

Sanjukta Chakraborty

Assistant Professor

Department of Civil Engineering

Indian Institute of Technology Palakkad, Kerala

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Work Experience

- **Assistant Professor** -- Indian Institute of Technology Palakkad, Kerala, India, December 2018- Present time
- **Post doctoral researcher (Institute Postdoctoral Fellow)** -- Tsinghua University, Beijing, China January, 2018 -- November 2018
- **Senior Engineer** -- Civil, M. N. Dastur & Company (P) Ltd, Kolkata, September 2010-- December 2011
- **Engineer** -- Civil, M. N. Dastur & Company (P) Ltd, Kolkata, June 2007-- July 2008

Research Interests

My research interests are primarily focussed on the vibration control of structure under random excitation considering various passive and active mechanisms with an emphasis on analytical and experimental investigations. In particular, I am interested in the following topics:

- Frequency adaptive control mechanism, effectiveness, and applications to structural systems like buildings, bridges.
- Energy transfer and high frequency excitation of nonlinear hysteretic system, component behaviour during earthquake excitation under structural nonlinearity
- Passive adaptive control to cater detuning problem of bridge vibration
- Integrated control and condition assessment of aged over bridge structure

Educational Background

Doctor of Philosophy (December, 2011 – 24th July, 2017)

Civil Engineering; Indian Institute of Technology, Kanpur

Specialization: Structural Engineering

Thesis supervisor: Prof. Samit Ray Chaudhuri

Dissertation: “Adaptive control and performance enhancement of base isolated structures with emphasis on behavior of structure and nonstructural components”
Course Work Cumulative Performance Index (CPI): 9.5 out of 10

Master of Technology (July, 2008—27th August, 2010)

Civil Engineering; Indian Institute of Technology, Kanpur

Specialization: Structural Engineering

Thesis supervisor: Prof. Durgesh C Rai

Dissertation: “Study on the significance of fatigue on the reinforced concrete wind turbine shaft”

Course Work Cumulative Performance Index (CPI): 9.5 out of 10

Bachelor of Engineering (June 2003—June 2007)

Civil Engineering

Jadavpur University, Kolkata (West Bengal)

Cumulative grade point average (CGPA):8.3/10 (Honors)

Journal publications:

1. Abhishek, S and Chakraborty S. “Frequency Adaptive Control System in Flexible Bridge with Vehicle-Bridge Interaction.” [International Journal of Mechanical Sciences](#) (2025), Under Review (positive review).
2. Jain S, Madhu M L, Ghosh A, Chakraborty S, Das B (2025) “An adaptive feedback-based TMD system for passive control of rail bridge vibration.” (Structures), 79
3. Abhishek S, Pilakkat D, Panda J, and Chakraborty S (2025) “Theoretical and experimental assessment of Maxwell-Boltzmann type gain distribution for the vibration control of a generalized structural system.” European Journal of Control, 83.
4. Panda J, Chakraborty S, Ray-Chaudhuri S (2025) “Experimental evaluation of a servomechanism-based PI controller for seismic response control in smart base-isolated steel building.” Journal of Constructional Steel Research, 227
5. Abhishek S, Chakraborty S (2024), Effect of a frequency adaptive control system on the modal control spillover of structures, Structures, 67.
6. Chakraborty S, Sensy K, Ji, X (2024), Control of a building system with sudden nonlinearity using the sliding mode technique, Journal of Vibration and Control, <https://doi.org/10.1177/10775463241273>
7. Sarkar, S, Chakraborty, S, and Ghosh (2024), A Wave-induced vibration control of Floating production storage and offloading systems by tuned mass damper inerter, Advances in Structural Engineering, 27 (8).

