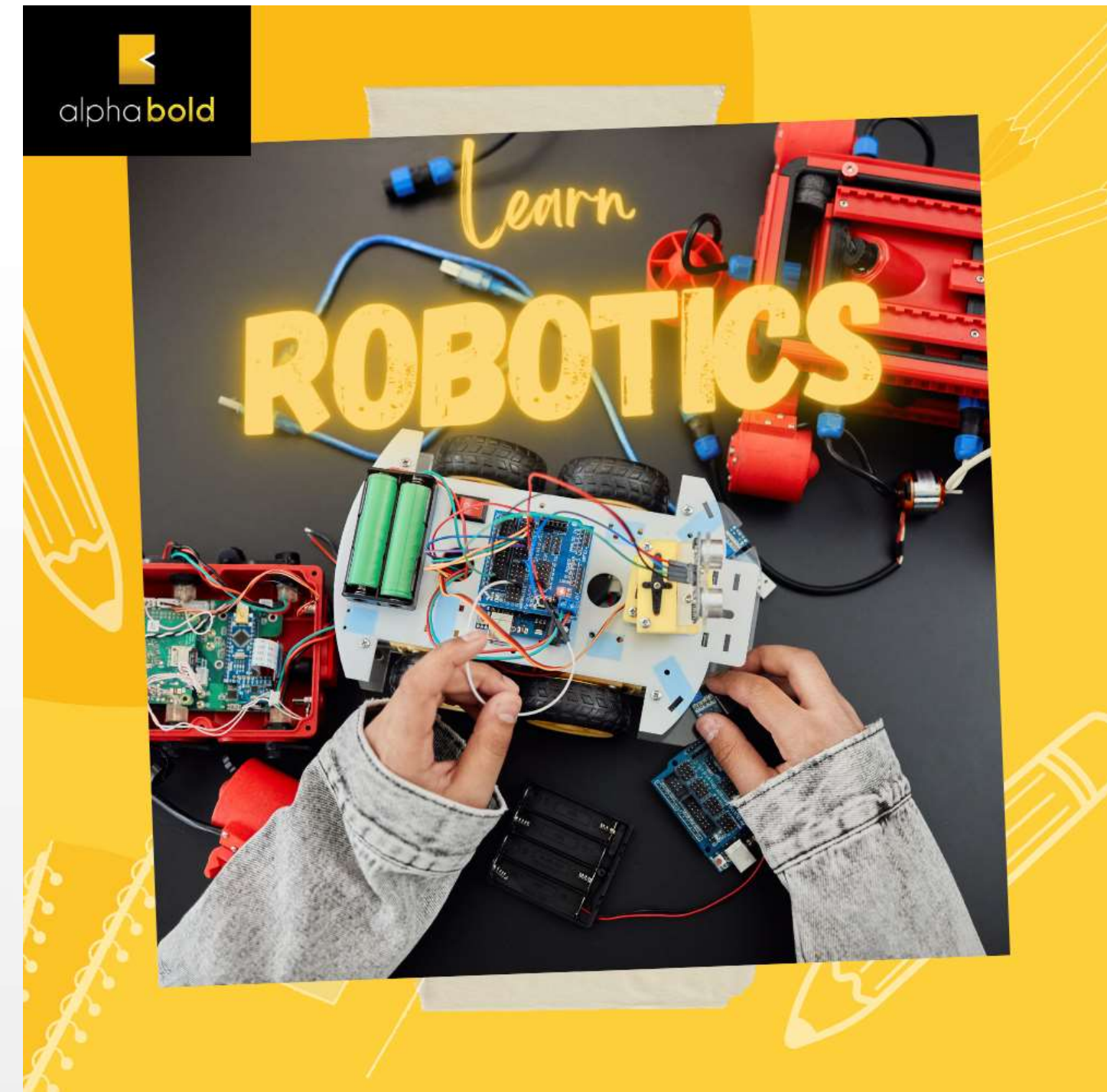
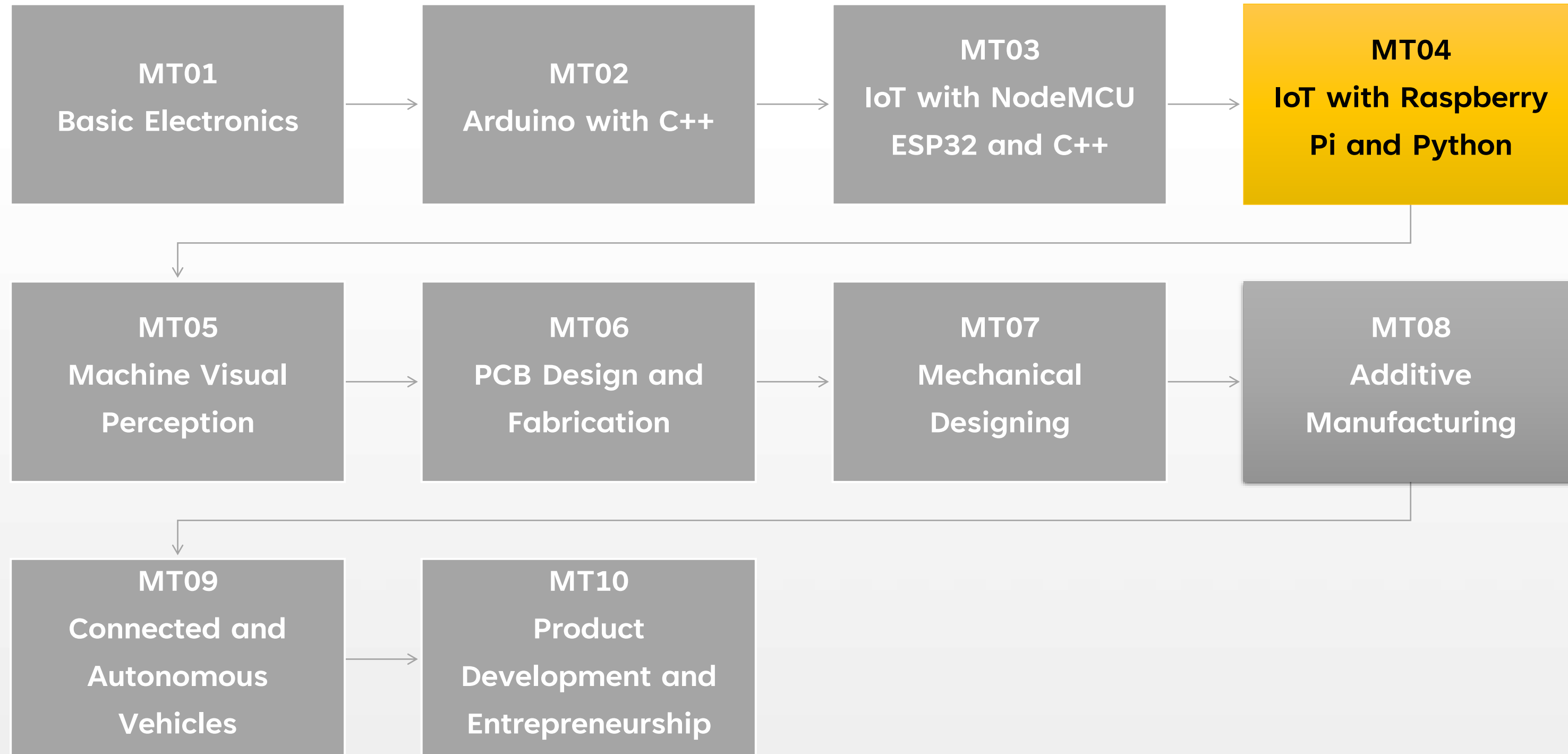


