



Centre for Career Development
Indian Institute of Technology Guwahati

Brochure
Class of 2024

- M Tech in Biomedical Science and Engineering
- Medical Devices and Diagnostics
 - Regenerative Medicine, Stem cell & Therapeutics



Jyoti and Bhupat Mehta
School of Health Sciences and Technology

Indian Institute of Technology Guwahati



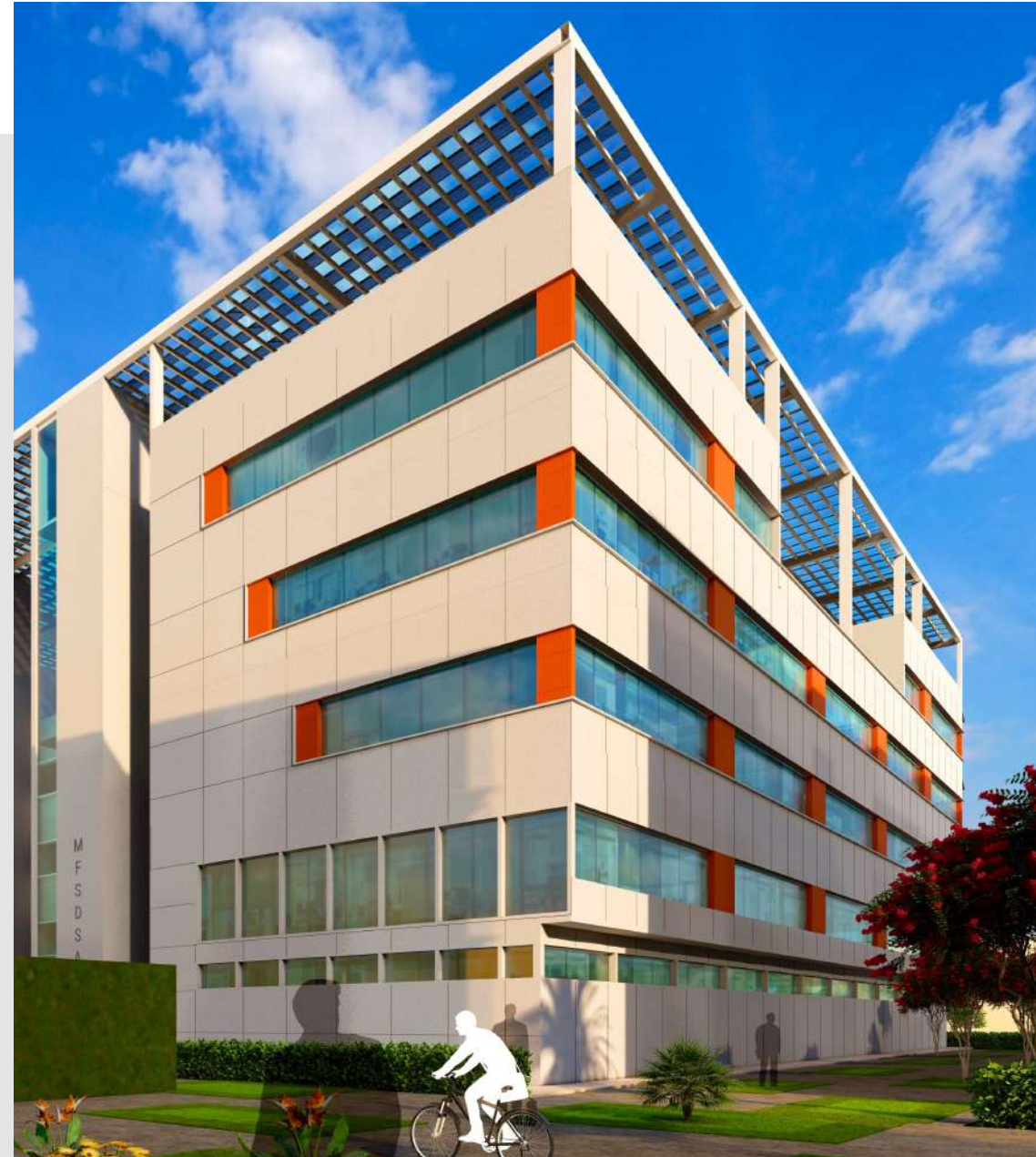
About the Institute

Established in 1994 as an 'Institute of National Importance,' IIT Guwahati is a coveted destination for students driven by a passion for learning and innovation. Recognised among the Top 100 Young Universities worldwide by Times Higher Education, it proudly stands as one of only two institutions from BRICS nations to achieve this distinction. The rapid rise of the Institute to prominence can be attributed to its unwavering commitment to adaptability and excellence. Its programs and courses continually evolve to meet global demands, fostering a diverse academic environment that has transformed it into a national epicentre for research, development, and technical education. Faculty members at IIT Guwahati are dedicated to providing students with a solid conceptual foundation in their respective fields, preparing them to confidently tackle the challenges of the professional world. Furthermore, the institute offers a wealth of opportunities for holistic development, with world-class sports facilities and a rich assortment of extracurricular activities.

In the realm of higher education, IIT Guwahati is an inspiring symbol of academic excellence, innovation, and comprehensive education. It molds the leaders and innovators of tomorrow, contributing significantly to India's educational landscape and global recognition.

Jyoti and Bhupat Mehta School of Health Sciences & Technology

Located within the respected confines of IIT Guwahati, the Jyoti and Bhupat Mehta School of Health Sciences and Technology - JBMSHST serves as an exemplar of cutting-edge innovation and education in the field of biomedical science and engineering. Its imminent unveiling of a state-of-the-art academic and research facility promises to redefine the boundaries of healthcare technology. At its core, this institution champions experiential learning, offering a comprehensive curriculum, which delves into diverse disciplines encompassing engineering streams, chemical-physical-biological sciences, health data analytics, machine learning, software development, and the intricacies of design principles. In its advanced laboratories, students are meticulously prepared to transcend conventional boundaries. Through immersive hands-on experiences, they are rigorously trained for careers extending far beyond traditional silos. This nurturing environment attracts the brightest minds from the realms of science, engineering, medicine, design, regulatory aspects, entrepreneurship, and policymaking. Together, they foster a culture of relentless innovation, pioneering transformative solutions that not only reduce external dependencies but also cultivate self-reliance. In a way, JBMSHST stands as a testament to the pursuit of leadership, innovation, and progress. Its impact extends not only across India but resonates globally, emerging as a crucible for groundbreaking advancements in healthcare technology.



