

# Interactive C++

## -with Virtual Robotics(Curriculum)

Duration-48 Hours

### Section 1: Core C++ Fundamentals

#### Module 1: First Steps into C++

##### Lesson 1 – Welcome to C++ World

- What is C++?
- Writing first program: Hello World
- Header files and main()
- Using cout, endl
- Running first program

##### Activity:

- Print name, age, favorite hobby

##### Lesson 2 – Talking to Your Program

- Variables
- Data types
- cin input
- Variable declaration vs initialization

##### Project:

- Personal profile generator

##### Lesson 3 – C++ Expressions and Operators

- Arithmetic operators
- Assignment operators

- Increment/decrement
- Expression building

**Practice:**

- Simple calculator

**Lesson 4 — Making Decisions with Logic**

- Boolean thinking
- if, else
- Comparison operators

**Project:**

- Age eligibility checker

**Module 2: Logic Builders**

**Lesson 5 — Smart Conditions**

- Nested if statements
- Multiple conditions
- Logical operators (&&, ||, !)

**Project:**

- Movie ticket booking system

**Lesson 6 — Logic Gates through C++**

- AND gate
- OR gate
- NOT gate
- Truth tables

**Task:**

- Simulate digital logic

## **Lesson 7 – Ternary Thinking**

- Ternary operator
- Quick decision making

### **Practice:**

- Odd/even checker

## **Lesson 8 – Randomness in Programs**

- Random numbers
- Basic probability

### **Project:**

- Casino Luck Game

## **Module 3: Loops and Pattern Thinking**

### **Lesson 9 – For Loop Foundations**

- Loop syntax
- Counting patterns
- Range problems

### **Practice:**

- Multiplication tables

### **Lesson 10 – While Loop Logic**

- Condition-controlled loops

### **Project:**

- Palindrome checker

### **Lesson 11 – Do While Exploration**

- Guaranteed execution loops

Project:

- Armstrong number checker

## **Lesson 12 – Pattern Challenges**

- Nested loops

## **Module 4: Structured Coding with Functions**

### **Lesson 13 – Why Functions Matter**

- Function creation
- Parameters
- Return values

### **Lesson 14 – Reusable Logic**

- Multiple functions
- Program decomposition

#### **Project:**

- Calculator using functions

### **Lesson 15 – Function Overloading**

- Same name, different inputs

### **Lesson 16 – Recursion Introduction**

- Recursive thinking
- Simple recursion examples

#### **Challenge:**

- Factorial and countdown

## **Module 5: Arrays, Memory, and Problem Solving**

### **Lesson 17 – Arrays Begin**

- 1D arrays

- Indexing
- Traversal

### **Lesson 18 — Arrays in Real Problems**

- Max/min finding
- Search in arrays

#### **Project:**

- Student marks analyzer

### **Lesson 19 — Pointers Made Easy**

- Memory concept
- Pointer basics

### **Lesson 20 — References in C++**

- Reference variables
- Pass by reference

#### **Assessment**

- Coding challenge using arrays + functions

## **Module 6: Beginner OOP Foundations**

### **Lesson 21 — Thinking in Objects**

- Class vs object
- Attributes and methods

### **Lesson 22 — Encapsulation Basics**

- Public/private members

### **Lesson 23 — Constructors Introduction**

- Creating objects properly

### **Lesson 24 — Inheritance Made Simple**

- Parent-child relationships

### **Lesson 25 — Polymorphism Starter**

- Method overriding

### **Lesson 26**

#### **Assessment:**

- Smart Student Management System
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## **Section 2: Virtual Robotics with TinkerCAD**

### **Module 7: First Robotics with Digital Output**

#### **Lesson 27 — Meet TinkerCAD Robotics**

- Interface
- Breadboard basics
- Arduino + C++ connection

#### **Lesson 28 — LED Control Basics**

- Digital output
- Blink logic

#### **Project:**

- Single LED blink

#### **Lesson 29 — Traffic Light System**

- Multiple outputs
- Timing control

#### **Project:**

- Traffic light simulator

## **Lesson 30 — Quiz Buzzer System**

- Push buttons
- Input reading

### **Project:**

- Quiz buzzer game

## **Module 8: Sensors and Analog Thinking**

### **Lesson 31 — Analog Input Introduction**

- analogRead()
- Sensor values

### **Lesson 32 — Night Lamp Automation**

- Light sensor threshold

### **Project:**

- Automatic night lamp

### **Lesson 33 — Temperature Alert System**

- Temperature sensor logic

### **Project:**

- Temperature alarm

### **Lesson 34 — Plant Water Reminder**

- Manual threshold input instead of soil moisture sensor
- Multi-condition alerts using potentiometer / serial simulation

## **Module 9: Timing and Intelligent State Systems**

### **Lesson 35 — Timing Basics with millis()**

- millis()

- Simple timing without delay

### **Lesson 36 – Reaction Time Game**

- Timed responses

#### **Project:**

- Reaction tester

### **Lesson 37 – Password Lock Logic**

- Sequential input handling with fewer states

### **Lesson 38 – Simple Memory Sequence**

- Basic arrays + timing

#### **Assessment:**

- Smart Security Console

## **Module 10: Actuators and Robotics Movement**

### **Lesson 39 – PWM and Smooth Control**

- analogWrite()

### **Lesson 40 – Mood Lamp Design**

- Brightness fading

### **Lesson 41 – Servo Motor Basics**

- Servo library
- Angle control using simple sweep

### **Lesson 42 – Servo Demonstration Project**

- Servo angle positioning only
- Replace robotics arm with simple servo control

## **Module 11: Real Robotics Logic**

### **Lesson 43 – Ultrasonic Distance Sensing**

- Distance measurement using simulated values

### **Lesson 44 – Parking Sensor Assistant**

- Safe zone detection

#### **Project:**

- Parking assistant

### **Lesson 45 – Obstacle Avoidance Robot Brain**

- Scan left/right logic only
- Compare distances

#### **Project:**

- Virtual obstacle avoidance logic

### **Lesson 46 – Smart Elevator Controller**

- Queue logic
- Floor scheduling

#### **Project:**

- Elevator simulator (logic only)

### **Module 12:**

#### **Lesson 47 –48 : Assessment**

Smart Greenhouse Controller

#### **Capstone Projects**

- Parking Assistant
- Elevator Logic Simulator
- Greenhouse Controller

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