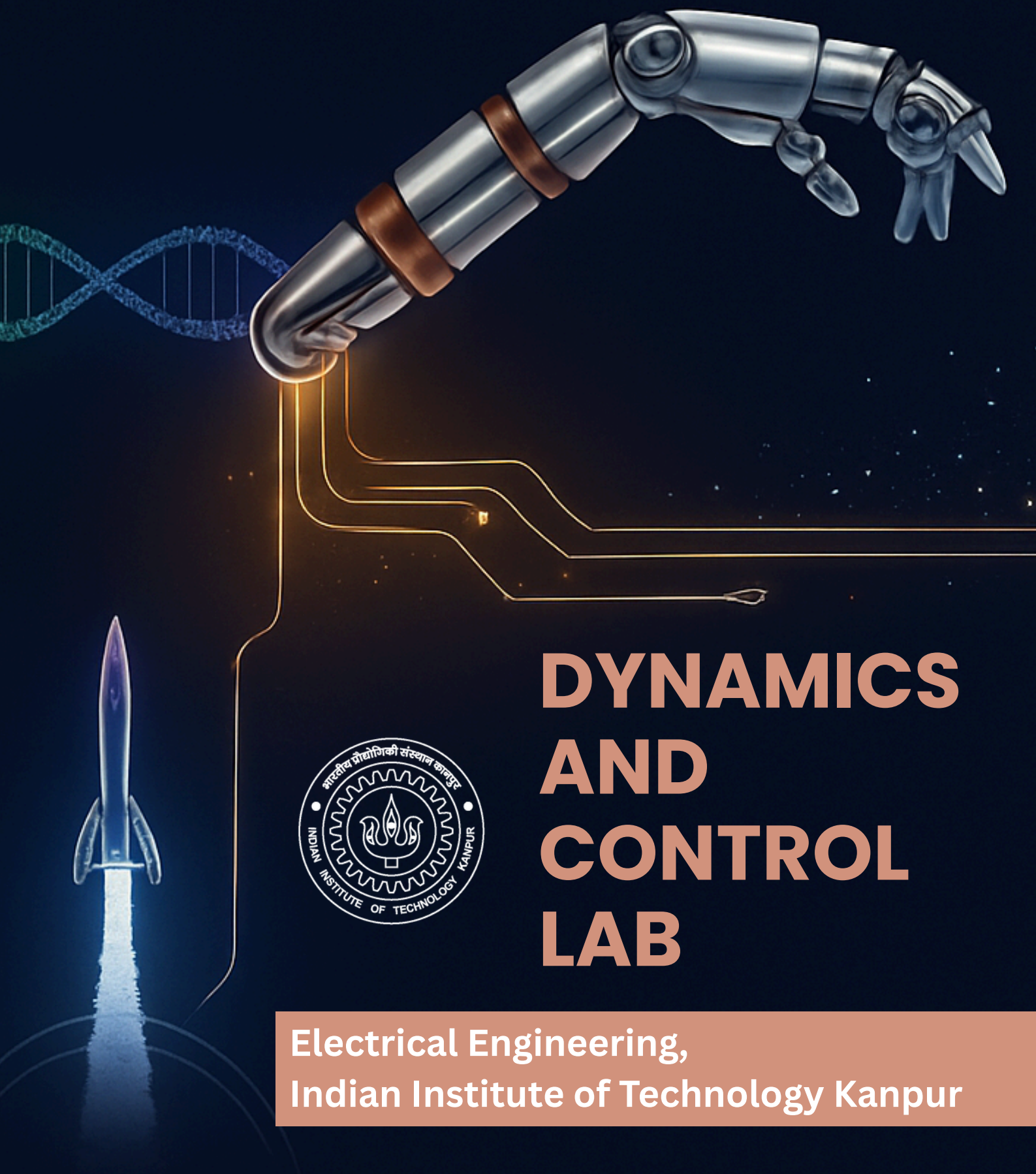


**A RESEARCH
GROUP**



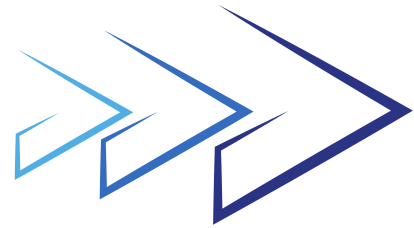
DYNAMICS AND CONTROL LAB

**Electrical Engineering,
Indian Institute of Technology Kanpur**

MEMORIES



IIT Kanpur – a legacy



- An Experiment in Collaboration – Born from the Kanpur Indo-American Program, IITK became a unique East–West academic experiment that transplanted the American research university model into India.
- Pedagogy Revolution – Unlike earlier IITs, IITK emphasized laboratories, experimentation, and problem-solving over rote learning, pioneering a new style of technical education in India.
- Cradle of Computer Science – With the early IBM 1620 and later systems, IITK introduced computer science as a discipline in India, decades ahead of the national curve.
- Cultural Identity – The campus fostered a distinctive "hall culture," blending academic intensity with camaraderie, creativity, and a sense of freedom that shaped generations of alumni.
- Alumni as Global Connectors – The first waves of IITK graduates carried its ethos abroad, linking India to Silicon Valley, global academia, and industry, fueling the IT revolution.
- Symbol of Modern India – The institute's story reflects India's post-independence ambition: leapfrogging into the modern scientific world by marrying global expertise with local aspirations



Who we are?

We are a curious bunch of researchers brought together by one big question:

"How can we use control theory to make complex systems work better — for people, for technology advancement, and for the planet?"