Message from Head

The Jyoti and Bhupat Mehta School of Health Sciences and Technology (<https://www.iitg.ac.in/shst/>) at IIT Guwahati aims to train biomedical engineers to take leadership responsibilities in the health sector. The school has been handsomely supported by Mehta Family Foundation (<https://mehtafamilyfoundation.org/>) for its upcoming state-of-art academic and research building. The foundation also supports an Indo-US knowledge collaboration program through which the school's UG and PG students collaborate with the world's top colleges, faculties, and laboratories during their academic and research training.

The learning methodologies of the school have been designed to gain understanding on the diverse areas of of engineering, biological-chemical science, data analytics, and design principles through hands-on experiences. Thus, the students and scholars graduating from the school are strong in the fundamental areas of PCBM and well-equipped with the basics of electronic-mechanical-bio instrumentations, circuits, devices, bioprocesses, and design principles through hands-on experiences in the laboratories. In the near future, scientists and engineers from all streams, doctors, designers, regulators, entrepreneurs, and policymakers will invent and innovate under this umbrella to inculcate cutting-edge research from this school. The focus here is to build up on the gen-next inventions and innovations that reduce import dependency and make the country self-reliant.

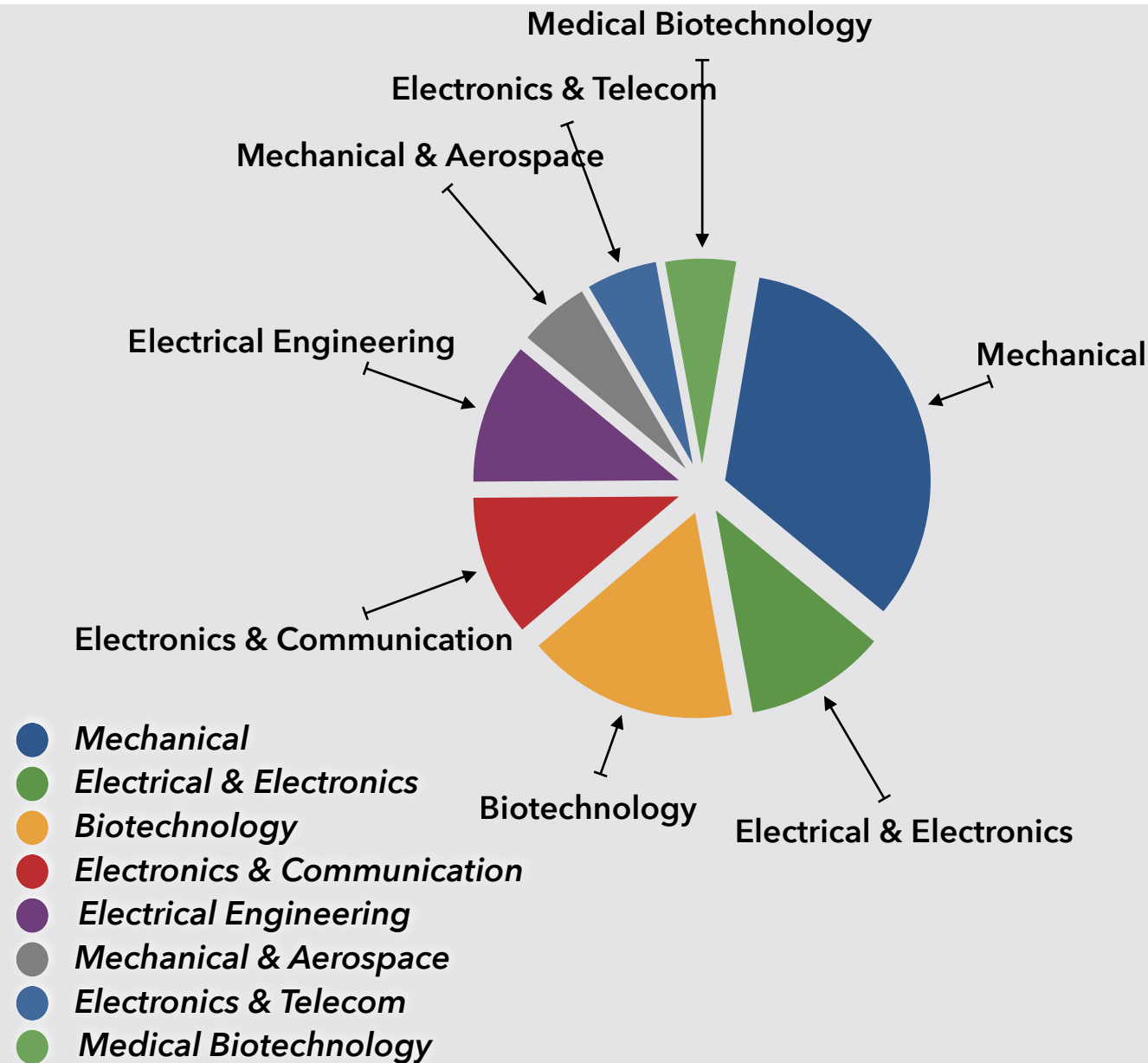


Batch Demographics

Integrating knowledge and approaches from multiple disciplines to address complex problems like:

- Health data analytics and Consultancy
- Neuronal modelling and simulation
- Bioinformatics
- Medical devices

Where different fields converge, innovation emerges

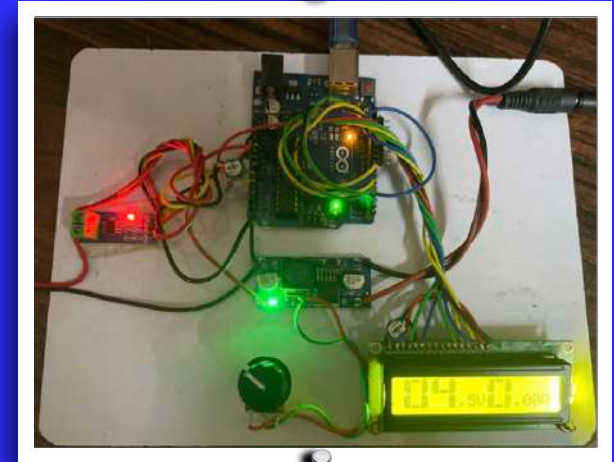


Research and Projects

"Design and Development of an Electronic Chamber for Cell Culture"

- Revolutionize bioprocessing with an electronic cell culture device, incorporating advanced sensors and automation for improved efficiency.
- Design chamber parts in AutoCAD and utilize 3D printing with Ultimate Cura for precision fabrication, contributing to innovative solutions.

