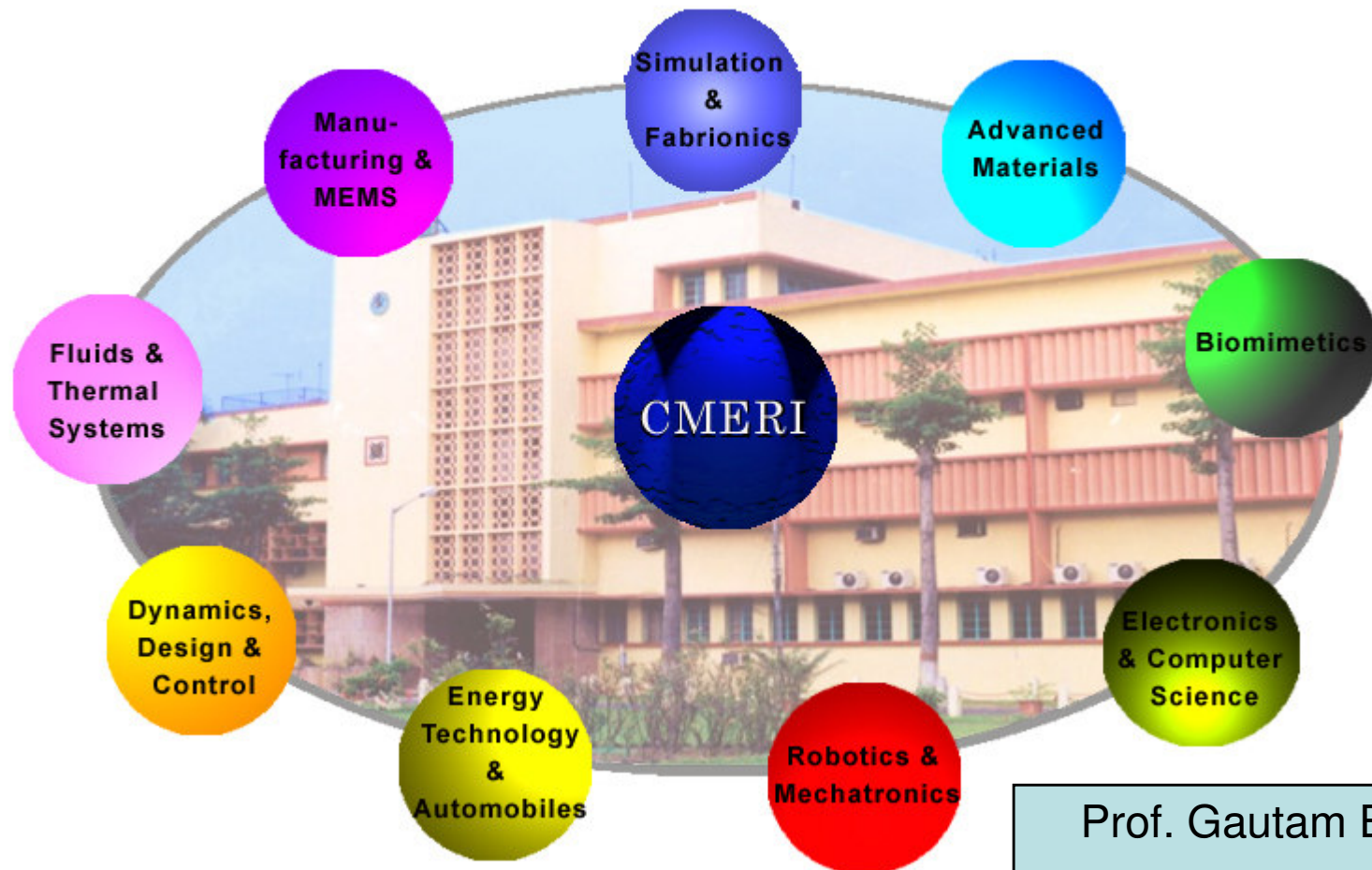


Central Mechanical Engineering Research Institute, Durgapur (Council of Scientific & Industrial Research)

