The VEX V5 Leaderboard is a fun and interactive tool that can be used to display and document student performance in the STEM Labs, keeping students engaged with each other.

Using the VEX V5 Leaderboard with Your Classroom

The VEX V5 STEM Lab are focused around Rethink challenges. Challenges promote collaboration and naturally motivate students to improve their robots, their strategy, and their code. The VEX V5 Leaderboard is designed to help facilitate these challenges by providing an interactive tool for educators to use to present and record challenge data.

Display the leaderboard throughout your challenge to show team scores and ranking, making it easy for students to visualize overall team performance throughout the challenge.

Customizing the Leaderboard for Your Challenge

The steps below outline how to add information and customize the leaderboard for your classroom challenge.

Access the VEX V5 Leaderboard

To access the VEX V5 Leaderboard, go to https://education.vex.com/leaderboard/. Then select the V5 Leaderboard.

Name Your Leaderboard

The leaderboard name text is editable.

Rename the leaderboard by selecting “Leaderboard Name” and edit the text.

Select anywhere outside of the name text or select "Enter" once finished.

Label Score Columns

The score column text is editable.

Rename the columns by selecting the title and edit the text.

Select anywhere outside of the text or select "Enter" once finished.

Select the "+” or “–” icon to add or delete score columns.

Add Team Names

Select a team in the Team Name column to enter a team name in the leaderboard.

Add more teams by selecting the “Add Team” button.

Delete teams by selecting the trashcan icon.

Once you have added all participating teams and score columns, you are ready to start the classroom challenge.

Running a Classroom Challenge with the VEX V5 Leaderboard
The leaderboard makes it easy to run a classroom challenge. The accessible interface allows you to display the time for all students

competing to see, as well as input scores and see team rankings update in real time as the challenge progresses.

Keep Time for Challenges

Select “Start” to start the timer on the leaderboard.

Select “Stop” to end the challenge run and stop the timer.

Select “Reset” to set the timer back to zero for the next run of the challenge.

See Scores and Team Ranking in Real-time

Add team scores by selecting a score in the score column, then add the score. Scores can be changed or overwritten at any time.

Scores for multiple runs are automatically totaled for each team and appear in the "Total Score" column.

As scores are added, the teams will automatically be ordered by rank from highest to lowest score. If two teams have the same score, they will share the same rank.

Document and Celebrate Student Performance

Select “Print Leaderboard” to print or save the the entire leaderboard as a PDF.

The PDF will display the team names as well as the scores.

Select the printer icon to print or save an individual team certificate as a PDF.

The certificate will include the challenge name, team name, team rank, and the team's total score.

Using the VEX V5 Leaderboard

Introduction

The purpose of this article is to offer helpful information for those unfamiliar and just getting started with the 2023–2024 VEX Robotics Competition (VRC) game Over Under. Topics in this article will cover the purpose of building Striker and the next steps to make it your own.

Hero Bots are designed by VEX engineers each year to play the Competition. The Hero Bot design changes from year to year depending on the game, so the Hero Bot for the VRC game Over Under is Striker.Remember, the Hero Bot is designed as a starting point for you to test and improve upon, not an end product. The Hero Bot is designed so that new teams can learn valuable building skills and have a robot they can customize to compete with early in the season. Advanced teams can also use the Hero Bot to be able to quickly assemble a robot to investigate the game's dynamics.

The 2023-2024 Hero Bot is in no way a final product however, a Triball scoring machine. To reiterate, the Hero Bot is a starting point. We here at VEX believe that everyone should have a fair chance at competing in this year’s Competition, thus the Hero Bot is born.Competing can seem intimidating, especially when there are teams who have been competing for many years with a lot of experience.Building Striker, one is able to understand more about the game and what is actually needed in a robot design, rather than just reading it on a piece of paper.

Perusing the Over Under Game Manual, it is hard to exactly envision a robot that performs scoring activities while at the same time obeying rules as a newcomer.This is exactly why Striker has been made and offered to everyone, for the purpose of allowing everyone to start in the same place regardless of experience.

Beginning Robot Design

Think about it this way; there is almost an infinite combination of the parts and connection patterns provided in your VEX V5 Competition Starter Kits (link to poster). With that statement being true, mathematically, anything is possible. You just have to find that exact formula to answer all your problems. The question that arises with

that is this, “Where do I start?”

