## Dr. Zahnupriya Kalita

### **Assistant Professor**

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### **Research Interest:**

- Rehabilitation Robotics: Prosthetic limbs (upper and lower) and Exoskeletons (upper limb and lower limb)
- Machine Learning
- Mechanical Design and Optimization
- Mechatronics

### Member:

ERL lab, Tezpur University

https://www.tezu.ernet.in/erl/people.html

## **Education**

Sn.	Degree	Institute	Year of Completion	Thesis/Dessertation Title
1.	Ph.D. Supervisor: Professor Dilip Datta (Tezpur University)	Depart of Mechanical Engineering, Tezpur University, Assam, India	2013-2018	Facility layout Optimization Using Genetic Algorithm
2.	M.Engg Supervisor: Dr. Nitin Afzulpurkar (Asian Institute of Technology)	Asian Institute of Technology, Thailand	2010-2012	A Microparticle Separation Device for Separation of Cancer Cells from Blood.
3.	B.Tech Supervisor: Dr. Manash Hazarika (Assam Engineering College)	Assam Engineering College, ASTU, Assam, India	2006-2010	Experimental study of Theory of Machines laboratory



### Work experience

Sn.	Positions held	Name of the Institute	From	То	Pay scale
1.	Assistant Professor(Adhoc)	Tezpur University	16.01.2013	25.08.2014	Rs. 25,000/- fixed
2.	Assistant Professor(Stage-1)	Tezpur University	26.08.2014	25.08.2019	Rs. 15,600-Rs. 39,100/-, Grade pay- Rs. 6000/-
3.	Assistant Professor(Stage-2)	Tezpur University	26.08.2019	Till date	Rs. 15,600-Rs. 39,100/- Grade pay- Rs. 7000/-

## Professional Recognition/ Award/ Prize/ Certificate, Fellowship

S.No	Name of Award	Awarding Agency	Year
1.	Fellowship for doing	Asian Institute of	2010-2012
	Master's degree in Asian Institute Of Technology, Thailand	Technology, Thailand	

## Research and Publications Research Interests:

My research interest is in Rehabilitation Robotics focusing mainly on the development of Biosignals controlled Prosthetic limbs (upper and lower) and Exoskeletons (upper and lower limbs) for the disabled (due to injury, illness, old age) for regaining their motor and sensory control of their limbs. This will involve the knowledge of:

- Kinematics of machines, mechanical design, and optimization for the mechanical design of the Prosthetic Limb or the Exoskeleton.
- Biomedical Signal Processing and Machine Learning for biomimetic control of the Prosthetic Limb and the Exoskeleton.

## Patents:

Dilip Datta, Arpeeta Saikia, **Zahnupriya Kalita**, Sudipta Saikia. A saddle system for female bicycles adapted to counter forward slip of rider on saddle surface during sudden braking. Granted with Patent No.: 478941.

#### **Design Registration:**

Tezpur University, IHFC-IIT Delhi, Amlan Jyoti Kalita, Maibam Pooya Chanu, Prayash Boruah, **Zahnupriya Kalita**, Nayan M. Kakoty, Satyajit Borah. Name of Design: EMG CONTROLLED PROSTHETIC HAND (ENRICH), Class: 24-03, Application no. 363884-001, Journal No. 20/2023, May 19, 2023.

#### **Journal Publications**

- Rwittik Barkotoky, Zahnupriya Kalita, Sushen Kirtania. Anthropomorphic Design and Control of a Polycentric Knee Exoskeleton for Improved Lower Limb Assistance. Intelligent Service Robotics, 2024, <u>https://doi.org/10.1007/s11370-024-00512-x</u>.
- Zahnupriya Kalita and Dilip Datta. A constrained multi-objective multifloor facility layout problem. Accepted for publication in International Journal on Interactive Design and Manufacturing on 02-01-2024.
- Zahnupriya Kalita, Sabyasachi Kashyap, Raktim Borah, Mukul Chandra Swargiary and Khandib Pao. Design and Analysis of a Five Fingered Robotic Hand. Nanoworld Journal, Volume 9(S1): S476-S480, 2023.
- Zahnupriya Kalita and Dilip Datta. Solving the bi-objective corridor allocation problem using a permutation-based genetic algorithm. Computers & Operations Research, Volume: 52(Part-A), 2014, Pages 123-134, Elsevier.
- Zahnupriya Kalita and Dilip Datta. A constrained single-row facility layout problem. International Journal of Advanced Manufacturing Technology, Volume: 98, Issue No. 8, 2018, Pages 2173-2184, Springer.
- Zahnupriya Kalita, Dilip Datta, and Gintaras Palubeckis. Bi-objective corridor allocation problem using a permutation-based genetic algorithm hybridized with a local search technique. Soft Computing, Volume: 23, Issue No: 3, 2019, Pages 961 986, Springer.

