutosh Yadav		
11	Shivakant Tiwari	Fabrication of forced and free damped vibration setup	2016
	Kuldeep Singh Parihar		
	Tushar Batra		
	Vaibhav Singh		
12	Mohit Keshav	Remotely operated fire-fighting robot	2015
	Rohit Khanna		
	Siddique Akbar		
	Vaibhav Tanwar		
13	Vaibhav Aggarwal	Thermal analysis of an electrically fired batch furnace	2013
	Sudhanshu Pandey		
	Gautam Pratap		