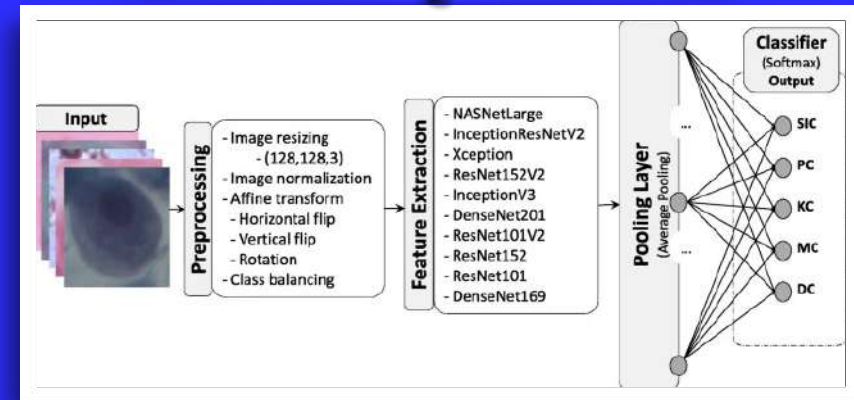
By Bhaskar Taye



"Single cell image analysis"

- This project aims to classification of cervical cells in Pap smear images using Support Vector Machine.
- Extracting 26 features per region, it distinguishes cell types like superficial-intermediate, parabasal, koilocytes, and metaplastic based on intensity, texture, and shape.

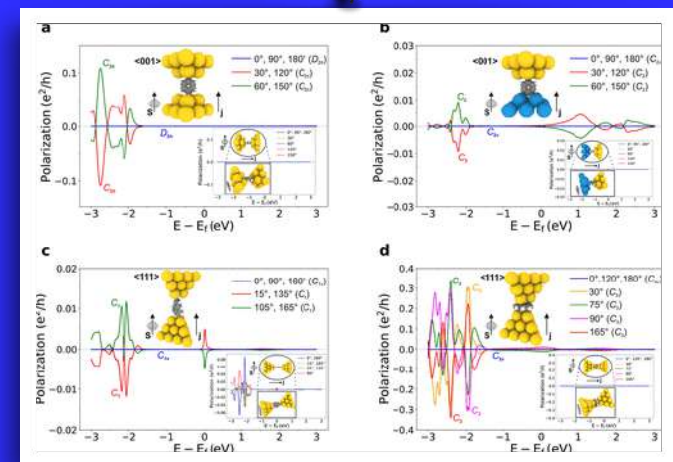
By Deepak Mandloi



"Study On CISS Effect For The Development Of Chirality-Sensitive Spin-Based Technology In Healthcare Applications"

- Investigate and understand the mechanisms and characteristics of the Chiral-Induced Spin Selectivity (CISS) effect in relevant materials.
- Identify and address existing limitations in spintronics and chirality-sensitive technologies to contribute to the development of technologies with potential implications for medical diagnostics..

By Neeraj Bharti



Research and Projects

"A Multiplexed Microfluidic Point-of-care Technology for DILDs Diagnosis"

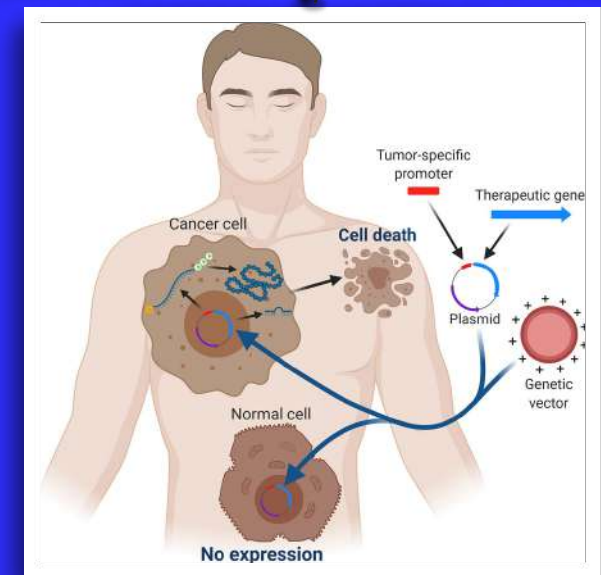
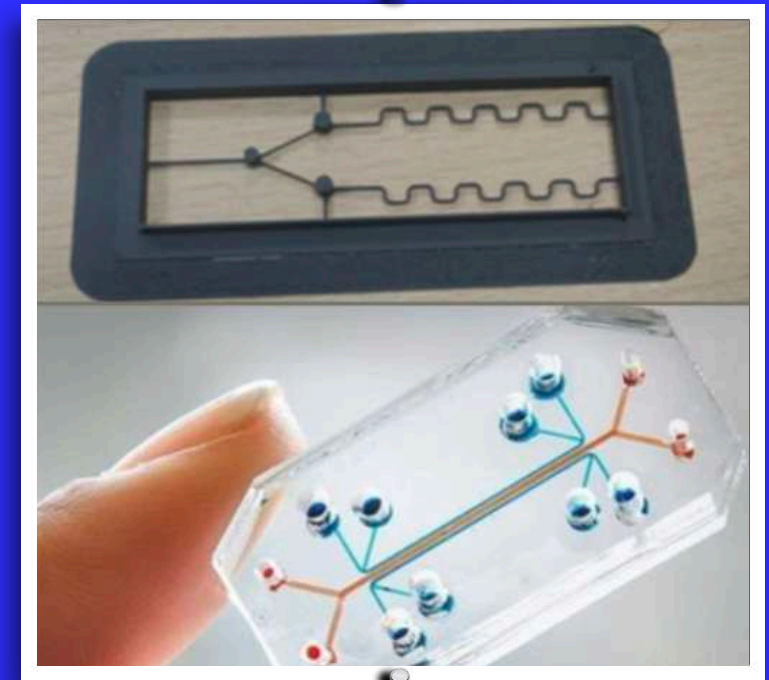
- The secondary objective is to design and optimize a multiplexed microfluidic platform capable of simultaneous quantification of liver enzymes AST, ALT & ALP.
- The aim is to create a robust, integrated system that offers high sensitivity and specificity which detects the early diagnosis of liver diseases by using POC.
- The primary objective is to validate the performance and feasibility of the enzyme-kinetic reactions using clinical serum samples.

By Neeraj Jaswal

"Understanding genomic architecture of a novel gene FAM168A and its involvement in neuronal cancer"

- Gain a molecular function of FAM168A in physiology, cancers and neurodegenerative disease by performing in depth bioinformatics analysis
- Explore the involvement of FAM168A in different pathway and understand its biological function
- Characterise its expression by employing qPCR, western blotting .