Our lab is a blend of whiteboards filled with equations, robots learning to care, circuits sensing life, and even tiny bacteria being reprogrammed to help astronauts in space. From gene networks in cells to power flows in smart grids — we build models, design controllers, and run experiments to understand and improve the systems around us. We're not just solving equations — we're solving real problems. At heart, we're driven by the belief that good engineering can make life better — and we work every day to make that true.

We aim for stability, robustness, and adaptability, not just in our systems but in how we approach science.

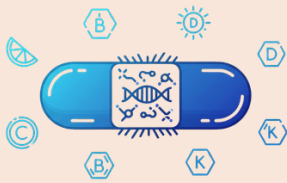
Our Mission

We are a multidisciplinary research group driven by the goal of developing control engineering frameworks for real-world systems — blending theory and practice to serve technology and society.

Research Verticals

At present, we are broadly focusing on following domains

Development of Space Probiotics
using Synthetic Biology



Models, Dynamics, and Control of
Biomolecular Systems



AI-ML Based
Genetic Circuit Design



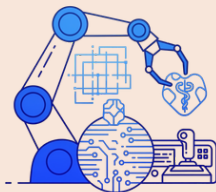
Controller Designs for
Grid Stability Improvement



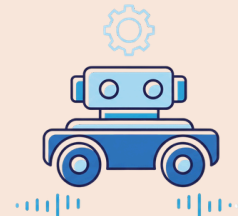
Estimation and Control of
Electrical Vehicles and Aircraft



Development and Control of
Assistive Robotic Manipulators

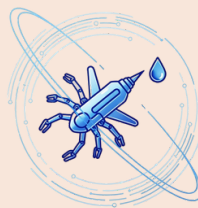


Development of
Autonomous Mobile Robots



Control Systems

Control of Microrobots for
Drug Delivery



International Research Collaborations

Imperial College
London

Caltech



RICE



NYU



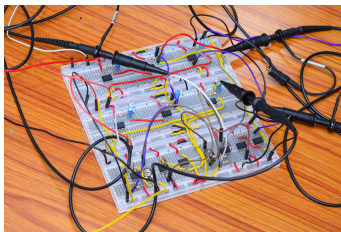
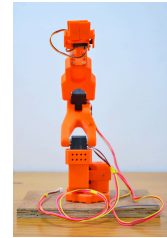
UNIVERSITY OF
DELAWARE



Recent Technology Developed



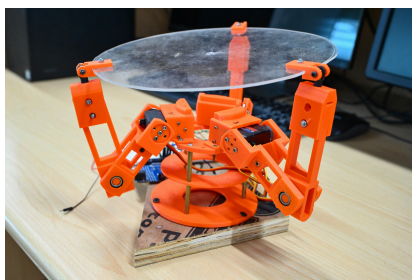
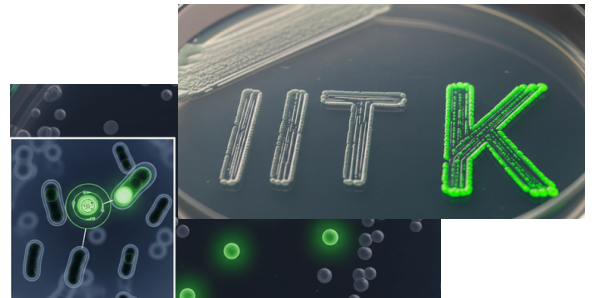
Developed multiple robotic manipulators for light load, such as feeding robots for frail personnel. This robot can also capture your health diets and recalibrate calorie requirement



