IQ Preview: Clawbot with Controller

8 - 15 years old | 45 min - 2 hrs, 50 min | Intermediate

Description

Students will program the VEX Controller to direct the Clawbot IQ through several engaging challenges using the concept of loops.

Key Concepts

How to create, download and run a program Program using events and loopsPairing the Controller to a VEX IQ build How to save a programHow to model with mathematics

Objectives

- Build a VEX IQ Clawbot and configure its Smart Sensors.
- Pair the Controller to a VEX IQ Brain.
- Download the correct project template.
- Describe the purpose of a loop in programming.
- Create event based programs.
- Explore programming blocks used to program the Controller in Tank Mode and test student created programs.

Materials needed:

1. VEX IQ Super Kit
2. VEXcode IQ Blocks
3. Engineering Notebook

STEM Lab Format

The following VEX STEM Lab supports students as they are introduced to completing a VEX Clawbot build, designing programs using loops, and utilizing VEXcode IQ Blocks to program the Controller in Tank Mode. Students will explore how loops benefit various industries that create using repetitive tasks as well as VEX IQ competitive teams.

Seek: The goal of this section is for students to work collaboratively to build the VEX IQ Clawbot and answer exploration questions in their engineering notebook.

- The Completed Look of the Build
  - This page features a picture of a completely built Clawbot that can be used to introduce the STEM Lab. It can be used as a student reference during the building process.
- Parts Needed
  - This page lists all the parts needed to build the Clawbot. It can be used as a student reference during the building process.
- Build Instructions

    - This section features detailed steps for students to follow to build the Clawbot. The Clawbot will be used for the duration of the STEM Lab. Suggested Time Allotment: 60 mins.
- Exploration Questions
    - This page features several discussion questions to pique interest in the Clawbot and its capabilities. Suggested Time Allotment: 5 mins.

Play: The goal of this section is for students to demonstrate how the Clawbot operates and behaves when basic drivetrain commands are used in a program.

- Loops: Simplifying Repetitive Action
    - This page focuses on the importance of precision and consistency in a robot's looped behaviors. Suggested Time Allotment: 5 mins.
- Controller: Tank Drive Exploration - Parts 1 & 2
    - These pages introduce students to programming the VEX IQ Clawbot to move using the Controller. Suggested Time Allotment: 40 mins.

Apply: The goal of this section is to introduce students to how robots interact in their daily lives and the competitive world of robotics.

- Loops in Manufacturing
    - This page will help students understand how robots use loops in the real world to help with repetitive tasks, such as candy making on an assembly line. Suggested Time Allotment: 10 mins. This page is optional.
- Let's Complete!
    - This page introduces students to some of the team competition tasks at VEX Worlds, and how they relate to the driver control with loops. Suggested Time Allotment: 5 mins. This page is optional.

Rethink: The goal of this section is for students to explore ways to use VEXcode IQ Blocks to complete additional event based programs revolving around the Controller in Tank Drive.

- Event-Based Programming: Communication Among Blocks
    - This page introduces students to the idea that event-based programming is like daily life situations that trigger consistent responses. Suggested Time Allotment: 5 mins. This page is optional.
- Controller: Clawbot Control
    - This page prepares students for the Remix Challenges by having them check that the Clawbot is ready. Suggested Time Allotment: 5 mins. This page is optional.
- Remix Challenges
    - This page proposes three challenges for students to complete by continuing to explore and utilize programming blocks. Students will work together to use event-based programming and then test their projects using the Controller. Suggested Time Allotment: 30 mins. This page is optional.

Know: The goal of this section is for students to complete a summative assessment on the content presented in the STEM lab.

- Know Questions
    - Students will answer several multiple-choice assessment questions. Students receive immediate feedback as their answer choices are submitted. Suggested Time Allotment: 5 mins.

Facilitation Notes

- Teacher support, discussion questions, tips, and student assessment are all organized in the STEM lab to give the teacher a successful engagement.
- VEXcode IQ Blocks and VEX OS should be downloaded to each student device that will be used for programming the Clawbot.
- Students should become familiar with the various kit pieces before beginning to build the Clawbot. Each Superkit contains a poster containing relative size representations of all the pieces contained in the kit.

- Batteries should be charged for both the Brain and Controller prior to the start of the STEM lab.
- VEXcode IQ Blocks offers several online tutorials to assist students who may have missed instruction or would like to review.
- An engineering notebook can be as simple as lined paper within a folder or binder. The notebook shown is a more sophisticated example that is available through VEX.

Educational Standards

USA Standards

Standards for Technological Literacy (STL)

- 2.M
- 2.N
- 9.F
- 9.G
- 9.H
- 11.K
- 11.L

Computer Science Teachers Association (CSTA)
Grades 3-5

- 1B-CS-02
- 1B-CS-03
- 1B-AP-08
- 1B-AP-09
- 1B-AP-10
- 1B-AP-11
- 1B-AP-12
- 1B-AP-16

Grades 6-8

- 2-CS-02
- 2-AP-13
- 2-AP-14
- 2-AP-15
- 2-AP-16
- 2-AP-17
- 2-AP-18
- 2-AP-19

Next Generation Science Standards (NGSS)
Grade 3-5

- 3-5 ETS 1-1
- 3-5 ETS 1-2
- 3-5 ETS 1-3

Middle School

- MS-ETS1-2
- MS-ETS1-4

Common Core State Standards (CCSS)
Grades 3-5

- CCSS.MATH.CONTENT.3.OA.A.1
- CCSS.MATH.CONTENT.3.OA.A.3
- CCSS.MATH.CONTENT.3.OA.C.7
- CCSS.MATH.CONTENT.2.MD.A.1
- CCSS.MATH.CONTENT.1.MD.A.2
- CCSS.MATH.CONTENT.4.OA.A.1
- CCSS.MATH.CONTENT.4.OA.A.2
- CCSS.MATH.CONTENT.4.OA.C.5
- CCSS.MATH.CONTENT.5.OA.A.1
- CCSS.MATH.CONTENT.5.MD.B.2

Middle School

- CCSS.MATH.CONTENT.6.EE.A.1
- CCSS.MATH.CONTENT.7.EE.A.1
- WHST.6-8.4
- RST.6-8.3
- CCSS.MATH.PRACTICE.MP4

Texas Essential Knowledge and Skills (TEKS)

- 111.26.b.1
- 111.26.b.12
- 126.16.c.6
- 126.16.c.4

Florida State Standards (CPALMS)

- SC.68.CS-CS.2.13
- SC.68.CS-CS.2.14
- SC.68.CS-CS.2.2
- MAFS.5.MD.1
- MAFS.5.MD.2
- MAFS.5.MD.3-

Indiana Academic Standards (IAS)

- SC.68.CS-CC.1.3
- SC.68.CS-CS.1.1
- SC.68.CS-CS.1.3
- SC.68.CS-CS.1.4
- SC.68.CS-CS.2.10
- SC.68.CS-CS.2.11
- SC.68.CS-CS.2.12
- SC.68.CS-CS.2.13
- SC.68.CS-CS.2.14
- SC.68.CS-CS.2.2
- MA.5.M.1
- MA.5.M.3
- MA.5.DS.1

Australian Standards

- VEX IQ ACARA Mapping
- VEX IQ VIC ACARA Mapping
- VEX IQ Stage 3 Mapping
- VEX IQ Stage 4 Mapping