8. Y Cao, Z Qu, H Fu, X Ji, S Chakraborty (2024), A substructural shake table testing method for full-scale nonstructural elements, *Mechanical Systems and Signal Processing* 218, 111575
9. Abhishek, S., **Chakraborty, S.** (2023) “The effect of an adaptive feedback-control system in the structural vibration control”, *Journal of Sound and Vibration*, Vol: 548 1--14
10. Panda, J., Chakraborty, S Ray-Chaudhuri, S, (2022) “Development and performance evaluation of a robust suboptimal H_∞ -based proportional–integral controller–observer system with target tracking for better control” *Structural Control and Health Monitoring* 29 (11), e3084
11. Li, X., Sun, H., Ji, X., **Chakraborty, S.**, Wang, L. (2022) “Range of applicability of real mode superposition approximation method for seismic response calculation of non-classically damped industrial building”, *Earthquake Engineering and Engineering Vibration* 21 475–488
12. Panda, J., **Chakraborty, S.**, Ray-Chaudhuri, S. (2021) “A novel servomechanism based proportional–integral controller with Kalman filter estimator for seismic response control of structures using magneto-rheological dampers”, *Structural Control Health Monitoring*, Vol 28, <https://doi.org/10.1002/stc.2807>
13. Ji, X., Zhang, J., Ikago, K., **Chakraborty, S.** (2021) “Tuned viscous mass damper (TVMD) coupled wall system for enhancing seismic performance of high-rise buildings”, *Engineering Structures*, Vol 240.
14. **Chakraborty, S.**, Ghosh, A.D., Ray-Chaudhuri, S. (2021) "A novel tuned mass-conical spring system for passive vibration control of a variable mass structure", *Journal of Vibration and Control* (<https://doi.org/10.1177/10775463211000497>), Vol 28.
15. Sachdeva, G., **Chakraborty, S.**, Ray Chaudhuri, S. (2018) “Seismic response control of a structure isolated by flat sliding bearing and nonlinear restoring spring: Experimental study for performance evaluation”, *Engineering Structures*, Vol 159, Page 1--13
16. **Chakraborty, S.**, Ray Chaudhuri, S. (2017), “Energy Transfer to High Frequency Modes of a Building due to Sudden Change in Stiffness at its Base”, *ASCE Journal of Engineering Mechanics*, Vol 143, No 8(DOI: 10.1061/(ASCE)EM.1943-7889.0001262)
17. **Chakraborty, S.**, RayChaudhuri, S. (2017), “Equivalence of Optimal Gain between H_2 Norm Minimization and LQR Control of a Linear System”, *ASCE Journal of Engineering Mechanics*, Vol 143, No 6(DOI: 10.1061/ (ASCE)EM.1943-7889.0001218)
18. **Chakraborty, S.**, Roy, K., RayChaudhuri, S. (2016), “Design of re-centering spring for flat sliding base isolation system: Theory and a numerical study”, *Engineering Structures*, Vol 126, page 66-77

19. **Chakraborty, S.**, and Ray Chaudhuri, S. (2016), “Development of a New Algorithm to Control Excitation of Particular Mode of a Building”, *Journal of Automation and Control Engineering*, Vol 4, No 5, page 370--374
20. **Chakraborty, S.**, and Ray Chaudhuri, S. (2016), “Control of blast induced vibration of building by pole placement and LQG control algorithm”, SEC2014 , *Journal of Structural Engineering, SERC*, Vol 43, No 1, pp. 111-119, ISSN: 0970-0137
21. **Chakraborty, S.**, and Ray Chaudhuri, S. (2014), “Frequency-dependent optimal control in independent modal space for seismic response control of structures”, *Journal of Vibration and Control*, Vol 22, No 14, page 3236–3252

Patent

Shubhang Jain, Madhu M L, Sanjukta Chakraborty (2024), “Passive adaptive control of rail-bridge girder”, Patent application no: 202441094974

Conference Proceedings and Reports

1. Abhishek, S and Chakraborty, S (2024) “Effect of Observation Spillover on Frequency Adaptive Feedback Controlled Structural System.” In: Recent Developments in Structural Engineering. Vol. 2. Springer
2. Abhishek, S, Pilakkat, D, and Chakraborty, S (2024) “Experimental assessment of a frequency adaptive feedback mechanism for a three dimensional structural system including perturbation.” In: Lecture Notes in Civil Engineering. Springer.
3. Abhishek, S., Pilakkat, D., Chakraborty, S (2024) “A study on the effects of torsional spillover on an ideally controlled three dimensional structure” *Journal of Physics: Conference Series* 2647 (3), 032009
4. Panda, J., Adarsh S., Chakraborty, S (2024) “Decentralized H2-Based Semi-Active Control To Suppress Transient Vibration Of Structures, *Journal of Physics: Conference Series* 2647 (3), 032017
5. Abhishek, S, and Chakraborty, S (2022) “Effect of a optimum control input in seismically excited structure considering modal control spillover.” In: Symposium in Earthquake Engineering. Springer. 2022, pp. 415–428. isbn: 978-981-99-1608-5.
6. Jain, S., **Chakraborty, S.**, “Detuning effect of multiple tuned mass damper system in vibration control of rail bridge girder” In the Proceeding of Proceedings of the 7th