Starting Line

Believe it or not, once you have built Striker and tested the game, you have already started! When beginning to freely-build, it is definitely worth your while to state why and for what purpose you are freely-building. The questions to these answers have most likely been found through your testing of Striker. It is often helpful to document your thinking and design constraints found in the game manual before you begin to build.

You could make a chart with the goals you want your design to achieve.

Some examples of goals you may want to achieve include:

I want the design to score a Triball.
I want the design to be Elevated at the end of the match.
I want the design to traverse the Long Barrier.

You could also make a chart with the constraints on your design.

Some examples of constraints you may have to consider include:

Only can use 88W of combined power of all motors (11W & 5.5W).
Only can use V5 System parts.
Only can store one Triball at a time.

It is important to lay these questions out not only for the sake of

remembering them, but also to stay on track. With infinite combinations of connections, it can be hard to remember exactly why you started once you have started. Listing your goal and all the limiting factors can help to ensure you create what you originally wanted.

Design, Create, and Iterate

Knowing your goal and constraints sets the stage for designing your solution. Before building, it is important to have a plan. Build Instructions offer a very specific and detailed plan for a build. When free building, plans can be looser, but should involve some kind of sketch of what it is that you are trying to build. This means practice creating a mental model of your idea, transferring that to paper, then matching your drawing to actual pieces from the Kit.

Once you have laid out what you want to achieve with your build and the factors directly in between you and that goal, it is then a balancing act. You must find the perfect balance between your constraints and your goals to create what exactly you set out to achieve. Do not be afraid to try new things! It is important as you experiment with these possible solutions and builds that you do not follow one specific path. With an almost infinite combination of parts in the Kit, there is definitely more than one approach to your problem! Test and iterate on your build to make sure it achieves your goal and still meets your constraints. The entire free building process is loads of fun as it places you in the driver’s seat! Lastly, while this is a competition, it is a friendly competition to say the least.

Visit the VEX Forum and VEX Professional Development Plus (PD+), which has a lot of great resources from other team’s builds! Get inspiration, ask questions, or view solutions to questions you may have that have already been answered by either VEX employees, VEX mentors, or VEX enthusiasts!

Getting Started with VRC '23-'24 Robot Design: Over Under

Introduction

The purpose of this article is to offer helpful information for those unfamiliar and just getting started with the 2023-2024 VEX IQ Robotics Competition (VIQRC) game Full Volume. Topics in this article will cover the purpose of building Byte and the next steps to make it your own.

Hero Bots are designed by VEX engineers each year to play the Competition. The Hero Bot design changes from year to year depending on the game, so the Hero Bot for the VIQRC game Full Volume is Byte.Remember, the Hero Bot is designed as a starting point for you to test and improve upon, not an end product. The Hero Bot is designed so

that new teams can learn valuable building skills and have a robot they can customize to compete with early in the season. Advanced teams can also use the Hero Bot to be able to quickly assemble a robot to investigate the game's dynamics.

The 2023-2024 Hero Bot is in no way a final product however, a Block scoring machine. To reiterate, the Hero Bot is a starting point. We here at VEX believe that everyone should have a fair chance at competing in this year’s Competition, thus the Hero Bot is born.Competing can seem intimidating, especially when there are teams who have been competing for many years with a lot of experience.Building Byte, one is able to understand more about the game and what is actually needed in a robot design, rather than just reading it on a piece of paper.

Perusing the Full Volume Game Manual, it is hard to exactly envision a robot that performs scoring activities while at the same time obeying rules as a newcomer.This is exactly why Byte has been made and offered to everyone, for the purpose of allowing everyone to start in the same place regardless of experience.

Beginning Robot Design

Think about it this way; there is almost an infinite combination of the parts and connection patterns provided in your VEX IQ Competition Kits (link to poster). With that statement being true, mathematically, anything is possible. You just have to find that exact formula to answer all your problems. The question that arises with that is this, “Where do I start?”

Starting Line

Believe it or not, once you have built Byte and tested the game, you have already started! When beginning to freely-build, it is definitely worth your while to state why and for what purpose you are freely-building. The questions to these answers have most likely been found through your testing of Byte. It is often helpful to document your thinking and design constraints found in the game manual before you begin to build.

You could make a chart with the goals you want your design to achieve.

Some examples of goals you may want to achieve include:

I want the design to be able to intake Red Blocks and score them.
I want the design to remove Blocks from the Supply Zone.
I want the design to be very mobile.

