

## ***MATLAB (4-6weeks)***

### ***Understanding of MATLAB***

- Introduction to MATLAB?
- What, Where, Why MATLAB?
- Future Scope of MATLAB

### ***Array Implementation using MATLAB***

- Matrices and Arrays
- Array Creation
- Matrix and Array Operations
- Sum, transpose and diagonal
- The magic Function
- Matrix Operators
- Array Operators

### ***2-D Plotting***

- 2-D and 3-D Plots
- Line Plots
- 3-D Plots
- Subplots
- Basic Plotting Functions
- Creating a Plot
- Displaying Multiple Plots in One Figure
- Controlling the Axes
- Adding Axis Labels and Titles
- Creating Mesh and Surface Plots
- About Mesh and Surface Plots
- Plotting Image Data
- About Plotting Image Data

***Working with Handle Graphics Objects***

- Graphics Objects
- Setting Object Properties
- Functions for Working with Objects
- Specifying Axes or Figures
- Finding the Handles of Existing Objects

***Scripts and Functions***

- Overview
- Scripts
- Functions
- Types of Functions
- Global Variables
- Command vs. Function Syntax

***Simulink in MATLAB***

- Introduction to Simulink in MATLAB
- Use of Simulink in MATLAB
- Circuit Designing
- Circuit Simulation

***Designing of Systems***

- Designing in Control Systems
- Designing & Analysis of Signals
- Designing of Signals & Systems
- Designing of Basic Electronics
- Control System Analysis
- Bode Plot, Nyquist plot, Root locus.
- Time Domain and Frequency Domain Analysis of Control Systems.


***Image Processing using MATLAB***

- Introduction to Image Processing
- Various Images Manipulation
- How to use readymade functions.


***Plotting Image Data***

- About Plotting Image Data
- Reading and Writing Images
- Overview of Printing
- Printing from the File Menu
- Exporting the Figure to a Graphics File
- Using the Print Command

***Hardware Interfacing***

- Interfacing of Microcontroller
- Controlling of Motors, LEDs
- Camera Interfacing
- Image Capturing & Segmentation
- Using Serial Communication
- Object Detection Tracking
-  MATLAB and Arduino with GUI

***GUI Development***

- Introduction to GUI
- Creating Interactive MATLAB GUI
- Drag & Drop Approach
- Front & Back End Development
- M-File Editing
- Writing our own functions
-  Interfacing GUI for Image Processing

## **Embedded System(4-6weeks)**

### **INTRODUCTION TO EMBEDDED SYSTEM**

- History & need of Embedded System
- Basic components of Embedded System
- Hardware Classification of Embedded System
- Programming Language Classification of Embedded System
- Advantage & Disadvantage of Low level & High level programming language of Embedded System

### **CLASSIFICATION OF MICROPROCESSOR & MICROCONTROLLER**

- Difference between Microprocessor & Microcontroller
- Classification based on architecture
- Classification based on Instruction Set
- Type of Microcontroller
- Memory Classification

### **BRIEF INTRODUCTION TO COMPUTER ARCHITECTURE**

- Classification of Von-Neumann and Hardware Architecture
- Difference between RISC and CISC
- Memory Classification (Primary & Secondary)

### **COMPUTER LANGUAGES**

- Low Level Languages
- Middle Level Language
- High Level Language
- Interaction of language with Compilers

### **EMBEDDED DEVELOPMENT TOOLS**

- Assembler
- Interpreter
- Compiler
- Simulator

## **INTRODUCTION OF EMBEDDED C**

- Why C
- Benefits of C over Assembly
- Constants, Variables & Data Types
- Keywords & Identifiers
- Data type & its memory representation
- User Defined Data type (structure)
- Array
- Pointers
- Operators
- Arithmetical Operator
- Logical Operator
- Bitwise Operators
- Control Statement and Loops
- If
- Switch
- For
- While
- Do While
- Introduction to Preprocessor Directives
- Assembly within C (Inline Assembly)

## **BASIC ELECTRONICS**

- Resistor
- Capacitor
- Diode
- Transistor

## **TYPES OF MOTORS**

- AC motor
- DC motor
- Stepper motor
- Servo motor
- DC geared motor

**MOTOR CONTROLLING CIRCUITS IC'S**

- LM358(dual op- amp)
- LM35(Temperature sensor)
- L293D(dual H-bridge IC)
- 7805(Voltage regulator)

**PIN DESCRIPTION & ARCHITECTURE OF AVR MICROCONTROLLER  
MEMORY ARCHITECTURE OF ATMEGA16  
LED INTERFACING**

- Pattern generation using led panel

**LCD INTERFACING**

- To move data on LCD in 8-bit
- To move data on LCD in 4-bit
- To display data on both rows in 4 and 8-bit Mode
- Scrolling message display on LCD in 4 and 8 bits Mode.

**SWITCH & KEYPAD INTERFACING**

- Introduction to Switches & Keyboard Matrix
- Interfacing Circuit of Switches & Keyboard Matrix
- Programming of Keyboard Matrix & Switches
- Controlling of LED's by using Switches
- Key board Matrix & LCD Interfacing Program

**TIMER**

- Timer0/Timer1/Timer2 Programming
- PWM using Timers

**INTERRUPT**

- Timer Interrupts Programming
- External Hardware Interrupts Programming
- Interrupt Priority

**RS232 INTERFACING**

- Interfacing with PC using UART/RS232
- Interfacing with PC using UART/RS232 with
- Interrupts

**ADC INTERFACING**

- To display digital data on LED
- To display digital data on LCD

**SENSOR INTERFACING**

- Introduction to Sensing Devices
- IR Sensor Interfacing
- Temperature Sensor Interfacing

**I2C PROTOCOL**

- Features
- Implementation

**SPI PROTOCOL**

- Features
- Implementation

## Android (4 – 6 Weeks)

### Core Android

#### Mobile Development Platforms

- Mobile Programming Languages
- Design and development of Mobile User Interface
- Mobile Application Development & Debugging

### Basics of Android

- Android Core Building Blocks
- Android Emulator
- AndroidManifest.xml
- R.java file
- Hide Title Bar
- Screen Orientation

### UI Widgets

- Image Button
- AlertDialog
- Spinner
- RatingBar
- DatePicker
- TimePicker
- ProgressBar

### Activity & Intent

- Activity Lifecycle
- Implicit Intent
- Explicit Intent
- Android Menu
- Option Menu
- Context Menu
- Popup Menu



**Layout Manager**

- Relative Layout
- Linear Layout
- Table Layout
- Grid Layout

**Adaptor**

- Array Adaptor
- Cursor Adaptor
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**View**

- WebView
- ScrollView
- TabHost

**Advance Android****Android Framework & Service**

- Android Service
- Details of Android Framework

**Data Storage**

- Shared Preferences
- Internal Storage
- External Storage

**XML**

- XML Parsing SAX
- XML Parsing DOM

**Content Provider**

- Content Provider Fundamentals
- About Content Providers

**Telephony API**

- Broadcast Receiver
- Making Phone Call
- Send SMS
- Send Email

**Location API**

- Location API Fundamental
- Example of Android Location API
- Working with Google Maps

**Hardware Abstraction Layer**

- Fundamentals of Hardware Abstraction Layer \

**Android Permission model & Application Sandboxing Cross-Compiling System Programmes for Android Platforms**

- Fundamentals of Android Permission Model
- Application Sandboxing Cross-Compiling System Programmes