IIES Indian Institute of Embedded Systems

PGD DIPLOMA IN EMBEDDED SYSTEMS AND ARTIFICIAL INTELLIGENCE

Offline
Online

6 Months

Gain Real Project Experience & Placement

Modules

Programming in c
- Learn C Programming from Scratch
- Hands-on Coding with Real Examples
- Build Strong Foundation for Embedded Systems

Data Structures & Algorithms
- Fundamentals & Data Structures
- Algorithm Design & Problem Solving
- Practical Implementation & Projects

Basic Electronics
- Digital
- Analog
- Communication

Embedded C with 8051 Microcontroller
- Introduction to Embedded Systems
- Embedded Hardware
- Embedded Tools & Design

ARM Cortex - M3 (LPC1768)
- ARM Evaluation & Interfacing
- Mini Projects & Protocol Implementation

Automotive
- Introduction to Embedded Systems
- Embedded Hardware
- Embedded Tools & Design

Artificial Intelligence in Embedded Systems Using ESP32
- Foundations of AI & Embedded Systems
- AI Model Development & Deployment
- Applications & Real-Time Implementation

Unix / Linux Shell Programming
- Unix/Linux Basics & File Management
- Shell Programming & Scripting
- Advanced Unix Concepts & System Administration

Networking
- Network Fundamentals & Architecture
- Routing, Protocols & Security
- Practical Networking & Client-Server Models

100% Placement Assistance

Placement Assistance
- Resume Building & Profile Preparation
- Mock Interviews & Technical Interview Training
- Job Referrals with Embedded Companies
- Dedicated Placement **till 2 Years**

Program Takeway

Program Takeaway
- Strong Foundation in Embedded Systems & Programming
- Hands-on Experience with Real-Time Projects
- Industry-Ready Skills with Placement Assistance

Project Based Training

Project Based Training
- Work on Real-Time Embedded Projects
- Hands-on Hardware & Programming Practice
- Practical Industry-Oriented Learning

Hiring Domains

Hiring Domains
- Aerospace & Automotive
- IOT & Defence
- Semiconductor & EV Vehicles
- Wireless
- IT Services

~~₹ 65,000~~ **₹ 42,000**

1 C Programming

prerequisite

•Basicknowledge of Computer Fundamental.

module outline

- Environment Setup
- Program Structure
- Basic Syntax
- Data Types
- Variables
- Constants
- Storage Classes
- Operators
- Decision Making
- Loops
- Functions
- Scope Rules
- Arrays
- Pointers
- Strings
- Structures
- Unions
- Bit Fields
- Typedef
- Input & Output
- File I/O
- Preprocessors
- Header Files
- Type Casting
- Error Handling
- Recursion
- Variable Arguments
- Memory Management
- Command Line
- Arguments

projects

- Mini project

2 Data Structures & Algorithms

prerequisite

•basicunderstanding of C programming language, text editor, and execution of programs

module outline

Overview

Environment Setup

Algorithm

- Algorithms Basics
- Asymptotic Analysis
- Greedy Algorithms
- Divide and Conquer
- Dynamic Programming

Data Structures

- Data Structure Basics
- Array Data Structure

Stack & Queue

- Stack
- Expression Parsing
- Queue

Searching Techniques

- Linear Search
- Binary Search
- Interpolation Search
- Hash Table

Linked Lists

- Linked List Basics
- Doubly Linked List
- Circular Linked List

Sorting Techniques

- Sorting Algorithms
- Bubble Sort
- Insertion Sort
- Selection Sort
- Merge Sort
- Shell Sort
- Quick Sort
- Graph Data Structure
- Depth First Traversal
- Breadth First Traversal

Tree Data Structure

- Tree Data Structure
- Tree Traversal
- Binary Search Tree
- AVL Tree
- Spanning Tree
- Heap

Recursion

- Recursion Basics
- Tower of Hanoi
- Fibonacci Series

3 Basic Electronics

prerequisite

•Basic knowledge of Electronics fundamental.

module outline

Digital

- Number conversion Addition and subtraction Logic gates
- Combinational design Encoder Decoder Multiplexer De multiplexer
- Sequential design Flip-flops Shift register Counters

Analog

- Semi-conductors
- Diodes
- Transistors and subtraction
- Logic gates
- BJT Basic theorems { kvl, kcl, thevenin and Norton's theorem}
- Op-amp
- ADC,DAC

Communication

- Amplitude modulation Frequency
- modulation
- Phase modulation
- ASK and FSK modulators
- GPS
- Bluetooth ZIG-BEE
- WIFI

4 EMBEDDED SYSTEMS

prerequisite

- Shouldhaveagood understanding of the concepts of basic electronics such as circuits, logic gates, etc.

