Introduction to Robotics -- Core

Overview

This beginning robotics course uses VEX EDR Robotics parts and RobotC software to introduce the student to basic programming as well as problem solving strategies. This course will involve students in the development, building and programming of robots to accomplish various tasks. Students will work hands-on in teams to design, build, program and document their progress. Topics may include motor speed, gear ratios, torque, sensors, program loops, project documentation and decision-making. For second semester projects, students are broken into teams of three. Each team has a project manager, a builder, and a programmer.

Objectives

- Design robots and use RobotC programming software for specific activities and scenarios
- Use and analyze gear ratios, torque, timing, sensors, and program loops
- Collaborate in groups and teams

Assessment

Students are assessed through quizzes and group projects focused on building design, programming, and project management skills.

Course Essentials

Equipment	**Cost/Unit**
VEX Parts (Super kit)	$1,100 each (1 set/3 students)
Computers to Run RobotC	$0 if you already have some, $500-600 per computer if you need to purchase

First Semester Outline:

Unit 1: Robotics Building Basics	Safety, Parts Identification, Build a basic clawbot
Unit 2: Gears and Drivetrain speed	Motor Mechanics, Gear Ratios, Wheels and Drivetrains
Unit 3: Gears and Manipulators/Accumulators	Lifting Mechanisms, Throwing Mechanisms, Torque
Unit 4: Sensors	Types of Sensors, Application of Sensors
Unit 5: Programming Basics	Documenting the Process, Basic programming structure, Commenting code, Basic commands
Unit 6: Shaft Encoders	Distance Calculations, Using Shaft encoders instead of time

Second Semester Outline:

Unit 7: Auto-straightening and Variables	Accelerate with autos-straightening, Basketball Slalom Drill, Understand Variables in programming
Unit 8: Line Followers and Conveyor Systems	Follow a Mardi Gras parade route and “throw” a bead
Unit 9: Bump and Limit Switches with Functions	Sentry simulation, Bump into a wall
Unit 10: Understanding Potentiometers	Robodunk for March Madness using potentiometer to raise and lower arm
Unit 11: UltraSonic Sensors	Robodunk using Ultrasonic Sensor to detect distance away
Unit 12: Final Project	Using all sensors, build a robot within the design parameters that can successfully navigate through a mystery maze