International Conference on Civil Structural and Transportation Engineering (ICCSTE'22) (2022)

7. Vivek, T, V., Apoorva, C., Bhavathrathan B. K., **Chakraborty, S.**, "Traffic Rerouting to Maximize Structural Reliability" In the Proceeding of Second ASCE India Conference on Challenges of Resilient and Sustainable Infrastructure Development in Emerging Economies, (CRSIDE2020) (2020)
8. Ray Chaudhuri, S., **Chakraborty, S.**, "Component Response of Base Isolated Structure under Seismic Excitation" In the Proceedings of 17th World Conference on Earthquake Engineering (17WCEE, Sendai, Japan (2021).
9. **Chakraborty, S.**, Ji, X., "Comparative Assessment of Linear Quadratic Algorithm between Real and Independent Modal Space", In proceedings of the 7th World Conference on Structural Control and Monitoring, 7WCSCM, July 22-25, 2018, Qingdao, China
10. **Chakraborty, S.**, Ray Chaudhuri, S., "Study of spill over phenomena for frequency dependent feedback control algorithm", In Proceedings of 13th International Conference on Vibration Problems (ICOVP 2017) 29th November - 2nd December, 2017, Indian Institute of Technology Guwahati, INDIA,
11. **Chakraborty, S.**, Ray Chaudhuri, S., "Feedback control of particular mode of a hysteretic structure", In Proceedings of Eighth ISSS National Conference on MEMS, Smart Materials, Structures and Systems, Indian Institute of Technology Kanpur, Kanpur, India, 28-30 September, 2016.
12. Amir, M., **Chakraborty, S.**, Ray Chaudhuri, S., "Location optimization and LQR algorithm for inter - story drift control of structures with toggle bracings", In Proceedings of Eighth ISSS National Conference on MEMS, Smart Materials, Structures and Systems, Indian Institute of Technology Kanpur, Kanpur, India, 28-30 September, 2016.
13. **Chakraborty, S.**, Ray Chaudhuri, S. (2015), "Development of a New Algorithm to Control Excitation of Particular Mode of a Building", In Proceeding of 2015 2nd International Conference on Robotics and Automation Engineering (ICRAE 2015) Beijing, China, October 23-25, 2015 (*Best oral presentation*).
14. **Chakraborty, S.**, Ray Chaudhuri, S. (2014), "A Study on High Frequency Excitations of Base Isolated Building Under Seismic Excitation", In Proceeding of the Second European Conference on Earthquake Engineering and Seismology, Aug 24-29, Istanbul, Turkey.
15. **Chakraborty, S.**, Ray Chaudhuri, S. "Development of Frequency Dependent Optimal Control in Independent Modal Space". In Proceedings of Advances in Control and Optimization of Dynamical Systems, Indian Institute of Technology, Kanpur, Kanpur, India, Volume 3, Part: 1, Page 47-54, 2014 (*2nd student best paper*)

16. **Chakraborty, S.,** Roy, K., Arun, C. C., Ray Chaudhuri, S. "On Development of a New Seismic Base Isolation System". In Proceedings of Sixth International Conference on Scalable Uncertainty Management (SUM 2012), Marburg, Germany, Volume 7520, page 574-581,2012

Teaching Experience:

Course: Engineering Mechanics, CE1020,

Semester – Jan to May, 2024

No of students: 60

Teacher Course Feedback: 3.79/5

Course: Engineering Mechanics, CE1020,

Semester – Jan to May, 2023

No of students: 60

Teacher Course Feedback: 4.3/5

Course: Structural Analysis, CE2020

Semester – Jan to May, 2022

No of students: 31

Teacher Course Feedback: 8.86/10

Course: Structural Analysis, CE2020

Semester – Jan to May, 2021

No of students: 31

Teacher Course Feedback: 8.95/10

Course: Strength of Material, CE2010

Semester – July to Nov, 2021

No of students: 31

Teacher Course Feedback: 7.84/10

Course: Strength of Material, CE2010

Semester – July to Nov, 2020

No of students: 33

Teacher Course Feedback: 7.82/10

Course: Structural Dynamics, CE5513

Semester – July to Nov, 2020

No of students: 6

Teacher Course Feedback: 8.86/10

Course: Structural Dynamics, CE5513

Semester – July to Nov, 2019

No of students: 9

Teacher Course Feedback: 7.89/10

Course: Earthquake Analysis & Design of Structures, CE5517

Semester – July to Nov, 2021

No of students: 3

Teacher Course Feedback: 8.19/10

I was selected two times for the student tutorship for the course Mechanics of Solid (ESO-202A) in Indian Institute of Technology, Kanpur.

Tutor (2014--2015, Semester-- July to December)

Indian Institute of Technology, Kanpur

Course: "Mechanics of Solid: ESO202" – An institute level core course

Description: An undergraduate course; Total number of students in tutorial section- 30;

Tasks: tutorial classes are taken every week and graded quizzes, midterms and final.

Tutor (2015--2016, Semester – January to May)

Indian Institute of Technology, Kanpur

Course: "Mechanics of Solid: ESO202" – An institute level core course

Description: An undergraduate course; Total number of students in tutorial section- 40;

Tasks: tutorial classes are taken every week and graded quizzes, midterms and final.

Research Supervision (IIT Palakkad)

Completed

PhD Student

1. Dr. Jagajyoti Panda, IIT Kanpur (Defended on June 10, 2022), **Co-supervisor**
Research area: Servo-mechanism Based Adaptive Control For Smart Base-isolated Structures Subjected to Uncertain Ground Excitations: Algorithm Development and Experimental verification

Present affiliation: Assistant Professor in the National Centre for Disaster Mitigation & Management at MNIT Jaipur

MS Student

1. Mr. Shubhang Jain (Graduated in 2023) Research area: Passive control structural system with varying structural property
Present affiliation: BIM Engineer in Eckersley O'Callaghan (Former Engineer in L&T)

Senior Project Engineer (IIT Palakkad Techno Innovation Hub, IPTIF)

1. Dr. Deepthi Pilakkat
Research area: Experimental Development of feedback control closed loop control for a linear frequency adaptive mechanism
Present affiliation: Sr. Gr Assistant Professor, Department of Electrical Engineering, Amrita University (Coimbatore campus)

Thesis Submitted

PhD Student

1. Mr. S Abhishek, (July, 2019 – present time)

Research area: Frequency adaptive control of structural system
Research Seminar was over on 15th October 2024
Thesis submitted on November 18th 2024

Ongoing

PhD Student

2. Mrs. Kadeeja Sensy (July 2021 – present time)
Research area: High frequency excitation and effect on non-structural components
Research Proposal was over on March 2024
3. Mr. Madhu M.L (July 2023 – present time)
Research area: Bridge TMD system
Comprehensive passed on September 2024
4. Mrs. Harija K S (July, 2024 – Present)
Research area Structural health monitoring of bridge structure
Course work is going on

Post doctoral

Dr. Nilarghya Sarkar
Institute postdoctoral fellow, IIT Palakkad,
Joined on 5th November 2024

Research area: Viscoelastic damper system for a Jacket platform

BTP Student (completed)

Chiluveru Apoorva (101601006)

Research area: Reliability assessment of a degraded road bridge based on monitored data

Received best project award

Anudeep Rajapantula(101601020)

Research area: Effect of De-tuning Due to Mass Variability for Rail Bridge Structures

Mukesh Mahato (101701015)

Research area: Reliability analysis of a existing bridge structure considering earthquake load

Gulshan Kumar (101701011)

Research area: Optimal location of TMD for controlling multiple modes

Siyyala Narendra (101801029)

Research area: Study of vibration characteristics of elevated water tank

Gumin Mize (101801013)