module outline

- Embedded Systems
- •Introduction to Embedded Systems
- •What is Embedded Systems
- •Characteristic of Embedded Systems
- •Deigning of an Embedded Systems
- •Embedded Systems Processors
- Microprocessor
- Microcontroller
- •MP vs MC
- •Type of Micro Controller
- •Embedded Systems Tools
- Overview

5 8051 Microcontroller

prerequisite

•Prerequisite:Cprogramming and Embedded C

module outline

- **Processors**
- **Architectures**
- **Tools and Peripherals**
- **8051 Microcontroller**
- **I/O Programming**
- **Terms**
- **Assembly Language**
- **Registers**
- **Registers Bank/Stack**
- **Instructions**
- **Addressing Modes**
- **Special Function Registers**
- **Timer/Counter**
- **Interrupts**

projects

•Mini project

6 ARM Cortex - M3 (LPC1768)

prerequisite

•Cprogrammingand Embedded C

module outline

- **ARMevaluation system**
- **Interfacing ADC and DAC**
- **Interfacing LED and PWM**
- **Interfacing real time clock & serial port**
- **Interfacing keyboard and LCD**
- **Interfacing EPROM and interrupt**
- **Mailbox**
- **Interrupt performance characteristics of ARM and FPGA.**
- **Flashing of LEDS.**
- **Interfacing stepper motor and**
- **temperature sensor.**
- **Implementing zigbee protocol with ARM.**

projects

•Mini project

7 Automotive

prerequisite

- Introduction to Automotive Embedded Systems

module outline

- **Introduction**
- **Automotive Systems Overview**
- **Embedded Technology in Automotive Industry**
- **Automotive Microcontroller**
- **Introduction to CAN Protocol**
  - **•Features of CAN**
  - **•CAN nodes and states**
  - **•CAN Controller ;CAN Transceiver; CAN Bus levels;**
  - **•NRZ Coding; Twisted Pair wiring with termination**
  - **•CAN Communication Principle, CSMA-CD**
  - **•CAN Standard and Extended**
  - **•Characteristics of CAN Protocol**
  - **•CAN from OSI Perspective**
  - **•Physical Layer; Data Link Layer; Application Layer**
  - **•CAN Frame Formats: Data Frame; Remote Frame; Error Frame**
  - **•Error Detection Mechanisms**
  - **•CAN Time Quanta; Relation of Baud rate and Length of CAN bus**
  - **•CRC and Acknowledge**
- **CAN Programming**
  - **•Related Registers**
  - **•Implementing CAN Messaging systeme**
  - **•Communication between two nodes using CAN protocol**

8 Artificial Intelligence in Embedded Systems Using ESP32

prerequisite

- Basic knowledge of C/C++ programming and familiarity with microcontrollers is recommended.

module outline

- **Introduction to AI & Embedded Systems**
- **Basics of Embedded Systems**
- **Components of Embedded Systems**
- **Basics of AI**
- **Types of AI for Embedded Applications**
- **Key AI Concepts (Dataset, Training, Inference)**
- **Edge AI Concept**
- **Communication Interfaces (Wi-Fi, Bluetooth)**
- **Software Tools (Arduino IDE, TensorFlow Lite, Edge Impulse, MicroPython)**
- **AI Model Development Workflow**
- **Data Collection & Preprocessing**
- **Model Training & Optimization**
- **Deployment on ESP32**
- **Real-Time Inference**
- **Challenges in Embedded AI**
- **Optimization Techniques (Quantization, Pruning, TinyML)**
- **AI Applications (Smart Home, Industrial, Automotive, Healthcare)**
- **Future Trends & Career Opportunities**
- **Conclusion & Certification**

projects

•Mini project

9 Unix / Linux Shell Programming

prerequisite

•ProgramminginC and data Structure

module outline

- For Beginners
- Home
- Getting Started
- File Management
- Directories
- File Permission
- Environment
- Basic Utilities
- Pipes & Filters
- Processes
- Communication
- The vi Editor
- Shell Programming
- Shell Scripting
- What is Shell?
- Using Variables
- Special Variables
- Using Arrays
- Basic Operators
- Decision Making
- Shell Loops
- Loop Control
- Shell Substitutions
- Quoting Mechanisms
- IO Redirections
- Shell Substitutions
- Shell Functions
- Manpage Help
- Advanced Unix / Linux
- Regular Expressions
- File System Basics
- User Administration
- System Performance
- System Logging
- Signals and Traps