You could also make a chart with the constraints on your design.

Some examples of constraints you may have to consider include:

Only can use less than or equal to 6 IQ Smart Motors.
Fit within an 11” wide x 20” long x 15” high (279mm x 483mm x 381mm) volume.
Only be built from the VEX IQ product line.

It is important to lay these questions out, not only for the sake of remembering them, but also to stay on track. With infinite combinations of connections, it can be hard to remember exactly why you started once you have started. Listing your goal and all the limiting factors can help to ensure you create what you originally wanted.

Design, Create, and Iterate

Knowing your goal and constraints sets the stage for designing your solution. Before building, it is important to have a plan. Build Instructions offer a very specific and detailed plan for a build. When

free building, plans can be looser, but should involve some kind of sketch of what it is that you are trying to build. This means practice creating a mental model of your idea, transferring that to paper, then matching your drawing to actual pieces from the Kit.

Once you have laid out what you want to achieve with your build and the factors directly in between you and that goal, it is then a balancing act. You must find the perfect balance between your constraints and your goals to create what exactly you set out to achieve.
Do not be afraid to try new things! It is important as you experiment with these possible solutions and builds that you do not follow one specific path. With an almost infinite combination of parts in the Kit, there is definitely more than one approach to your problem! Test and iterate on your build to make sure it achieves your goal and still meets your constraints. The entire free building process is loads of fun as it places you in the driver's seat! Lastly, while this is a competition, it is a friendly competition to say the least.

Visit the VEX Forum and VEX Professional Development Plus (PD+), which has a lot of great resources from other team's builds! Get inspiration, ask questions, or view solutions to questions you may have that have already been answered by either VEX employees, VEX mentors, or VEX enthusiasts!
Getting Started with VIQRC '23-'24 Robot Design: Full Volume
To get started driving with the 2023-24 VIQRC Hero Bot, Byte, you will need to use a provided code for use with the Controller. The default drive program on the IQ Brain is not compatible with Byte.

Downloading the Controlling Byte Project
To use this code on Byte, select your coding method of choice (Blocks, Python, or C++) and download the VEXcode IQ project from the link below.

Controlling Byte Blocks Project
Controlling Byte Python Project
Controlling Byte C++ Project

Note: These links will take you to a Google Drive file. Check that the name of the file in the top left corner matches the project you want to download (.iqblocks, .iqpython, .iqcpp), then select the Download button in the middle of the screen.

Using the Controlling Byte Project

Open VEXcode IQ on your device and connect your IQ Brain.

For more information about accessing and connecting to the app-based version of VEXcode IQ, view these articles.
For more information about accessing and connecting to the web-based version of VEXcode IQ, view these articles.

Open the Coding Byte VEXcode IQ project. For more information on how to open a project from your device, select the articles that match your project.

Opening VEXcode IQ Blocks Projects
Opening VEXcode IQ Python Projects
Opening VEXcode IQ C++ Projects

Ensure your Controller is paired with the IQ Brain, then download and run the project. For more information on how to download and run a project, select the article that matches your project.

Download and Run a VEXcode IQ Blocks Project
Download and Run a VEXcode IQ Python Project
Download and Run a VEXcode IQ C++ Project

Driving Byte, the 2023-24 VIQRC Hero Bot
The videos in the V5 Workcell Educator Certification Course are an essential resource for educators. There may be instances in which you would like to add them to an LMS, or other instances in which videos from the VEX server may be blocked by network firewalls or other restrictions. In order to provide access to the videos, we have

supplied a shared Google Drive folder containing all of the videos from the V5 Workcell Educator Certification Course.
This article explains the contents and structure of the files in this folder.
Select this link to access the Google Drive folder.

When you open the Google Drive folder, you will see a folder for each Unit of the Certification.

Upon opening one of the Unit folders, you will see a folder for each of the two videos in the Unit: the video that demonstrates the activity for that accompanying STEM Lab, and a video for the facilitation of that activity.

Inside each folder is the video for that Unit.

All videos are named according to the same system. The sections of each video name are separated by underscores and are as listed in this example:

VEX Platform (Workcell)
Certification Unit (Unit 4)
Name of Video (activity)

Caption files for each video are also included in a separate folder. They are provided in .srt and .vtt formats.

