

PROGRAMMING FOR IOT BOARDS SYLLABUS

Module 1: IoT Ecosystem

- Challenges and Levels of Implementation
- Enabling Technologies
- Overview of Processing Elements and Peripherals

Module 2: Programming for Prototyping Boards

- Environment: Board, IDE, Shields
- Programming
 - Syntax, Variables, Types, Operators, Constructs, and Functions
- Sketch
 - Skeleton, Compile, and Upload
 - Accessing Pins
- Debugging
 - UART Communication Protocol
 - Serial Library

Module 3: Interfacing for Prototyping Boards

- Circuits
 - Design, Wiring, Passive Components
- Sensors and Actuators
 - Interfacing, Read and Write
- Software Libraries
- Shields
- Interfacing and Libraries

Module 4: Programming for Single Board Computers

- Board Schematic
- Setup, Configure, and Use
- OS Implications
 - Linux Basics, File System and Processes
- Shell CLI and GUI
- Programming APIs
 - RPi.GPIO
 - PWM Library to Access Pins
 - Tkinter

Module 5: Interfacing with Single Board Computers

- Networking
 - Internet Connectivity
 - Standard Internet Protocols
 - MQTT
 - CoAP
- Networking Socket Interface
- Cloud
 - Public APIs and SDKs for Accessing Cloud Services
 - Social Network APIs
- Interfacing
 - Sensors and Actuators
 - Pi Camera
 - Servo
 - APIs for Data Conversion

Module 6: Embedded Programming and RTOS

- MCU
 - GPIO
 - WDT
 - Timers/Counters
 - I/O

- A/D
- D/A
- PWM
- Interrupts
- Memory
- Serial Communication (UART, I2C, SPI)
- Peripheral Interfacing
- OS Basics
 - Types, Tasks, Process, Threads (POSIX Threads)
 - Thread Preemption
 - Preemptive Task Scheduling Policies
 - Priority Inversion
 - Task Communication and Synchronization Issues
 - Racing and Deadlock
 - Binary and Counting Semaphores (Mutex Example)
 - Choosing RTOS

Module 7: Real World Projects

- IoT Integrated Primary Health Care
- Face Detection by AI
- Cloud IoT Systems for Smart Agriculture
- Smart Home Gadgets
- Autonomous Car Features
 - Speed and Horn Intensity Control

PAJAMA PADHAI