

Introduction to Raspberry Pi Programming with Python

Course Description

This course is an introduction to the Raspberry Pi, a powerful and affordable single-board computer. In this course, you will learn how to set up and configure your Raspberry Pi, write programs in Python, and use the GPIO pins to control external devices. By the end of this course, you will have a solid foundation in Raspberry Pi programming and be able to build your own projects.

Audience

This course is designed for beginners who have no previous experience with the Raspberry Pi or programming. It is ideal for hobbyists, students, and anyone interested in learning more about this versatile platform.

Hardware Requirements

Participants will need a Raspberry Pi board, a microSD card, a power supply, and a computer with an internet connection.

Pre-requisite Knowledge/Skills

Students should have a solid understanding of Python programming and basic electronics concepts. Familiarity with the Linux operating system and the Raspberry Pi is also required.

Course Objectives

1. Understand the basics of the Raspberry Pi platform
2. Set up and configure your Raspberry Pi
3. Write programs in Python
4. Control external devices using the GPIO pins
5. Build your own projects using the Raspberry Pi

Course Outline

The course comprises of 6 modules. The duration of the course is 16 hours.

Module 1: Introduction to Raspberry Pi and Linux

- Raspberry Pi Board and Processor
- Raspberry Pi vs. Arduino
- Operating System Benefits
- Linux Basics

- Navigating the Filesystem
- Login
- Text Editors
- Accessing Files

Module 2: Programming Basics with Python

- Python on Raspberry Pi
- Python Programming Environment
- Python Expressions
- Strings
- Functions
- Function Arguments
- Lists
- List Methods
- Control Flow

Module 3: Working with GPIO Pins

- General Purpose IO Pins
- Protocol Pins
- GPIO Access
- Pulse Width Modulation
- Demo of a Blink
- Graphic User Interface
- Tkinter Library
- Interaction

Module 4: Setting Up and Configuring Raspberry Pi

- Raspberry Pi Setup
- Raspberry Pi Configuration
- Overclocking
- Permissions
- Processes
- Linux Graphic User Interface

Module 5: Advanced Topics in Raspberry Pi

- Raspberry Pi IoT

- Communicating with Other Devices
- Interfacing with Sensors
- Robotics Applications
- Voice Recognition and Control
- AI and Machine Learning on Raspberry Pi

Module 6: Real-world Projects with Raspberry Pi

- Building a Home Security System
- Creating a Smart Mirror
- Developing a Weather Station
- Designing a Home Automation System
- Making a Game Console
- Building a Robot

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