Accessing the V5 Workcell Educator Certification Videos for Export
To print to the Console in web-based VEXcode V5, a connection to the user/console web-serial port is needed. This second port is needed because the first serial port links the V5 Brain to the device for project downloads from a browser.
For more information about connecting to the first serial port in web-based VEXcode V5, view these articles.
Note: to print to the Console, the V5 Brain must stay connected to the device via a USB cable while using the user/console web-serial port.
Connecting to the User/Console Web-Serial Port

Ensure the V5 Battery is charged and is connected to the V5 Brain. Turn on the Brain by pressing the Power button on the Brain.

Connect the V5 Brain to your device using the Micro-USB cable.

Ensure the V5 Brain is connected to the device via the first web-serial port. For more information on this connection process, view the article for your device:

Connecting with Web-based VEXcode V5 - Chromebook
Connecting with Web-based VEXcode V5 - Mac
Connecting with Web-based VEXcode V5 - Windows

The Brain icon should be green and the Brain name/Team number should appear.

Select ‘Connect User / Console Serial Port.’

macOS/Chromebook

Windows

Select each image above to enlarge.
A prompt will appear. It will appear slightly different between macOS/ Chromebook and Windows, select ‘Continue.’

macOS/Chromebook

Windows

Select each image above to enlarge.

macOS/Chromebook: select the V5 Brain with the HIGHEST ID number from the list of Brains available. The lowest ID number should already be paired.

Windows: Select 'User Port.' The Communications Port should already be paired.

macOS/Chromebook

Windows

Select each image above to enlarge.
Select 'Connect' once your choice is highlighted.

The User / Console Port will display as ‘Connected’ once the connection is successful.

Disconnecting from the User/Console Web-Serial Port

To disconnect your device from a V5 Brain, unplug the Micro-USB cable from your device or the V5 Brain.

You can also disconnect a V5 Brain from web-based VEXcode V5 by turning the Brain off.
Turn the Brain off by holding the Power button until the screen on the Brain goes black.

Both of the methods above will disconnect the V5 Brain from both web-serial ports, showing the V5 Brain icon as white.

Connecting to the User/Console Port in Web-Based VEXcode V5

Playing custom imported sounds is a unique function in the VEXcode V5 software. This article will walk you through where and how to import sounds into VEXcode V5, the setup required to ensure the sounds play properly, and an explanation of how the play VEXcode sound command works.

VEXcode V5 Blocks

VEXcode V5 Python

VEXcode V5 C++

Select each image above to enlarge.

Accessing the Play VEXcode Sound Command
By default, the play VEXcode sound command does not appear in the toolbox on the left side of the screen. The following steps explain how to enable the command.

Navigate to the File menu. Select ‘Tools’ and ‘Manage VEXcode Sounds.’
Note: this image shows blocks in the toolbox but the process is the same for C++ and Python projects.

The Manage VEXcode Sounds menu will then appear.

Select the check box to enable the play VEXcode sound command.

Functionality of the Manage VEXcode Sounds Menu
The Manage VEXcode Sounds menu is used to add sounds, edit sound names, and delete sounds.
Add a sound

Find an open row.

Enter the sound name into the associated ‘Name’ box.
When you input a new name, a blank row appears below the current row.

Paste the associated sound file URL into the same row as the new name.

When finished, select ‘Save Sounds.’

To edit the Manage VEXcode Sounds menu, select ‘Cancel.’
Save changes before hitting 'Cancel' to avoid losing any edits.

Delete a sound

Click the trash can icon to delete the sound linked to that row.

Select ‘Save Sounds’ to save the changes or ‘Cancel’ to exit the menu.
Note: at least one sound must always be listed in the table. The trash can icon will be grayed out when only one sound is left, to ensure one sound remains.

Edit a sound

You can edit a sound’s name or file URL by selecting it.

Select ‘Save Sounds’ to save the changes or ‘Cancel’ to exit the menu.

Connecting to the User/Console Port
To play custom sounds in web-based VEXcode V5, a connection to the user/console web-serial port is needed. This second port is needed because the first serial port links the V5 Brain to the device for project downloads from a browser.

For steps on how to connect the V5 Brain to the user/console port, view this article.

To play custom sounds, the V5 Brain MUST stay connected to the device via a USB cable while using the user/console web-serial port.

Using the Play VEXcode Sound Command
Drag and attach or type the play VEXcode sound command to your project. For more information on how the block functions, view the Help.