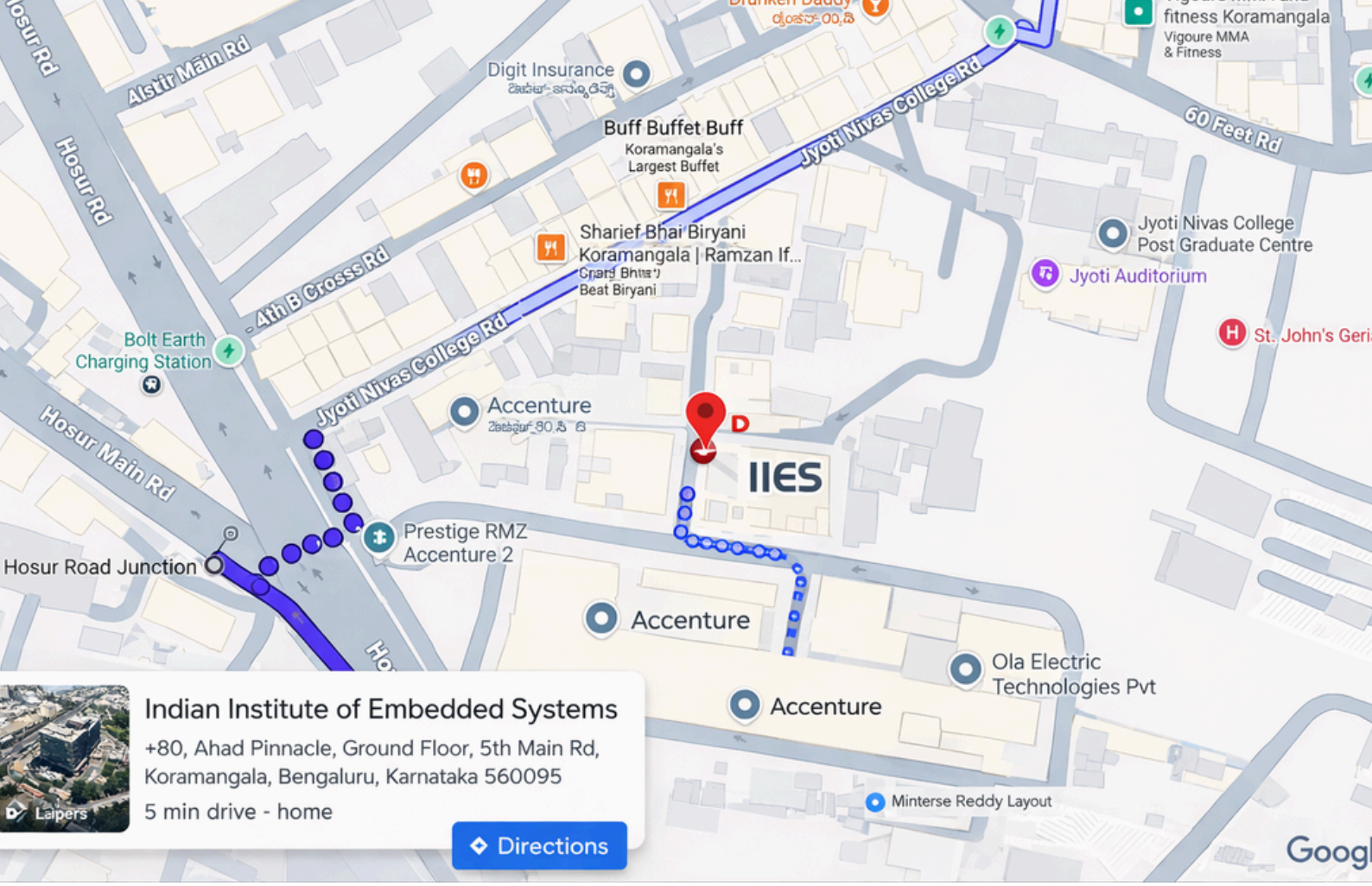
10 Networking

prerequisite

•Knowledge of Linux

module outline

- Introduction
- Features
- Architecture
- Components
- Computer Network
- Types
- Topologies
- Transmission Modes
- Models
- Models
- OSI Model
- TCP/IP Model
- Physical Layer
- Digital Transmission
- Transmission Media
- Guided Media
- UnGuided Media
- Multiplexing
- Switching
- Switching Modes
- Switching Techniques
- Data Link layer
- Data Link layer
- Error Detection
- Error Correction
- Data Link Controls
- Network Layer
- Network Layer
- Network Addressing
- Routing
- Network Layer Protocols
- Routing Algorithm
- Distance Vector
- Link State Routing
- Transport Layer
- Transport Layer Protocols
- Application Layer
- Client & Server Model
- Application Protocols
- DNS
- FTP
- Telnet
- SMTP
- SNMP
- HTTP
- Network Security
- Security
- Privacy
- Digital Signature
- PGP



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