



# Bidhan Chandra College

[Govt. Sponsored], ESTD: - 1961, NAAC Accredited

Recognized by U.G.C. (Govt. of India) and affiliated to Kazi Nazrul University

## 6<sup>th</sup> International Career Outreach Workshop “COMSOL MULTIPHYSICS: FUNDAMENTALS” Organized by the Microsystem Design-Integration Lab Bidhan Chandra College, Asansol, WB, India 12-13<sup>th</sup> July 2023, 10:30 AM-4:00 P.M IST

A series of career outreach workshops, by Microsystem Design-Integration Lab, Dept. of Physics, Bidhan Chandra College, Asansol, West Bengal, India, was organized since 2020, intended to help students thrive in a world of constant change, providing exposure, career-readiness and internship opportunities and professional career advisories at domestic and international level. Bidhan Chandra College, Asansol, West Bengal, is proud to enable Advanced Research, Design, Computational Facilities, and Google Workspace for Education, for its all faculties, staffs and above all students, during the trying time of pandemic, facilitating the teaching, and learning with cloud based collaborative tools. We are pleased to take a leap further by inviting the students, scholars, and faculties for two-day 12<sup>th</sup> -13<sup>th</sup> July 2023 on “COMSOL Multiphysics: Fundamentals”, in blended mode.

### Programme Schedule: 12<sup>th</sup> July 2023

Online Meeting Details:

July 12, 2023, 10:30 am – 4:00pm IST.

Google Meet joining link: <https://meet.google.com/oxj-iaps-reg>

#### Opening Session: 10:45 - 11:00 am

Outline of Career Outreach Initiative at Bidhan Chandra College by  
Convener, Dr. Amit Banerjee, Physics Dept., Bidhan Chandra College

#### Technical Session I: 11:00 am - 01:00 pm

Introduction to COMSOL Multiphysics  
Fundamental of COMSOL Multiphysics, Geometry building, meshing, Study  
Followed by Q/A.

#### Lunch Break: 1:00 pm - 01:30 pm

#### Technical Session II: 1:30 am - 03:00 pm

COMSOL Module:  
RF module, Wave Optics Module, Semiconductor Module, MEMS Module  
Followed by Q/A.

### Programme Schedule: 13<sup>th</sup> July 2023

Online Meeting Details:

July 13, 2023, 10:30 am – 4:00pm, IST.

Google Meet joining link: <https://meet.google.com/oxj-iaps-reg>

#### Technical Session III: 11:00 am - 01:00 pm

COMSOL Module:  
Design Module, Heat Transfer Module, Particle Tracing Module, Ray Optics Module, Material Library  
Followed by Q/A.

#### Lunch Break: 1:00 pm - 01:30 pm

#### Technical Session IV: 1:30 am - 03:00 pm

Support Case Creation  
Learning Resources  
Followed by Q/A.

## Organizing Committee

**Patron: Prof. Falguni Mukhopadhyay**, Hon'ble Principal, Bidhan Chandra College

**Chair: Dr. Goutam Mukherjee**, Convener, NAAC Committee;  
HOD, Dept. of Physics, Bidhan Chandra College

**Coordinator, IQAC: Dr. Saumen Chakraborty**, Dept. of Physics, Bidhan Chandra College

**Convener: Dr. Amit Banerjee**, Dept. of Physics, Bidhan Chandra College

**Organizing Secretaries: Dr. Sudipta Roy, Dr. Ajay Kr. Sharma, Mr. Apurba Paramanik**,  
Dept. of Physics, Bidhan Chandra College

Organized by **Microsystem Design-Integration Lab**,  
Dept. of Physics, Bidhan Chandra College

Partially supported by the **Device Development Programme (DDP)**,  
**Department of Science & Technology (DST)**, Government of India.

For further information on **Collaboration, Scope of Research and Internship**

Website: [www.bccollegeasansol.ac.in](http://www.bccollegeasansol.ac.in) || Email: [amit@bccollegeasansol.ac.in](mailto:amit@bccollegeasansol.ac.in)

### Active Research Project Currently:

Competitive Research Grant under Device Development Programme,  
by the Department of Science & Technology (DST), Ministry of Science and Technology, Government of India.