By Nilakshi Thaukria

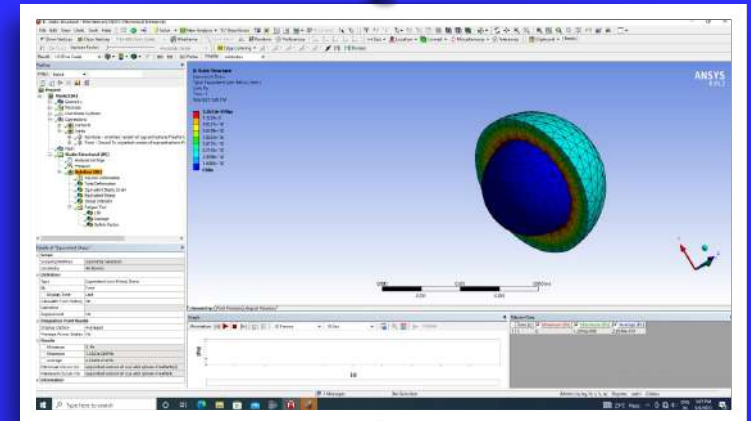


Research and Projects

"Static Structural Simulation of Acetabular Cup in Snsys"

- Deveopment of acetabular cup liner by autoclave moulding
- By using Ansys simulation, Computer aided design and manufacturing,.

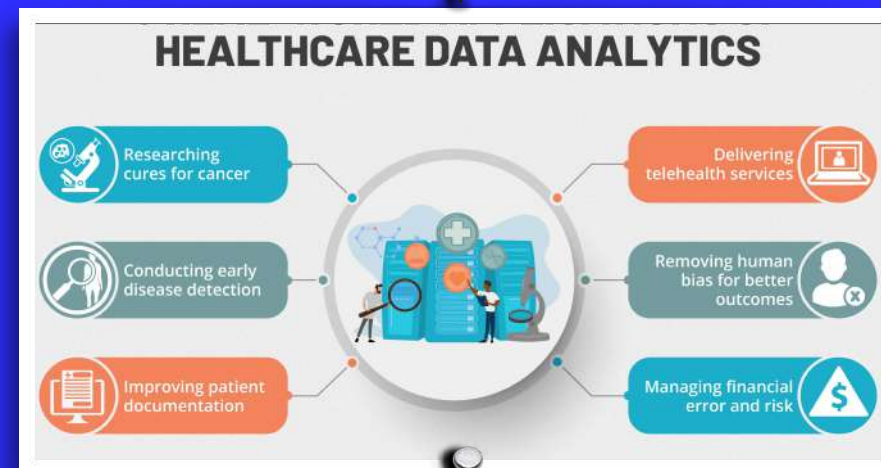
By Nithin S



"Developing An Analytical And Visualisation Tool For Public Health Data"

- Synthesising census health database for Assam using Generative model.
- Created a User Friendly Platform for Exploratory data analysis and deriving data insides, bringing clarity to intricate patterns and complex information.
- Employed advanced data analysis and hypothesis testing techniques to substantiate any derived insights or conclusions.

By Shobhit Kumar Singh



"Fabrication of Graphene Oxide Field Effect Transistors for Gas/Biomarker Detection"

- Synthesis and characterization of reduced graphene oxide and functionalized graphene oxide.
- Fabrication and characterization of rGO based FET
- Application of rGO FET as a biosensor

By Shweta Tiwari



Research and Projects

“Macromolecular Interactions and Disease Mechanisms through Structural Bioinformatics”

- Retrieving macromolecular structural information using bioinformatics databases like PDB and visualising by using PyMOL.
- Multiple sequence alignment and alignment is performed by the ClustalW tool.
- Molecular Docking performed by Autodock Vina, HDock, and then move to the dynamic simulation using Desmond and VMD.

By Suchismita Dhar

“Exploration and Evolution of Respiratory Rate Algorithm using PPG Signal”

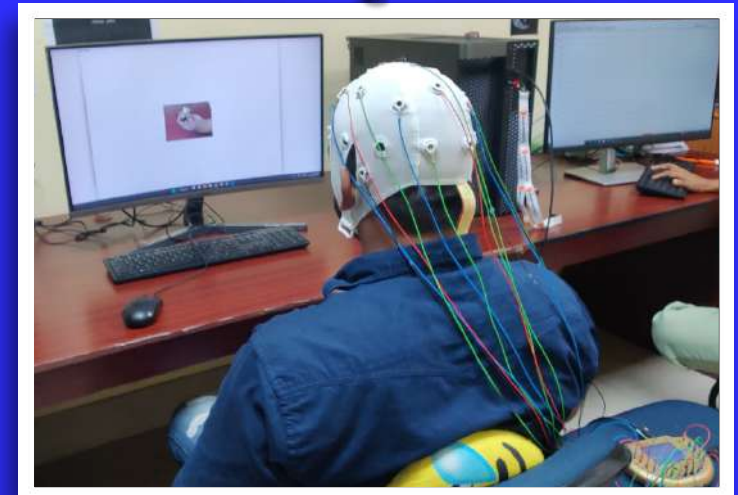
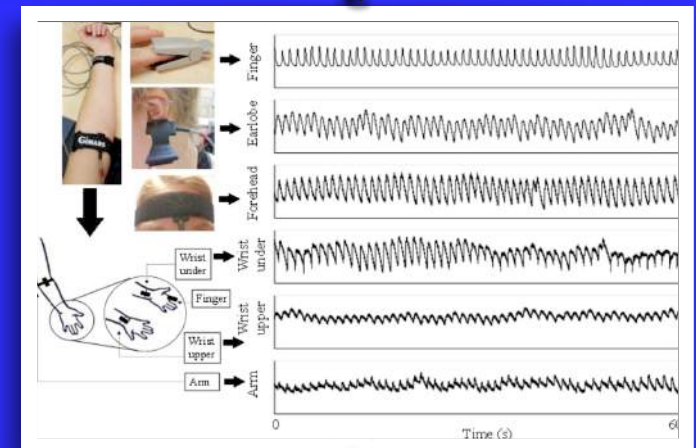
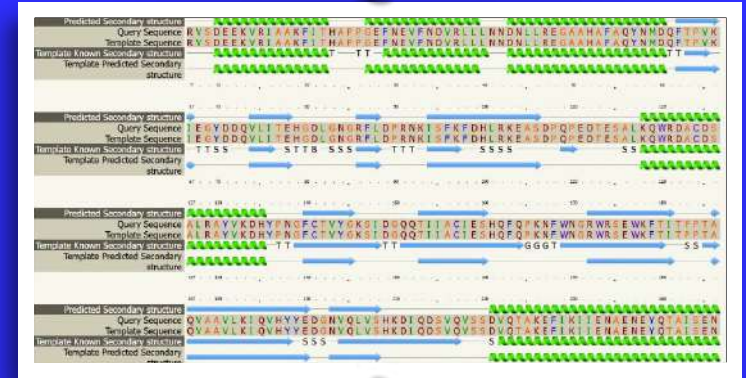
- Analysing PPG sensor data using various signal processing algorithms to get Respiratory rate, HR, and SpO2.
- Using Machine learning and Deep learning algorithms for determining RR.
- Comparing accuracy and computational power of algorithms.