Developed an inhouse autonomous electromagnetically propelled and closed-loop controlled microrobot setup for *in vitro* operation



We have developed mathematical models of genetic circuit performance under different environmental contexts and created DNA circuits that can act as sensors and controllers for the protein concentration inside a cell against perturbations



Vision-guided parallel operated planar manipulators system development and closed-loop controller design to maintain stability, with use case of ball-plate balancing system.



Ground Mobile Robot has been developed integrated with Lidar and Vision for Autonomous Operation



Closed-loop controller to design for power system to improve stability and performance

All works lead to publications in reputed journals, conferences, and/or patents

Ongoing Sponsored Projects

IndiaAlliance
DBT wellcome



शिक्षा मंत्रालय
MINISTRY OF
EDUCATION



Department of
BioTechnology,
Government
of India



Technology
Innovation Hub
of IIT Delhi



अनुसंधान नेशनल रिसर्च फाउंडेशन
Anusandhan National Research Foundation

These organisations have generously funded our research work

- **Development of Space Probiotics for Vitamin D Production using Synthetic Biology**, Sponsoring Agency: ISRO, Sept 2025 - Sept 2027, PI
- **Grid Readiness for EV: Enablers and Technological developments (GREET)**, Sponsoring Agency: ANRF, June 2025-June 2028, Co-PI
- **Development and Characterization of Regulatory Biomolecular Circuits in Synthetic Biology**, Sponsoring Agency: DBT, Sept 2024-Sept 2027, PI
- **Design of Synthetic Genetic Circuits: Robustness towards Change in the Growth Rate**, Sponsoring Agency: MoE, May 2024-May 2027, PI
- **Design and Development of a Tether System for Drone Application**, Sponsoring Agency: DRDO, May 2024-Nov 2025, co-PI
- **Design and Development of Ground Robots for Autonomous Navigation Systems**, Sponsoring Agency: TIH Foundation IITB, Dec 2023- July 2025, co-PI
- **Mitigating Resource Burden Of Heterologous Biomolecular Circuits In Escherichia Coli**, Sponsoring Agency: DBT/Wellcome Trust India Alliance, Jan 2024- Dec 2029, PI
- **AI Based Pose Estimation And Tracking Of Uncooperative Airborne Vehicle**, Sponsoring Agency: ARDB DRDO, Nov 2023- Nov 2025, co-PI
- **Nanorobotic Drug Delivery System & Lab-On-Chip Platform Development**, Sponsoring Agency: IHFC Delhi, March 2023- March 2026, PI



Meet the Researchers



Prof. Abhilash Patel
PRINCIPAL INVESTIGATOR



Dr. Arun Thapa
Postdoctoral Research Associate



Dr. Aditi Srivastava
Institute PostDoctoral Fellow



Dr. Sanjeev Pandey
Project PostDoctoral Fellow



Saikat Majumdar
PhD Student



Shikha Singh Chauhan
PhD Student



Akshay Jaiswal
PhD Student



Neeta Yadav
PMRF - PhD Student



Utkarsh Singh Solanki
PhD Student



Lisa Naik
PhD Student



Prakhhar Bajpai
PhD Student



Insha Rahman
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Arvind Trivedi
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Neelam Verma
PhD Student



Prashant Patel
MTech Student



Rachit Agarwal
UGP (BTech) Student



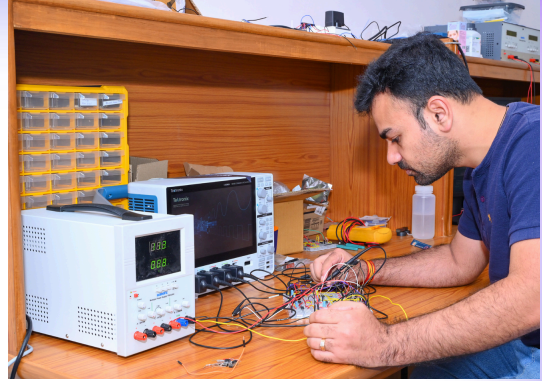
Esha Singh
Project Associate



May be you?
Researcher



Glimpse into THE lab



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