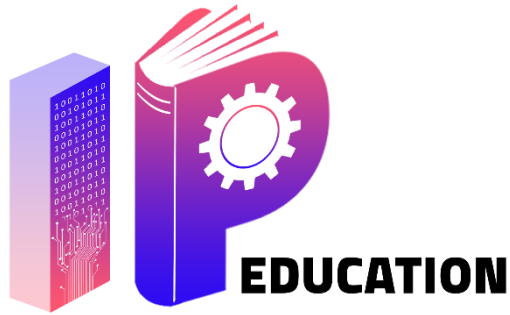




TOT Program

Course Syllabus

Course Title: Robotics Competition Mastery – WRO - Spike Prime & Pybricks

Credit hours: 25

Target audience: Trainers and Teachers

Course Description:

This specialized TOT course is designed for trainers aspiring to master text-based programming and advanced design within the LEGO SPIKE Prime platform, and to expertly prepare team coaches for the World Robot Olympiad (WRO). Trainees will acquire advanced hands-on skills in mechanical design—including gears, lift mechanisms, and structural bases—and will employ sophisticated Python-based programming via the Pybricks platform to control sensors and electronics, culminating in extensive practical applications that ensure professional, competition-level performance.

The Content	Duration (hour)
Fundamentals Subject 1: Revision – Python coding • Variables, datatypes, and methods • Numeric and logic operations • Conditional and looping statements • Lists, tuples, and dictionaries • User-defined functions Subject 2: The work space & technical Jargon • Module • Routine, Coroutine, and coding mechanisms Subject 3: Straight movement & Relative position • Modules, submodules, and methods in use • Synchronous(p) commands vs Asynchronous(a) commands • Asynchronous commands strategy1 • Implementations • Building Custom Functions Subject 4: Rotation around the z-axis • Motion (gyro) sensor • Modules, submodules, and methods in use • Constant Motor-speed technique • Implementations Subject 5: Sensors Operation • The Force sensor • The Distance sensor • The Color sensor • Modules, submodules, and methods in use • Implementations	25

WRO affairs – Advanced

Subject 1: Robot design III

- Interior and exterior structures
- Arms and lifts
- Weight distribution and similarity
- Wheel-effect
- Implementations

Subject 2: Gearing Systems - Advanced

- Mechanisms and principles
- Types and uses
- Gear ratio
- Implementations

Subject 3: Motion Transmission - Advanced

- Mechanisms and principles
- Implementations

Subject 4: Arm Design - Advanced

- Mechanisms and principles
- Implementations

Subject 5: Utilizing Variables

- The principle of variables in coding
- Blocks in use
- Implementations

Subject 6: Lists and Dictionaries

- The programming concept
- Blocks in use
- Storing and fetching data
- Employing mathematical Probability

Subject 7: Introduction to Control Engineering • Traditional control • P and D controllers • PD controller • Acceleration and deceleration Subject 8: Advanced Applications • Missions accomplishing strategies • Line follower • Moving in straight perfectly • Accurate rotating (pivot & spin) • Ramp Acceleration & deceleration • Physical robot reset • Await, async, and parallel commands • Practical Missions accomplishing • Manipulating Probabilities Subject 9: WRO this-year missions implementations	
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Course Requirements:

1. Laptop
2. Spike Prime robotics core & expansion kit

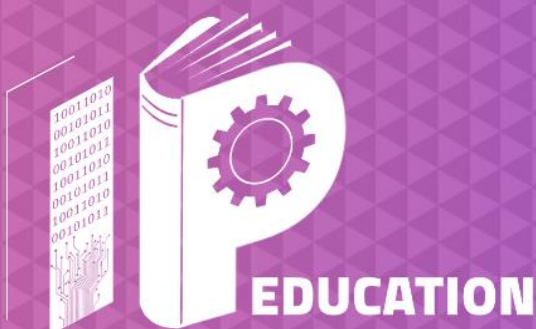
Learning Objectives: By the end of this course, trainees will:

1. Knowledge and Understanding

- A. Understand the basics and fundamentals of text-based coding through python language.
- B. Deeply, understand the required programming skills to use in practical implementations such as programming a robot.
- C. Comprehend the framework of writing a "clean" functional piece of code.
- D. Deeply, understand various programmatic commands for advanced of robot functionalities.
- E. Comprehend the upper intermediate and advanced skills and concepts of mobile Spike robots mechanical design of robots such as vehicles and tanks.

2. Skills and capabilities:

- A. Write mid-levelled to advanced pieces of code.
- B. Use many programmatic commands and programming skills to control and program spike prime robots to perform various missions.
- C. Acquire and develop a bunch of relevant engineering skills and practices.
- D. Use many programmatic commands and programming skills to control and program mobile robots to perform various missions.
- E. Develop and effectively employ the skill of problem-solving, to find different advanced solutions in terms of robots design and programming, many of their soft skills and thinking approaches as well.
- F. Recognize and use the advanced of programming and designing Spike robots which qualifies them to step up into more advanced courses.
- G. Acquire and develop a bunch of relevant engineering skills and practices.



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