By Tarun Hawdia

“Neural Mechanisms of Motor Imagery through EEG”

- Analysing EEG data to investigate changes in neural activity during motor imagery.
- Using statistical tests to identify significant differences between conditions.
- Studying the applications of FES and VR in enhancing motor imagery and understanding the underlying neural mechanisms.

By Zainab Sariya



Research and Projects

“Heart Valve Design and Fabrication for Optimal Flow and Functionality using CFD and 3d Bioengineering Techniques.”

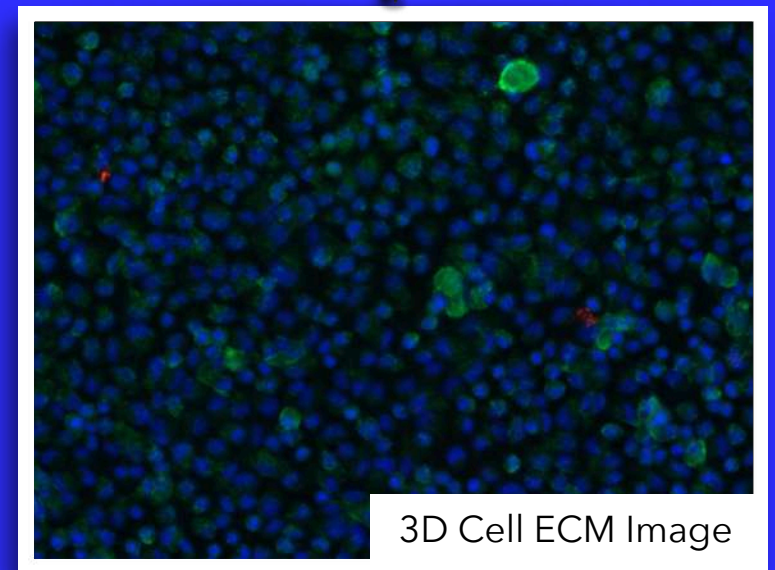
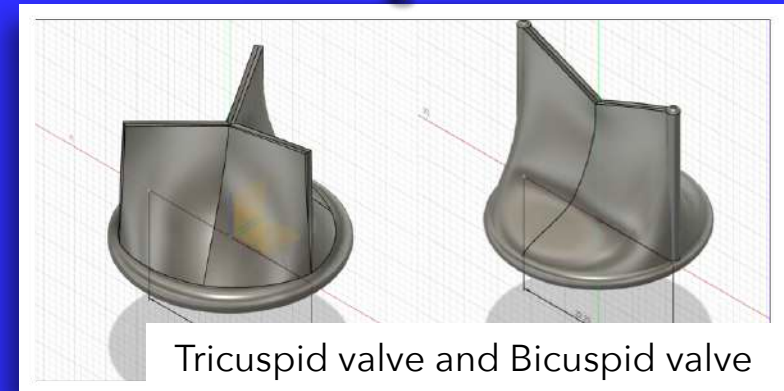
- Designed Aortic Heart Valve using AutoCAD and COMSOL, considering its complex geometry and functionality.
- Innovatively synergized Biomaterial, Synthetic Material and applied them in the Electrospinning Technique.
- Testing Heart Valve medical device, simulating human body conditions, by developing Electro-Mechanical device.

By Inampudi Vamsinath

“Microrheology of 3D cell ECM to study the temporal changes in viscoelastic properties.”

- Organ-On-A-Chip, virus production, bioprinting, Microfluidics.
- Working with viscosity and viscous elastic transformation of extra cellular matrix due to cell growth..

By Shubham Agrawal



Research and Projects

“Fabrication of Physiotherapy Device for hand Rehabilitation to Enhance stroke Recovery using Pneumatic Actuator.”

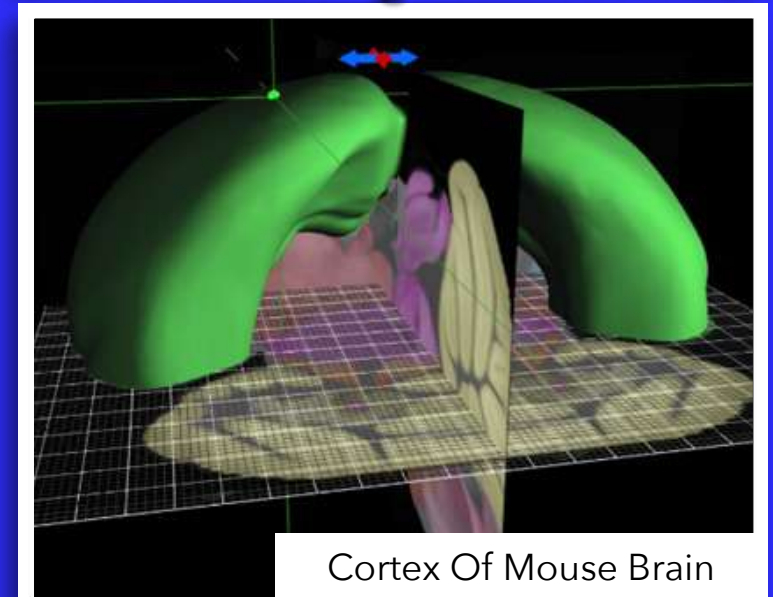
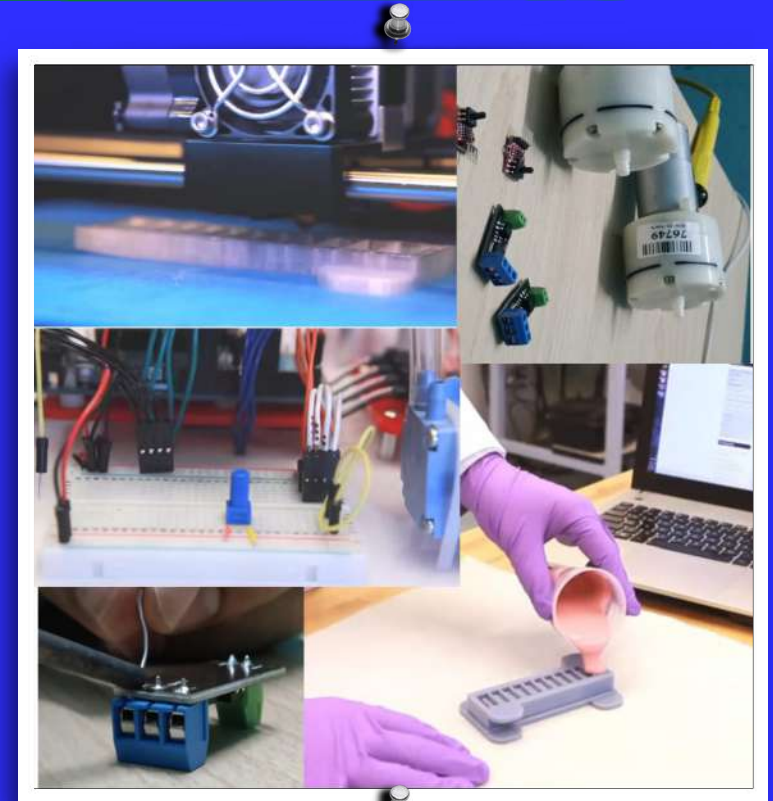
- Fabricated physiotherapy device for hand rehab, integrating pneumatic actuator to enhance stroke recovery.
- Implemented advanced pneumatic technology, ensuring tailored rehabilitation for improved recovery outcomes..

