NIELIT Virtual Academy
O Level Module-04 (M4-R5.1)

O level- Module-04 (M4-R5.1 - Internet of Things and its Applications)

Objective

The module is designed to equip the students to understand the basics of connected world that is Internet of Things (IoT) and its applications. IoT primarily refers to the connected

and smarter world having physical and virtual objects with some unique identities. IoT applications span across domains of industrial control, retail, energy, agriculture, etc. This module provides the theoretical and practical aspects of interfacing sensors and actuators, making informed world of Things speaking to each other. The different type of communication modes and models are discussed in detail. The in-depth knowledge of software and packages is provided to make applications in IoT paradigm.

After completing the module, the learner will be able to:

- ✓ Understand how connected devices work together to update other applications.
- ✓ Acquire knowledge to interface sensors and actuators with microcontroller based Arduino platform.
- ✓ Writing C programs in Arduino IDE.
- ✓ Understand the Communication between microcontroller and PC using serial communication.
- ✓ Build IoT based applications and understand how data flows between things.
- ✓ Understand how electronic devices control electrical appliances working at 220v AC.
- ✓ Understand security aspect of IoT devices.
- ✓ Enhance skill set towards better personality development.

Methodology:

- ✓ **Video Lecture with text contents.**
- ✓ **24x7 Availability.**
- ✓ **Content Access through e-learning portal.**
- ✓ **Covers both Theory & Practical.**
- ✓ **Doubt clearing session for all units.**
- ✓ **Sample paper practice.**

Registration Link: http://nva.nielit.gov.in

***For NIELIT O Level Registration and Examination, please contact Course coordinator:
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Internet of Things and its Applications (M4-R5.1)

Introduction to Internet of Things – Applications/Devices, Protocols and Communication Model

Unit-01	• Introduction - Overview of Internet of Things(IoT), the characteristics of devices and applications in IoT ecosystem, building blocks of IoT
	• Various technologies making up IoT ecosystem, IoT levels, IoT design methodology, The Physical Design/Logical Design of IoT

Things and Connections

Unit-02	• Working of Controlled Systems, Real-time systems with feedback loop e.g. thermostat in refrigerator, AC, etc.
	• Connectivity models – TCP/IP versus OSI model, different type of modes using wired and wireless methodology
	• The process flow of an IoT application.
	• Working of Controlled Systems, Real-time systems with feedback loop e.g. thermostat in refrigerator, AC, etc.
	• Connectivity models – TCP/IP versus OSI model, different type of modes using wired and wireless methodology

Sensors, Actuators and Microcontrollers

Unit-03	• Sensor - Measuring physical quantities in digital world e.g. light sensor, moisture sensor, temperature sensor, etc.
	• Actuator – moving or controlling system e.g. DC motor, different type of actuators

Building IoT applications

Unit-04	• Introduction to Arduino IDE – writing code in sketch, compiling-debugging, uploading the file to Arduino board, role of serial monitor.
	• Embedded 'C' Language basics - Variables and Identifiers, Built-in Data Types, Arithmetic operators and Expressions, Constants and Literals, Conditional Statements and Loops - Decision making using Relational Operators, Logical Connectives - conditions, if-else statement, Loops: while loop, do while, for loop, Nested loops, Infinite loops, Switch statement.
	• Arrays – Declaring and manipulating single dimension arrays Functions - Standard Library of C functions in Arduino IDE, Prototype of a function: Formal parameter list, Return Type, Function call.
	• Interfacing sensors – The working of digital versus analog pins in Arduino platform, interfacing LED, Button, Sensors-DHT, LDR, MQ135, IR. Display the data on Liquid Crystal Display(LCD), interfacing keypad
	• Serial communication – interfacing HC-05(Bluetooth module) Control/handle 220V AC supply – interfacing relay module.

Security and Future of IoT Ecosystem

Unit-05	• Need of security in IoT - Why Security? Privacy for IoT enabled devices- IoT security for consumer devices- Security levels, protecting IoT devices
	• Future IoT eco system - Need of power full core for building secure algorithms, Examples for new trends - AI, ML penetration to IoT

Soft skills-Personality Development	
Unit-06	- Personality Development - Determinants of Personality- self-awareness, motivation, self-discipline, etc., building a positive personality, gestures. - Self-esteem - self-efficacy, self-motivation, time management, stress management, Etiquettes & manners. - Communication and writing skills- objective, attributes and categories of communication, Writing Skills – Resume, Letters, Report, Presentation, etc. Interview skills and body language.