### Microsystem Design-Integration Lab Resources and Design Capabilities:

COMSOL Multiphysics with following packages: Wave Optics Module, Ray Optics Module, RF Module, AC/DC Module, Semiconductors Module, MEMS Module, Heat Transfer Module, Design Module, Material Library module;

National Instruments Multisim Software; NI Ultiboard Software; NI LabVIEW Software and DAQs;  
Siemens Solid Edge Software for 3D Design, Simulation;  
Advanced Design and Computation Facility;

### Active collaboration:

Advanced Device Research Division, Research Institute of Electronics, Shizuoka University,  
National University Corporation, Hamamatsu, Japan;

Dept. of Electrical and Computer Engineering, National University of Singapore;

Organic Electronics Research Center (OERC), Ming Chi University of Technology, Taipei, Taiwan;

## Career Outreach Workshop Supported by



Deals in: COMSOL Multiphysics, Siemens EDA,  
National Instruments, PSIM and Embedded Systems  
Solutions, SPRUT Technology, Texas Instruments  
[s.dutta@tridenttechlabs.com](mailto:s.dutta@tridenttechlabs.com) |  
[www.tridenttechlabs.com](http://www.tridenttechlabs.com)

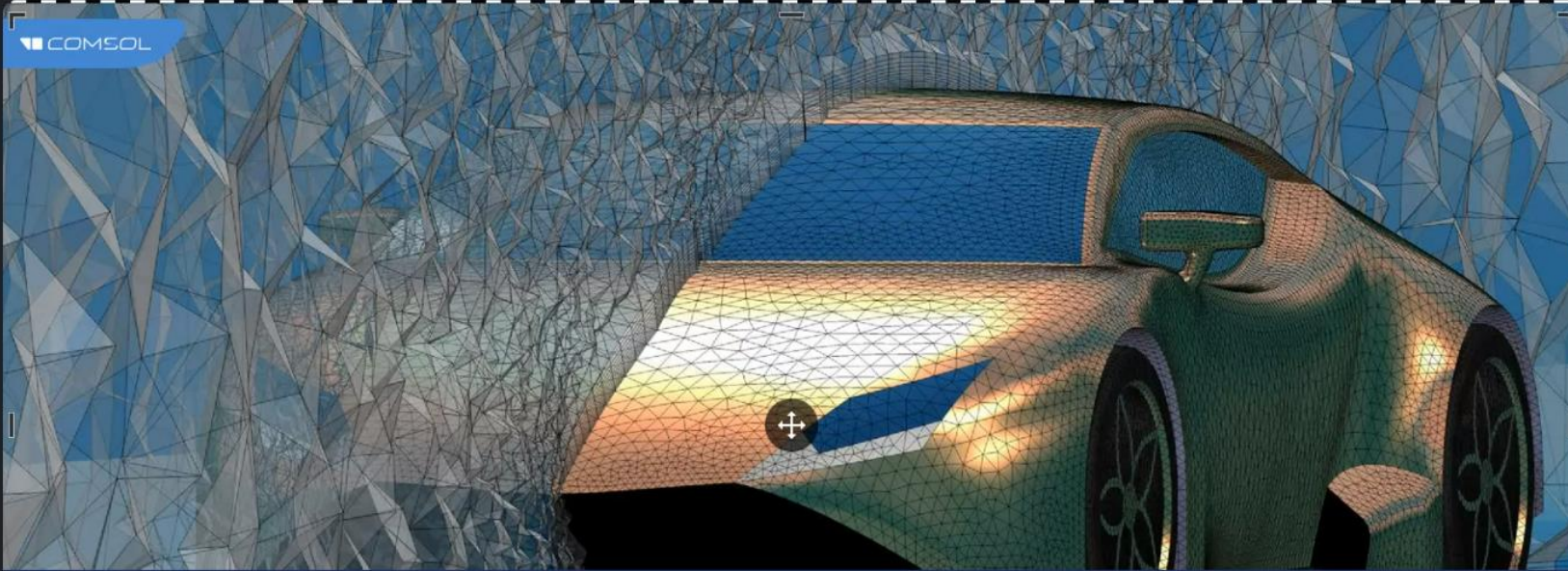


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RAHUL RAJAK (Presenting)



# Comsol Multiphysics

Rahul Rajak

1600 x 850 Cancel

RAHUL RAJAK

Sudip Chakrabo...

Saumen Chakra...

Saumendra Sank...

Sneha Chatterjee

Rajib Mahato

Goutam Mukherj...

3 others



Dr. Amit Banerjee

**RAHUL RAJAK (Presenting)**

**COMSOL**

# COMSOL Geometry

- Create 2D Geometry
  - Using Parameters, Copy, Array, Mirror
  - Primitive, Boolean, Transformations
  - (Partition)
- Expand 2 D geometry into 3D
  - Adding 3 D Component
  - Adding Work plane
  - Create Plane geometry, and using Extrude option
  - Importing Geometry file, geometry sequences
  - Using Revolve, Sweep, Parametric Curve features
- Creating 3D Geometry
  - Creating primitive objects in 3D
  - Using settings and implementing parameters
  - Different geometric operations :Boolean, Transformation, Partitioning

Using Virtual operations ( eg: Ignore Edges)

Participant avatars and names:

- RAHUL RAJAK
- Sudip Chakraborty
- Saumen Chakrabo...
- Saumendra Sankar...
- Sneha Chatterjee
- Subhraman Sarkar
- 4 others
- Dr. Amit Banerjee