Research area: Component vibration characteristics under sinusoidal loading

Pindiga Srujan (101801019)

Research area: Investigation on varying path inerter mechanism

Kumba Siva (102001015)

Research area: Buckling behaviour of helical spring

Summer Internship

Mr. Abhradeep Ghosh (June 2023 – July 2023)

From IEST Shibpur

Work area – Bridge TMD system

Ms. Muneeba V (June 2019 – July 2019)

From NIT Culicut

Work area: Water tank model design from the prototype

Project

Completed

1. **Title:** Analytical and Experimental Investigation on Frequency Dependent Linear Control Algorithm for Performance Enhancement of Real Life Civil Structures under Random Excitation

Role: Principle Investigator (PI)

Duration: (December, 2019 – December 2021)

Agency: SERB, Startup Research Grant (SRG)

Cost: 21,56,240 rupees

Status: Completed

Ongoing

2. **Title:** Real time monitoring and control of road bridge structure

Role: Principle Investigator (PI)

Agency: SERB, National Mission on Interdisciplinary Cyber Physical Systems, Technology Innovation Hub (TIH, IIT Palakkad (IPTIF)

Cost: 45,00,000 rupees

Status: Ongoing

3. Development of a passive frequency adaptive control for structural system under excitations

Role: Principle Investigator (PI)

Agency: Exploratory Research Grant (ERG) IIT Palakkad

Cost: 20,70,000 rupees

Status: Ongoing

Under review/Submitted

4. Frequency adaptive control mechanism for the passive vibration control of structure under variations in dynamic properties

Role: PI

Prof. Satish Nagarajaiah agreed to be the host

Agency: SERB International Research Experience (SIRE)

Status: Submitted on November 2023, accepted for technical evaluation (February 2024),

In July 2024 notification came as “As the transition from SERB to ANRF is in progress, the decision on the proposals submitted under SIRE scheme has been put on hold”

5. Resilient design of structural and non-structural component of buildings subjected to hysteretic nonlinearity due to strong ground shaking

Role: PI

Co-PI: Dr. Sneha Gajbhiye

Agency: Power Research Grant, SERB, DST

Cost: 50,87,000 rupees

Status: Submitted on March, 2024, and provisionally accepted for further processing on May, 2024

6. Design, development and testing of a low frequency vibration isolator for towed SONAR arrays
Role: Co-PI
PI: Dr. Anoop Akkoorath Mana,
Co-PI: Dr. Sanjukta Chakraborty, Dr. Arun C O and Dr. Sagi Rathna Prasad
Status: Project proposal submitted to Naval Physical and Oceanographic Laboratory

Invited Talk

- Keynote invitation: DRDO Grants-In-Aid, National Level Workshop on "Securing the Frontlines: Blast Resistance in Defense Infrastructure" organized by Department of Civil Engineering, Adithya Institute of Technology, during 05-06 September 2024
- Delivered speech (Invited Speaker) on "Adaptive Control and Performance Enhancement of Structures" in the National Web Conference on Structural, Architectural, Building and Automation in Sustainable Engineering (SABASE-2020), 3rd – 4th June, 2020
- Delivered speech (Faculty talk) on "Excitation of High-Frequency Modes of Base Isolated Structure" in the Research Scholar Day, IIT Palakkad (28th September, 2019).

Workshop/Conference

- The organizer for three-day National Conference on Resilient Infrastructure (NCRI 2022) in the area of Structural Resilience during Jun 15th to 17th, 2022.
Duties: Conduct review process in structural resilience (invite reviewers, review assignment, selection, correspondence etc), invite speakers in the area of structural resilience, organize sessions in structural resilience
- Conducted 3 days' workshop titled "WOEKSHOP ON OPENSEES FOR STRUCTURES UNDER EXCITATION" during February, 24th – 26th 2023 as an upskilling activity in IIT Palakkad Technology IHub Foundation (IPTIF);
Around 10 candidates registered from different regions of India including participants from IIT Roorkee, ISM Dhanbad.