By Vishal Tande

“Development of Device for Non-Invasive Treatment of Alzheimer’s Disease (AD) using Electric Field (EF)”

- Designed and simulated(in COMSOL) electrode array architecture for rat brains to test in-vivo effectiveness of EF.
- Fabrication of electrode array on a flexible printed circuit board (PCB).
- Integration and packaging of excitation circuit, electrode array and power supply intended to be used on mouse models having induced Alzheimer’s disease.

By Pooja Godara



Cortex Of Mouse Brain



The learning methodologies adopted by the school have been carefully crafted to enable students to gain a holistic understanding of multiple fields, encompassing engineering, biological-chemical science, data analytics, and design principles, through engaging and immersive hands-on experiences.

Course Structure

Data Analytics:

- Introduction to Health Data Analytics
- Basics of Mathematical Modelling, Simulations, and Software
- Advanced Mathematical Modelling, Simulations, and Software

Engineering:

- Advanced Imaging and Biofabrication
- Introduction to Biomedical Electronics and Instrumentation
- Regulatory Affairs of Biomedical Devices
- Nano-Biomedicine & Drug Delivery
- Biomechanics
- Medical Diagnostic Devices, BioMEMS, Biosensors
- Cellular Systems Engineering
- Clinical Perspectives of Medical Device

Biological-chemical Science:

- Introduction to Cellular Processes
- Basic Physiology for Clinical Immersion
- Advanced Cell Biology
- Advanced Immunology
- Disease Models & Cell Therapeutics
- Advanced Biomaterials

Hands on experience:

- Product Design and Prototyping
- Biotechniques and Bioinstrumentation Laboratory
- Laboratory Diagnostics & Devices Laboratory
- Research Methodology, Ethics, IPR, Entrepreneurship and Biosafety

Course Structure

Semester I

Course	Course Name	L	T	P	C
HT501	Introduction to Cellular Processes	3	0	0	6
HT502	Basic Physiology for Clinical Immersion	3	0	0	6
HT503	Introduction to Biomedical Electronics and Instrumentation	2	1	0	6
HT504	Basics of Mathematical Modelling and Simulation	2	1	0	6
HT505	Research Methodology, Ethics, IPR, Entrepreneurship and Biosafety	2	1	0	6

Total Credits = 30

Semester II

Course	Course Name	L	T	P	C
HT506	Biotechniques and Bioinstrumentation Laboratory	0	0	3	3
HT507	Diagnostics & Devices Laboratory	0	0	3	3
HT508	Product Design and Prototyping Laboratory	0	0	3	3
HT xxx	Elective from Pool I				6
HT xxx	Elective from Pool II				6
	Elective from Pool III				6

Total Credits = 27

Semester III

Course	Course Name	L	T	P	C
HT xxx	Elective	3	0	0	6
HT598	Project - I	0	0	18	18

Total Credits = 24

Semester IV

Course	Course Name	L	T	P	C
HT xxx	Elective	0	0	6	6
HT599	Project - II	0	0	18	18

Total Credits = 24

POOL I

Complete 1 of the following Electivecourses:

HT 601 Medical Diagnostic Devices, BioMEMS, and Biosensors (2-1-0-6)

HTxxx Clinical Perspectives of Medical Device (3-0-0-6)

HTxxx Introduction to Health Data Analytics (3-0-0-6)

POOL II

Complete 1 of the following Electivecourses:

HT 602 Regulatory Affairs of Biomedical Devices (3-0-0-6)

HTxxx Advanced Imaging and Biofabrication (3-0-0-6)

HTxxx Advanced Mathematical Modelling, Simulations, and Software (2-1-0-6 units)

POOL III

Complete 1 of the following Electivecourses:

HTxxx Advanced Cell Biology (3-0-0-6)

HTxxx Cellular Systems Engineering (3-0-0-6)

HTxxx Nano-Biomedicine & Drug Delivery (3-0-0-6)

HTxxx Disease Models & Cell Therapeutics (3-0-0-6)

HT 603 Advanced Immunology (3-0-0-6)

HTxxx Advanced Biomaterials (3-0-0-6 units)

HTxxx Polymer Chemistry (3-0-0-6)

HTxxx Biomechanics (3-0-0-6)

Facilities

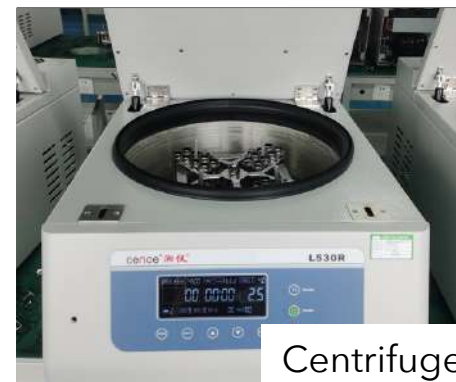
Comprehensive Overview of Hands-On Experience and Available Facilities