11:05 AM | oxj-iaps-reg

Meeting controls: Mute, Video, Chat, Reactions, Screen Share, Hand Raise, More, End Call



RAHUL RAJAK (Presenting)

Untitled.mph - COMSOL Multiphysics

File Home Definitions Geometry Materials Physics Mesh Study Results Developer

Local Variables Analytic Interpolation Piecewise More Functions Explicit Complement Adjacent Ball/Disk Box Cylinder Union Intersection Difference Colors Update Probes Probes Physics Utilities Nonlocal Couplings Pairs Coordinate Systems Perfectly Matched Layer Infinite Element Domain Absorbing Layer Moving Mesh Deformed Geometry Optimization View Clear Reduced-Order Models

Model Builder

- Untitled.mph (root)
  - Global Definitions 1
  - Parameters 1
  - Materials
  - Component 1 (comp 1)
    - Definitions
    - Geometry 1
      - Materials
      - Electromagnetic Waves, Beam Envelopes (ewb)
        - Wave Equation, Beam Envelopes 1
        - Perfect Electric Conductor 1
        - Initial Values 1
      - Mesh 1
    - Study 1
      - Step 1: Frequency Domain
      - Results

Settings

Geometry

Build All

Label: Geometry 1

Units

Scale values when changing units

Length unit: m

Angular unit: Degrees

Advanced

Geometry representation: CAD kernel

Design Module Boolean operations

Default repair tolerance: Automatic

Build new operations automatically

Build automatically when leaving geometry

Graphics

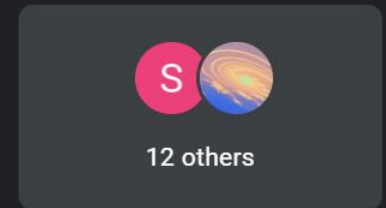
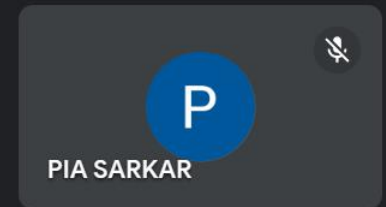
Messages Progress Log

COMSOL Multiphysics 6.1.0.357

806 MB | 897 MB

Type here to search

33°C Light rain 11:30 12-07-2023





RAHUL RAJAK (Presenting)

pacemaker\_electrode.mph - COMSOL Multiphysics

File Home Definitions Geometry Materials Physics Mesh Study Results Developer

Application Builder Model Manager Component 1 Add Component Parameters a=Variables f=Functions Import Build All Add Material Electric Currents Add Physics Build Mesh Compute Study 1 Add Study Electric Potential Add Plot Group Add Predefined Plot Windows Reset Desktop

Workspace Model Definitions Geometry Materials Physics Mesh Study Results Layout

Model Builder

- Component 1 (comp1)
  - Definitions
    - Geometry 1
      - Work Plane 1 (wp1)
        - Revolve 1 (rev1)
        - Spherical Electrode (sph1)
      - Work Plane 2 (wp2)
        - Revolve 2 (rev2)
        - Rotate 1 (rot1)
        - Rotate 2 (rot2)
        - Cylinder 1 (cyl1)
        - Difference 1 (dif1)
        - Form Union (fin)
        - Counter Electrode (sel1)
        - Cumulative Selections
    - Materials
      - Heart Tissue (mat1)
    - Electric Currents (ec)
      - Current Conservation 1
      - Electric Insulation 1
      - Initial Values 1
      - Ground 1
      - Electric Potential 1
    - Mesh 1
    - Study 1
    - Results
      - Datasets
      - Derived Values
      - Tables
      - Electric Potential (ec)
        - Volume 1
      - Electric Field Norm (ec)
      - 3D Plot Group 3
      - Export

Settings

Results

- Update of Results
  - Only plot when requested
  - Recompute all plot data after solving
  - Reevaluate all evaluation groups after solving
- Save Data in the Model
  - Save plot data: Automatic

Graphics

Convergence Plot 1

Volume: Electric potential (V)  $\times 10^{-3}$  m

Messages Progress Log

- [Jul 12, 2023, 12:58 PM] Some geometric entries are hidden.
- [Jul 12, 2023, 12:59 PM] Complete mesh consists of 15487 domain elements, 2066 boundary elements, and 480 edge elements.
- [Jul 12, 2023, 1:01 PM] Number of degrees of freedom solved for: 22695.
- [Jul 12, 2023, 1:01 PM] Solution time (Study 1): 20 s.

1.21 GB | 1.41 GB

Windows Taskbar: Type here to search, 33°C Heavy rain, 13:01 12-07-2023



Dr. Amit Banerjee

RAHUL RAJAK

G

Goutam Mukherjee

10 others





RAHUL RAJAK (Presenting)