Academic Achievements

- Reviewer of the following journals
 - a) Mechanical system and signal processing
 - b) Advances in Structural Engineering,
 - c) Nonlinear dynamics,
 - d) Structures,

- e) Shock and Vibration, and
- f) PLOS ONE

- Awarded the Best Oral Presentation Certificate of the conference in 2015^{2nd} International Conference on Robotics and Automation Engineering (ICRAE 2015), Beijing, China (23rd to 25th October, 2015)
- Awarded the 2nd Best Student Paper of the conference in the Third International Conference on Advances in Control and Optimization of Dynamical Systems (ACODS-2014), Indian Institute of Technology Kanpur, India, during 13-15 March 2014
- Selected two times for the Student tutorship for the course Mechanics of Solid (ESO-202A) in Indian Institute of Technology, Kanpur

MANAGEMENT & INSTITUTIONAL DEVELOPMENT ELEMENTS (Administrative role)

(in-charge of laboratory / facility / group, chairmanship and memberships of committees, involvement in student services, Institute community and administrative assignments).

- Chairperson EAYL for two years 2022-2023, 2023-2024
- Placement coordinator in the Career Development Center (Civil Engineering), 2022-2023, 2023-2024, 2024-present.
- Organized IAC-4, IAC-5 as a faculty coordinator from Civil Engineering
- Board member of Industry collaboration and sponsored research (IC & SR) from Civil Engineering 2022-2023, 2023-2024.
- BTP coordinator in Civil Engineering for two years 2021-2022, 2022-2023
- Faculty Advisor for students of the discipline of Civil Engineering from batch 2019 (10 students) and batch 2023 (9 students).
- Doctoral committee member of the following PhD scholars: Mr. Suresh E, Ms. K C Kalam Aswathy, Mr. Ajul E, Mr. Jibin Boban, Ms. Athira K, Mr. Mithulraj M, Mr. Anil B, Mr. Harikrishnan K P, Mr. Adarsh G S, Mr. Sirajudheen C H
- General test committee (GTC) member of the following MS students: Ms. Parvathi S, Ms. Aishwarya Maheshvar Kasarla, Mr. Ananthu Sasikumar, Mr. Gaurav Jain
- Volunteered to provide discipline-wise content for institute website from Civil
- Faculty coordinator from civil for JEEW Helpdesk since 2019 – 2023.

Laboratory Development

Instrumentations for structural testing

- Dynamic and & control experiments for structures from DST-SRG considering
 - (a) Data Acquisition System (Industrial Grade Embedded Controller) (MX 440 B HKB, MX 879B)
 - (b) signal analyzer

- (c) accelerometer (17g capacity) (4508-B piezoelectric Accelerometer)
- (d) LVDT with 100 mm capacity (1-WA/100mm-T)
- (e) LabVIEW driver for integrating HBM data acquisition
- Low Capacity (5 kN) MTS Actuator with the institute approval
- Speed control motors, accelerometer from Vernier from the Seed grant
- Small scale feedback control design using a microcontroller (ATmega328p), motor driver, DC motor, an LVDT and a PC with MATLAB/Simulink tool, implemented to single bay single story model frame of mild steel material and connected with a rigid aluminum mass from the Seed grant
- A 3m x 3m 2D Reaction frame for 10 kN dynamic loading with a frequency range of 50 Hz on the structure from IIT Palakkad Techno Innovation Hub project (IPTIF)
- Catman easy data acquisition software with laptop
- Purchase Process is going on for a DC dynamic shaker with shake table.

List of Referees

1. Prof. Santhakumar Mohan
Professor, Department of Mechanical Engineering
Indian Institute of Technology Palakkad
Kozhippara P. O, Palakkad, Kerala, Pin: 678557
Email: santhakumar@iitpkd.ac.in
2. Prof. Samit Ray Chaudhuri
Professor, Department of Civil Engineering
Indian Institute of Technology Kanpur
Kanpur - 208016, India.
Email: samitrc@iitk.ac.in
3. Prof. Xiaodong Ji
Professor, Department of Civil Engineering
Tsinghua University
Beijing, 100084, P. R. China
Email: jixd@mail.tsinghua.edu.cn
4. Prof. Vasant Matsagar
Professor and Dogra Chair
Multi-Hazard Protective Structures (MHPS) Laboratory
Department of Civil Engineering,
Indian Institute of Technology (IIT) Delhi,
Hauz Khas, New Delhi - 110 016, India.