IoT with Raspberry Pi and Python

Internet of Things, Raspberry Pi, Python





Course Unit Details

Overview

This course unit introduces you to the exciting world of the Internet of Things (IoT) and equips you with the skills to build your own IoT projects using Raspberry Pi and Python. You'll gain a foundational understanding of IoT concepts, explore the capabilities of Raspberry Pi, and learn how to program it using Python.

Aims

- Understand the fundamental principles of the Internet of Things (IoT)
- Gain practical knowledge of Raspberry Pi hardware and software setup
- Develop essential Python programming skills for IoT applications
- Design and build basic IoT projects using Raspberry Pi and Python

Learning Outcomes

- By the end of this course unit, you will be able to:
 - Define the Internet of Things (IoT) and its core components.
 - Explain the architecture and design principles of IoT systems.
 - Describe methods for data storage and analysis in the context of IoT.
 - Discuss security and privacy considerations for IoT devices.
 - Set up and configure a Raspberry Pi for development.
 - Utilize the Raspberry Pi Sense Hat and camera module for data collection.
 - Navigate the Linux file system on Raspberry Pi using SSH.
 - Write Python code for basic programming tasks like variable manipulation, conditional statements, and loops.
 - Design and implement a simple IoT project (vending machine, home automation system, or robotic car prototype) using Raspberry Pi and Python.

Syllabus

Section 1: IoT

1. Introduction to Internet of Things (IoT)
2. IoT Architecture and System Design
3. IoT Data Storage and Analytics
4. IoT Security and Privacy

Section 2: Raspberry Pi

1. Introduction to Raspberry Pi
2. Setting Up Raspberry Pi
3. Working with Sense Hat
4. Raspberry Pi Camera Module

Section 3: Linux File System and SSH

1. Linux File System
2. Headless Operations

Section 4: Python with Raspberry Pi

1. Programming with Python
2. Variables and Data Types
3. Conditional Statements and Loops
4. Functions

Project:

- Option 1: IoT enabled vending Machine
- Option 2: IoT Home Automation
- Option 3: Robotic Car Prototype

Course Unit Requirements

Desired

Prerequisite Course Units

- MT02, MT03

Background Knowledge

- Familiarity with robotics concepts such as integrating microcontrollers with sensors and motors
- Understanding of programming concepts such as function calls, conditional statements, loops and recursion

Prior Programming Skills

- Language: C++

Software and Packages Required

- OS: Ubuntu/ Raspberry Pi OS
- Latest Python Release

Hardware Required

- Electronic Components:
 - Microcontroller: Raspberry Pi
 - Necessary Sensors and Motors
- Computing device with internet connectivity

Recommended

Unix / Linux command line/ shell basics

- File commands: ls, cd, pwd, mkdir, rm, cp, mv, touch, cdhmod, tar
- Process management: ps, top, kill pid
- SSH user@host., grep, locate, echo
- Installation: ./configure, make, make install
- Ports

Thank you for learning with alpha **bold**



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