SIPP Program Canvas Course

Introduction to Robotics

Class Topics

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| **Class #** | **Hours** | Topics |
| 1 | 1.5 | Introduce engineering and engineering design process, Robotics and applications |
| 2 | 1.5 | Build the Drivetrain of the VEX Clawbot Robot |
| 3 | 1.5 | Write simple programs to drive DC motors: Robots go forward/backward, turn left/ right at different speeds. |
| 4 | 1.5 | Introduce relational and logic operators and programming structure: Running motors in an infinite loop |
| 5 | 1.5 | Program bump sensor and optical shaft encoders: Robots go straight and travel the required distance. |
| 6 | 1.5 | Program bump sensor and optical shaft encoders: Robots go straight and travel the required distance. Part II |
| 7 | 1.5 | Introduce the robotic arm and claw, potentiometer and limit switch:  Building a robotic arm on the chassis and program the arm/claw to grasp an object and move it to another location. |
| 8 | 1.5 | Programming the robot to perform a simple autonomous task of moving an object from one location to another utilizing sensors. |

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| **Week #** | **Hours** | Projects and Tasks |
| 1 | 3 | 1. Introducing the VEX Easy C programming environment. 2. Building the VEX Clawbot Drivetrain |
| 2 | 3 | 1. Programming Simple movement commands. 2. Using simple conditional loops and logic operations to control robot movement |
| 3 | 3 | 1. Using the bump sensor and optical shaft encoders to control the robot movements and create accurate movements. |
| 4 | 3 | 1. Attaching the robot arm and claw to the VEX Clawbot Robot. 2. Programming the robot to actuate the robot arm and claw. 3. Combining drivetrain commands with robot arm and claw. |

SIPP Program Canvas Course

Introduction to Drones

Class Topics

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| **Class #** | **Hours** | Topics |
| 1 | 1.5 | Introduction to drones and drone technology. Introduction to drone design and building process. |
| 2 | 1.5 | Introduction to basic drone components and electronics. Introduction to drone design for additive manufacturing. |
| 3 | 1.5 | Introduction to DJI Tello EDU Drone. Introduction to the Drone Programming environment. Introduction to remote drone piloting. |
| 4 | 1.5 | Programming basic movements with the DJI Tello Drone. |
| 5 | 1.5 | Incorporation of conditional loops and logic operators in drone autonomous programming. |
| 6 | 1.5 | Programming Tello drone with mission pad to complete mission tasks. |
| 7 | 1.5 | Programming Tello drone with mission pad to complete mission tasks. Part II |
| 8 | 1.5 | Programming Tello drone with mission pad to complete mission tasks. Part II |

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| **Week #** | **Hours** | Projects and Tasks |
| 1-2 | 3 | 1. Understanding remote control of drone using a remote control 2. Understanding basic drone movements and programming basic movement commands |
| 3 | 3 | 1. Programming drone autonomous movements to follow specific path plans to achieve tasks. |
| 4 | 3 | 1. Programming drones to follow mission pads placed at specific locations to complete a mission task. |