

Lesson 3:

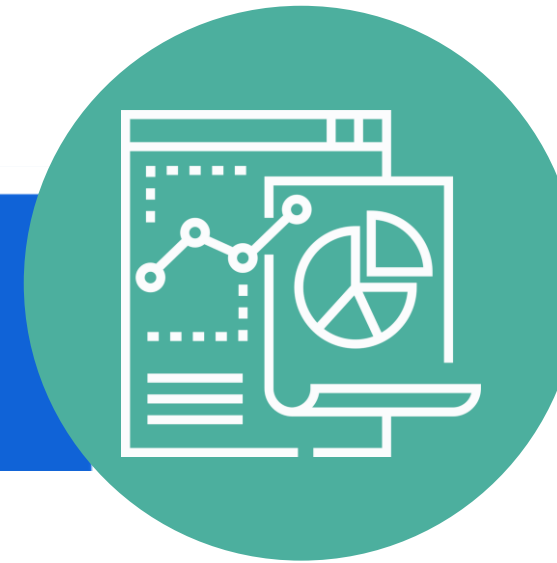
Introduction to Block-Based Programming

Technology



Lesson Objectives

Block-based Programming for Drones: Introduction and Instructions for Environmental Monitoring



Programming with C++ syntax, presenting the basic syntax for programming



What is programming?



- Definition: Block-based programming is a visual way of coding where users create programs by connecting blocks that represent code instructions.
- User-Friendly: Designed to be intuitive and easy for beginners, especially young learners.
- Programming in the C++ language represents the next level of programming, it is a higher degree of difficulty, as it does not have an interface as developed as block-based programming

Why Use Block-Based Programming?

- Simplifies Coding: Eliminates the need to write syntax, reducing the complexity of programming.
- Visual Learning: Enhances understanding of programming concepts through visual representation.
- Encourages Experimentation: Allows learners to experiment with code easily, fostering creativity and problem-solving skills.

Why do we want to demonstrate a comparison between different forms of programming?

We want to show the comparison between different forms of programming to highlight their strengths, weaknesses, and use cases. Each programming paradigm, whether text-based (like Python) or block-based (like Scratch), has a different purpose and appeals to different audiences.

The knowledge of several programming methods enables programming of various controllers from different manufacturer.

By comparing them, we can:

- **Understand accessibility:** Block-based programming is beginner-friendly, while text-based programming offers more flexibility for advanced users.
- **Identify learning pathways:** Highlighting similarities eases the transition from block-based to text-based coding.
- **Appreciate versatility:** Demonstrates how the same logic can be expressed in different forms, enhancing understanding.

Introduction to Scratch programming in Mind+

- Overview: Mind+ is a free, online platform that allows users to create interactive stories, games, and animations using block-based programming.
- Accessibility: Available in multiple languages and can be used on various devices.

Key Features of Scratch

- Blocks: Different types of blocks (motion, looks, sound, events, control, sensing, operators, variables) that perform specific functions.
- Image /video capture, image/ video usage, image/ video format, image /video storage
- Sprites: Characters or objects that perform actions in a Scratch project.
- Stage: The area where the action happens in a Scratch project.
- Scripts: Sequences of blocks that control the behavior of sprites.

Scratch programming with Mind+ for this Project

- Drone flight coding
- Code preparation for video capture and video storage



Scratch program code in Mind+ program Example

- Present a short scratch program code in Mind+ program that showcases how it can be used with drones and sensors
- Walkthrough every part of the program



Introduction to structured text - Python program code with scratch code in Mind+ program



Mind+ program offers us the possibility to write a program in blocks, and it shows the corresponding code in structured text in a separate window.

Comparison between Python program code and Scratch program code

- Scratch uses visual blocks that you drag and connect, making it easy for beginners to learn. It's great for creating simple projects like games and animations.
- Python is text-based, requiring you to write code. It's more powerful and used for complex projects like websites and AI, but it's harder to learn.

Scratch is simpler, while Python offers more possibilities

Discussion Questions for Students

Do you think block-based programming makes programming more fun and accessible?

What part of block-based drone programming seems the most challenging?

What are your questions?



Additional Resources

<https://codeclub.org/en/learn-to-code>

https://www.youtube.com/results?search_query=scratch+drone+coding+tutorial

<https://ardupilot.org/>

<https://scratch.mit.edu/>

<https://github.com/dronekit/dronekit-python>





Thank you for your attention !



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