#### **Books Chapters**

- Zahnupriya Kalita, Dilip Datta and Sudipta Saikia. Stability of bicycle at low speed. In: Modeling, Simulation and Optimization, 2021, Pages 165-175, ISBN: 978-981-15-9828-9, Springer.
- Dilip Datta, Arpeeta Saikia and Zahnupriya Kalita. Stability of female bicyclists on sudden braking. In: Modeling, Simulation and Optimization, 2021, Pages 153-163, ISBN: 978-981-15-9828-9.
- Zahnupriya Kalita and Dilip Datta. Corridor allocation as a constrained optimization problem using a permutation-based multi-objective genetic algorithm. In: Nature- Inspired Methods for Metaheuristics Optimization. Part of the Modeling and Optimization in Science and Technologies book series, Volume: 16, 2020, Pages 335- 358, ISBN: 978-3-030-26457-4, Springer.
- Zahnupriya Kalita and Dilip Datta. The constrained single-row facility layout problem with repairing mechanisms. In: Nature-Inspired Methods for Metaheuristics Optimization. Part of the Modeling and Optimization in Science and Technologies book series, Volume: 16, 2020, Pages 359-383, ISBN: 9783-030-26457-4, Springer.

#### **Conference:**

- Nayan M. Kakoty, Zahnupriya Kalita, Abhijit Boruah, Rajeevlochana G Chittawadigi, Subir K Saha. Development of A Technology Education Programme based on Self-Driven, Self-Learning and Self-Evaluating Approach. Advances in Robotics-5th International Conference of The Robotics Society, Pages 1-5, 2021
- Zahnupriya Kalita and D. Datta. Multi-objective optimization of the multifloor facility layout problem. IEEE International Conference on Advances in Mechanical, Industrial, Automation and Management Systems (AMIAMS-2017), MNNIT Allahabad, India.

- U. Arunav, B. Deka, M. Das and Z. Kalita (2017). Design of an alternate pedaling mechanism, in proceedings of the national conference on sustainable mechanical engineering: today and beyond held in Tezpur University, during 25-26th March, 2017.
- Z.Kalita (2014). A Microparticle separation device using inertia combined dielectrophoresis technique for the separation of tumour cells from blood, in the proceedings of International Symposium on Aspects of Mechanical Engineering & Technology for Industry held in NERIST, Arunachal Pradesh, during 6-8th December, 2014.

## **Projects:**

S. No.	Title	Cost in	Start Date	End Date	Role as	Agency
		Lakh			PI/Co-PI	
1.	Development of	Rs. 90.77	2021	2024	Co-PI	I-Hub
	A Cost-Effective					Foundation
	EMG Controlled					for
	Prosthetic Hand					COBOTICS,
	for Multiple					Technology
	Patterns					Innovation
						Hub of IIT
						Delhi

# **BTECH PROJECTS SUPERVISED/SUPERVISING:**

- Control System Design of a 4-Degree of Freedom Lower Limb Exoskeleton Using Computed Torque Controller
- Development of an automatic floor cleaning system.
- Design, Fabrication and Analysis of Regenerative Braking System.
- Scheduling and cost optimization of flexible manufacturing systems in a combination layout
- manufacturing plant.
- Design and fabrication of a robotic arm mounted on an Automated Guided Vehicle.
- Design and Fabrication of an Alternate Pedaling Mechanism.
- Design and Fabrication of an Automated Conveyor Belt System.
- Design and Fabrication of an Automated Seed Sowing Machine.

### MTECH PROJECTS SUPERVISED/SUPERVISING:

- A hand exoskeleton for rehabilitation of stroke patients.
- Design and Control of a 10 Degrees of Freedom Lower Extremity Exoskeleton with a Polycentric Knee Joint for rehabilitation (EXXON).
- Design and Analysis of a flywheel for Effective Kinetic Energy Storage.

- Design and Development of a Mechanism for enhancing Stability of Bicycle by Steering back
- Handlebar Automatically.
- Design and Development of a Mechanism for enhancing Stability of Female Bicyclists on
- Sudden Braking.

## **SEMINARS/WORKSHOPS ATTENDED:**

• 1 month Faculty Induction Program held at Teaching Learning Center, Tezpur University from

26th November to 26th December, 2018

• 2 week Faculty Development Programme on "Foundation program in ICT for Education"

organized by IIT Bombay from 8th March - 12 April, 2018.

• 1 day seminar on "Aeronautical Systems" organized by ARP, AR&DB, DRDO, HQ, New

Delhi, held at School of Engineering, Tezpur University on 8th October 2018.

• 1 week SERB school on "Noise and Vibration Control" conducted by Mechanical Engineering

Department, IIT Guwahati from 4th-8th December, 2017.

- 2 week ISTE workshop on "Environmental Studies" held (under National Mission on Education through ICT) conducted by Indian Institute of Technology Bombay from 2-12 June,
- 2015.2 week Faculty Development Programme on "Current Approaches in Teaching and

Research in Science and Technology" organized by the School of Engineering, Tezpur University from 15-

27 December, 2014.

 1 week Short term course on "Introduction to Numerical, Computational and Experimental Mechanics" organized by Mechanical Engineering Department, Assam Engineering College,

Guwahati, 9-13 December, 2014.

• 2 week ISTE workshop on "Fluid Mechanics" held (under National Mission on Education through ICT) conducted by Indian Institute of Technology Kharagpur, 20-30 May, 2014.