



Jagadish Chandra Bose Research Centre
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2 Days Workshop on Matrix Laboratory (MATLAB)

Matlab workshop mainly focuses on the student eager to learn about *Matrix Laboratory* which is a high-level language and interactive environment for numerical computation, visualization, and programming. Using MATLAB, a student can analyze data, develop algorithms, and create models and applications. The language, tools and built-in math functions provide to explore multiple approaches and reaches to solution faster than with spreadsheets or traditional programming languages. MATLAB can be used for a range of applications including signal processing and communications, **image and video processing**, control systems, test and measurement, computational finance, and computational biology.

Workshop Duration: 2 days (16 hrs.)

The duration of this workshop will be two consecutive days with eight hours session each day, in a total of sixteen hours properly divided into theory and hand on practical sessions. At the end of this workshop a competition will be organized among the participating students where each participating student will get Certificate of Participation and the Winners will get Certificate of Merit.

Two Days workshop Schedule:

Day 1 (Session 1)

Introduction to MATLAB

- What is MATLAB
- The dominance of MATLAB over other languages
- Power of Matrix computations
- The application of MATLAB in various fields of engineering
- MATLAB Environment

Arithmetic Functions in MATLAB



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- Matrixes and Vectors
 - Creating Matrixes and Vectors
 - Matrix Operation
 - Array Operation
 - Indexing Matrix
 - Adding Elements to Vector or Matrix
 - Various Flow Control used in MATLAB
 - 2D & 3D graphical Plotting

Day 1 (Session 2)

Introduction to Image Processing

- What is Image Data
- Image Processing Toolbox
- Importing Image
- How to build a matrix image
- Image Display
- Image Operations
- Image Conversion

Image Arithmetic

- Adding Images
- Subtracting Images
- Multiplying Images
- Dividing Images



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- Spatial Transformation
 - Resizing Images
 - Rotating Images
 - Cropping Images

Image Filtration

- What is Image Restoration
- Noise and Images
- Noise Models
- Noise removal using spatial domain filtering
- Periodic noise
- Noise removal using frequency domain filtering

Day 2 (Session 3)

Morphological Image Processing

- Mathematic Morphology
- Z_2 and Z_3
- Basic set theory
- Logic Operations
- Structuring Element
- How to describe Structuring Element
- Basic Morphological Operations
- Erosion
- Dilation
- Combining Erosion and Dilation



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- Filtering Application

Introduction to Graphical User Interface

Application and Demos

Note:

1. **These are just the major aspects that we will be discussing, each point will be elaborated in detail with demonstrations of the tools and techniques.**
2. **In this proposal we have listed Image Processing Tool Box. Other tool boxes can be included upon request.**

Project to be Covered

- 2D & 3D Graphical Representation
- Image Comparison
- Image Pairing
- Matrices Manipulation
- Filtering of Noise
- Red Object Detection
- GUI Based Calculator
- GUI Based Image Transforms

Prerequisite for Workshop

- Passion to learn new creative things.
- Knowledge of basic chips and micro controllers.
- Having basic knowledge of Computers.
- Basics of programming.
- PC/laptop must have at least 2GB RAM.
- Windows is preferable
- In case of MacBook or Linux, You need virtual window or .exe installers.
- Laptop/PC must have Bluetooth and its drivers.



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Who Could Attend?

- College students seeking future in Research.
- Educate Faculty & Staff in Matlab.
- Electronics, Instrumentation & Communications Students.
- Students from any branch can attend the workshop.

Benefits of Workshop

- Detailed knowledge about MATLAB.
- Students can design any Application based on Image processing and GUI.
- How to make software/ .exe file after programming.

Course Material & CD

- Software tool kit CD having (Study E-Book, Videos, Programs)