Microplate Reader



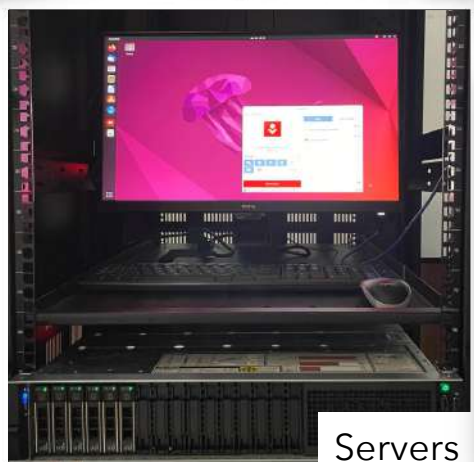
Brightfield microscope



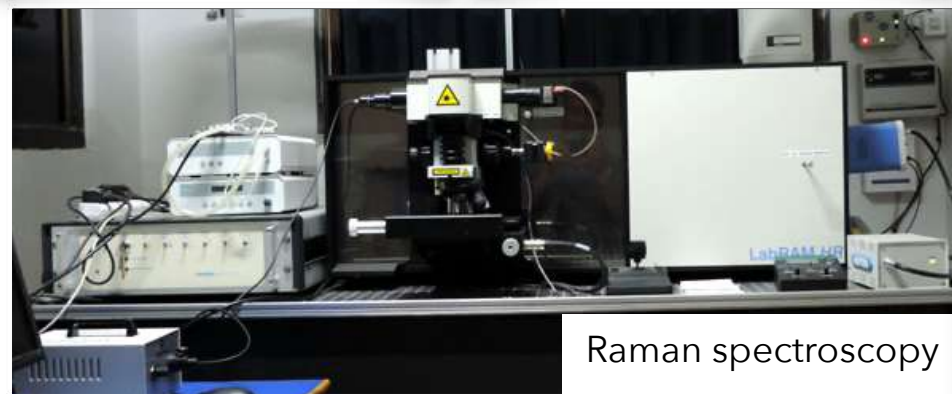
Centrifuge



QuantStudio PCR



Servers



Raman spectroscopy

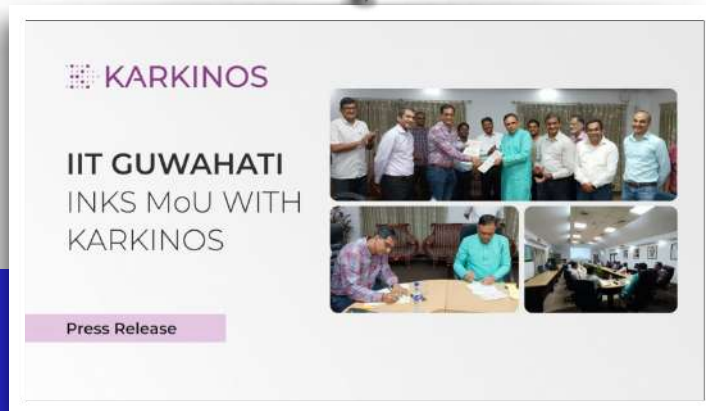


TEM

Lab & Workshop



Affiliation & Tie-ups



IIT Guwahati inks MoU with Karkinos; establishes Centre for Advanced Research on Diagnostics in Cancer



Tata Elxsi Collaborates with the Indian Institute of Technology- Guwahati (IIT-G) to foster EV Technologies



Student Profile

Health data analytics & Consultancy

Shobhit Kumar Singh



Bachelor: Mechanical Engineering
MTP: Developing a Data-Driven Public Health System using Machine Learning
Area of Interest: Biostatistics, Data analytics, Machine learning, Deep Learning, NLP, LLM, CI/CD

Tarun Hawdia



Bachelor: Electrical Engineering
MTP: Exploration and Evolution of Respiratory Rate Algorithm using PPG Signal
Area of Interest: SDE, Data analytics, System Design & Simulation, Medical Devices

Nithin S



Bachelor: Mechanical Engineering
MTP: Static Structural Simulation of Acetabular Cup in Snsys.
Area of Interest: SDE, Data Analytics, Medical Devices

Shekhar Jyoti Nath



Bachelor: Mechanical Engineering
MTP: Applications of Machine Learning in Molecular Dynamics Simulations
Area of Interest: Health Data Analytics, Biomedical Image Analysis

Bhaskar Taye



Bachelor: Electronics & Communication Engineering
MTP: Design and Implementation Electronic Bandage for accelerated wound healing in patients.
Area of Interest: Data Science, Data analytics



Supercomputer facility

Student Profile

Medical devices and diagnostics

Shubham Sanjay Agrawal



Bachelor: Mechanical Engineering

MTP: Point-of-Care Biosensors for the Detection of Biomarkers such as HbA1c or Glycated hemoglobin

Area of Interest: Microfluidic system, Cad, product engineering, lab on a chip, python, health consultancy

Inampudi Vamsinath



Bachelor: Mechanical & Aerospace

MTP: Heart valve design & fabrication for optimal flow and functionality using CFD & 3D bioengineering techniques

AOI: Data Science and analytics, CAD & simulation, Medical Devices



MRI Scanner

Shweta Tiwari



Bachelor: Biotechnology

MTP: Fabrication of Graphene Oxide Field Effect Transistors for Gas/ Biomarker Detection

Area of Interest: Health data analytics and consultancy, Medical devices and Sensors, Nanotechnology

Vishal Tande



Bachelor: Electronics & Telecommunication

MTP: Fabrication and Characterisation of FET based Electro-chemical Devices for Detection and Estimation of Cardiac Bio-markers for Point of Care applications

AOI: Consulting & Analytics, Medical devices, Biomedical Research

Neeraj Jaswal



Bachelor: Biotechnology

MTP: A Multiplexed Microfluidic Point-of-care Technology for DILDs Diagnosis

Area of Interest: Medical devices, Healthcare Analytics

Student Profile

Bioinformatics & Simulation

Suchismita Dhar



Bachelor: Medical
Biotechnology

MTP: Insights from structural
bioinformatics to understand
macromolecular interaction.

Area of Interest: Structural
Bioinformatics, Next Generation
Sequencing, clinical research, drug
discovery and development,
health data