Vision for the Future



Prof. Gautam Biswas
Director

Research in Mechanical Sciences and Engineering

• **Research Activities**

- Advanced Materials & Nanotechnology
- Biomimetics
- Electronics & Computer Science
- Dynamics, Design, Automation, & Control
- Energy Technology & Automobiles
- Fluids and Thermal Systems
- Manufacturing & MEMS
- Simulation & Fabrics
- Robotics and Mechatronics

Advanced Materials and Nanotechnology

- Smart Materials and Intelligent System
- Superplasticity and Internal Friction
- Creation of Metal-Polymer Hybrid Materials
- Damage Tolerance of Advanced Structural Materials
- Material Behavior Analysis in Atomic Scale
- Laser Applied Material Processing Technology
- Functionally Graded Materials
- New-tribomaterials
- Eco-tribology

Biomimetics

- Turbo Pump for Artificial Hearts
- Novel MRI/S Techniques Applied to Functional Analysis of Biological Tissues
- Optical Tomographic Imaging System
- Biomechanics of Hard Tissues
- Evaluation of Biocompatibility of Biomaterials and Standardization
- Biomechanical and Histomorphometric Evaluation of Clinical Bone Screw
- Evaluation of Hemocompatibility

Electronics and Computer Science

- Development of a New Optical Element and its Application to Optical Measurement in Mechanical Engineering
- Optical Actuators
- Fast X-ray CT Scanner
- Applications of Microprocessors and Microcontrollers
- Self-repairing Machine
- Advanced Finite Element Analysis
- Flexible Parametric Design Language
- Intelligent Transport Systems
- Remote sensing diagnostic devices

Dynamics, Design & Control

- Micro Compliant Mechanism Design Technology
- Material Characterization by Scanning Probe Microscopes
- Micro Functional Fabrication Using Ion Implantation
- Predictive Diagnosis for the Bearings
- Sensing and Actuation Technology
- Active Vibration Control
- Manufacturing Precision Textile Machinery
- Rapid Prototyping and Rapid Tooling
- Agricultural and Farm Machinery
- Residual Life Assessment and Condition Monitoring

Energy Technology & Automobiles

- Fuel Cells
- Energy from Hydrogen
- Direct Power Generation
- Combustion Fundamentals
- Countermeasures Against Greenhouse Effect
- Advanced and Hybrid Engine Systems
- Thermal Hydraulics of ADSS
- Fluidized Bed Technology
- Thermal Turbomachines
- Hydraulics Turbomachines and Pumps
- Solar Energy
- Alternative Fuels for Automobiles

Fluids and Thermal Systems

- Computational Fluid Dynamics
- Complex Fluids and Instabilities
- Advanced Heat Exchanger Technology
- Aerodynamic Characteristics of Turbine Cascade at Low Reynolds Numbers
- Transitional Flows and Turbulence
- Computational Aeroacoustics
- Dynamics of Thin Viscoelastic and Elastic Films
- Multiphase Flows
- Boiling and Condensation
- Transport processes in Porous Media
- Coating Flows
- Refrigeration and Airconditioning
- Cryogenics

Manufacturing and MEMS

- Micro Electromechanical Device Fabrication Technology
- Deposition and Micro Molding Technique Using Ultrafine Particle Beam
- Super Smooth Mirror-Finishing of Small Pipes
- Nano-Measuring Technology of Dynamic Surfaces
- Development of Ultra Light Magnesium Alloys with High Strength
- Design Support and Process Planning for Environmentally Conscious Products
- Advanced Manufacturing
- Welding Research
- Investment Casting
- System Design using Virtual Reality

Simulation and Fabrionics

- Micro-fabrication Technologies
- Microfluidics and Microsolidics
- Embedded Product Design
- Axiomatic Design
- Theory of Inventive Problem Solving
- Sustainable Design and Materials
- Design for Manufacturing
- Design for Assembly
- Benchmarking and Product Metric Development

Robotics and Mechatronics

- Underwater Autonomous Robotics
- Microrobotics
- Mechatronics
- Parallel Manipulators
- Crawl-type Stair Lift for Wheel chair
- Teleoperation Through Communication Line
- Robot Motion Planning
- Humanoid Robot Simulator
- Dynamic Control of Mobile Robot
- Leg-Wheel Hybrid Mobile Robot