Nilakshi Thakuria



Bachelor: Biotechnology

MTP: Cancer genomic
analysis of Fam protein

Area of Interest: Biotechnology
companies, marketing consultancy,
microbiologist

Neeraj Kumar Bharti



Bachelor: Electrical and
Electronics Engineering

MTP: Spectroscopic characterisation of
active monomers for sensor application

Area of Interest: Biomedical
Devices, Electronics, Data science

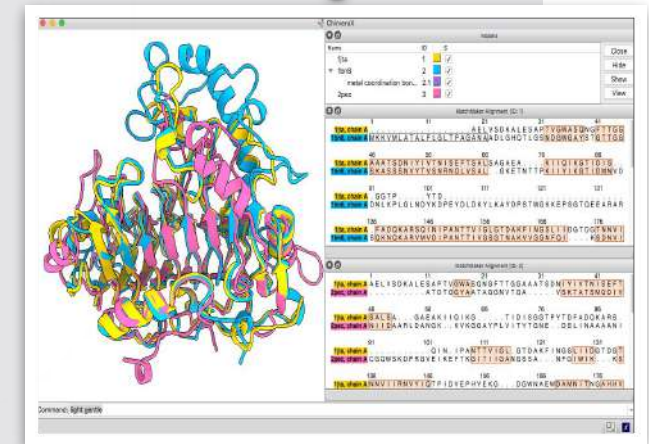
Sudip Kumar Maity



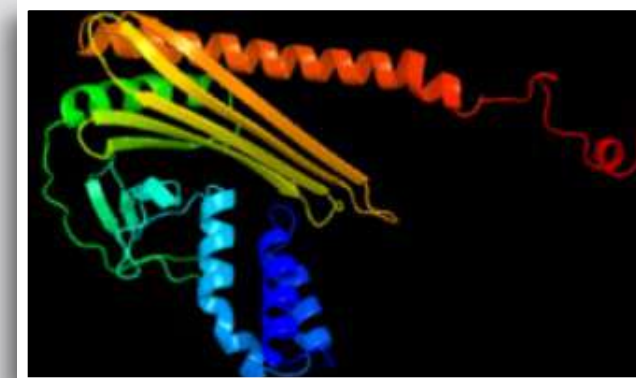
Bachelor: Electrical
Engineering

MTP: POC testing kit for detection
of E.coli bacteria in a biological
sample

Area of Interest: Bioinformatics &
Medical Devices



Sequencing



Student Profile

Neuronal Modelling and Simulation

Zainab Sariya



Bachelor: Mechanical Engineering

MTP: Investigating the Impact of FES & VR on Motor Imagery using EEG Data Recording in Human Subjects.

AOI: Management consultancy, business analytics, medical devices, biosensors

Deepak Mondloi



Bachelor: Mechanical & Aerospace

MTP: Mathematical modelling of neurodegenerative diseases

Area of Interest: SDE, Data Analytics

Aniket Kumar



Bachelor: Electronics & Telecommunication

MTP: Mathematical modelling of neuronal development

Area of Interest : SDE, Data Analytics, App development

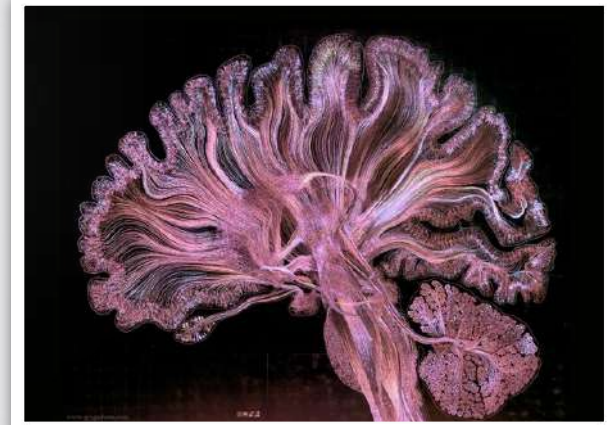
Pooja



Bachelor: Electrical & Electronics Engineering

MTP: Development of device for non-invasive treatment of Alzheimer's disease using electric field.

Area of Interest: Neurotechnology, Electronics, Consultancy

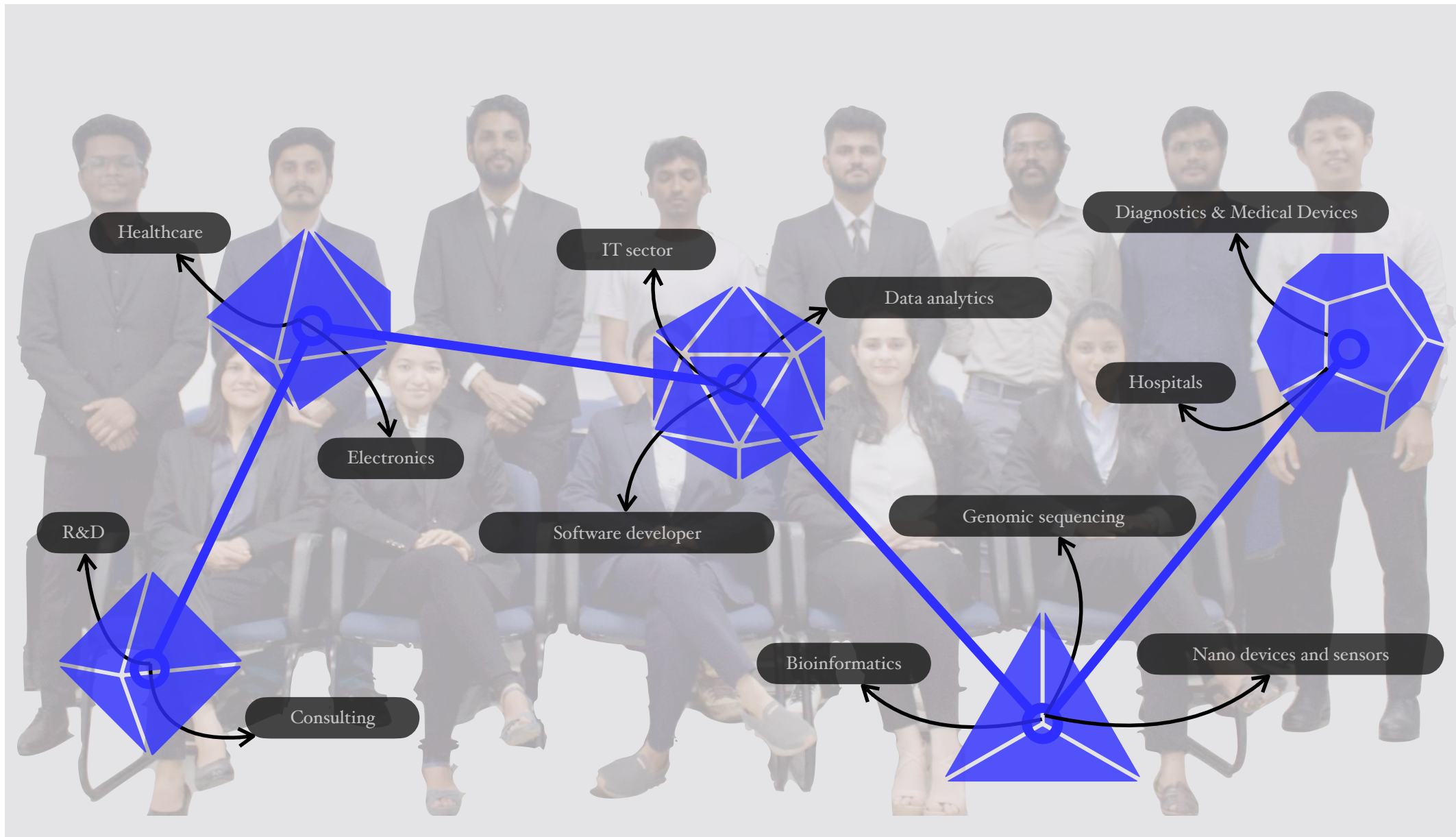


Neuronal Model



Motor Imagery

Where we fit in?



Contact Us



**Prof. Dipankar
Bandyopadhyay**
Professor & Head,
JBMSHST



Zainab Sariya
Placement coordinator



Shobhit Kumar Singh
Departmental placement
coordinator



Looking forward to your participation
CCD Welcomes you!