Help for VEXcode V5 blocks
Help for VEXcode V5 Python
Help for VEXcode V5 C++

VEXcode V5 Blocks

VEXcode V5 Python

VEXcode V5 C++

Select each image above to enlarge.

Since the sounds play through the connected device, ensure the volume is up when playing sounds.

Ensure the V5 Brain remains connected to the device via a USB cable while the project is downloaded and running.

Note: custom sounds are stored into the VEXcode V5 project and will function as long as the specific project is loaded. If VEXcode V5 is closed or a new project is loaded, the sounds will not operate. However, upon reloading the original project file, the custom sounds will resume playing as anticipated.

Playing Custom Imported Sounds in a VEXcode V5 Project

The VEX Robotics Competition (VRC) Spin Up Playground in VEXcode VR and the accompanying VRC Activity Lab, can be used as part of your curriculum. This Activity Lab walks you through coding the robot to remove discs from dispensers and then score the discs.

Overview of the VRC Spin Up Activity Lab

VEXcode VR Activity Labs are sequenced Activities with some additional scaffolding and supports added to help students as they complete the Lab. The Activities are all designed to be student-facing so they can be used to extend student engagement with VEXcode VR Playgrounds, like VRC Virtual Skills - Spin Up. Activity Labs are designed to be flexible, so that students can engage with them as is, or activities can be extended or adapted to best meet your students needs and your teaching style

Each Activity in the Lab includes an overview of what the robot should accomplish, a bulleted list to help break down the task into smaller components, and helpful hints if students need assistance while coding.

There are 12 Activities that make up the VRC Spin Up Activity Lab. All of these Activities are listed below, including what concepts are covered, and the number of each activity.

In Take It and Leave It (1) and Intake and Score High (2), students will code the intake discs from the field and score them in both the low and high goals. They will learn how to use the Intake motor in order to accomplish each of the tasks.

In Roll It Red (3), students are challenged to drive to a roller on the field then use the Optical Sensor to spin the roller until it is red. They will learn how to use the Intake motor group with the rollers and how to use the Optical Sensor in a VEXcode project.

In Where to Start (4), students will explore the different starting locations available and then put together all of their skills from the previous activities to intake and score two discs.

In GPS Guidance (5) and Load It and Launch It (6), students will use sensors to collect discs and score them in the high goal. GPS Guidance has students use the GPS Sensor on Disco, the Hero Robot, and Load It and Launch It has students use the Bottom Distance Sensor to detect when a disc has been moved onto the field through the loaders.

In Score a Pile of Discs (7) and Three Discs, One Launch (8) students will continue to use sensors to gather and score discs. In Score a Pile of Discs, students are introduced the Line Trackers placed throughout the intake to detect how many discs have been gathered by the robot.
In the Three Discs, One Launch Activity, students will use the Bottom Distance sensor to drive the Hero Bot to the three Discs highlighted in green, pick up the three Discs, and score them in the blue High Goal.

In Be Efficient! (9), students are challenged to take what they have learned about coding the different sensors on Disco, the Hero Robot, and apply them to score six discs as fast as possible.

In Along the Shortest Path (10) and Aim the Target (11), students will apply the GPS Sensor, the Optical Sensor, the intake motor group, and the Bottom Distance sensor in order to gather discs, score them, and spin rollers.

In Smart Plan (12), students will apply all of the skills they have learned in Activities 1 through 12 to get their highest possible score in VRC Spin Up!

Teacher Resources

The VRC Spin Up Activity Lab is a sequenced version of the Spin and Score, Take It and Leave It, Roll It Red, Load It and Score, and Location, Location, Location VEXcode VR Activities. Solutions for each activity can be found in the VEXcode VR Teacher Portal and is also linked here.

To help facilitate your students completing this Activity Lab, you can also use the following VEX Library articles.

View this article to learn more about facilitating coding conversations with students.

Learn more about using pair programming to support student collaboration in this article.

Read this article to learn about helping students to build resilience as they work through a project.

To learn about the robot used in the VRC Spin Up Playground, the features of the Playground, and more, see these articles from the VEX Library.

Teaching with the VRC Spin Up Activity Lab

Using Match Loads in VRC Over Under for VEXcode VR

Understanding the VRC Over Under Field Layout

Identifying Location Details Using the GPS Sensor in the VRC Over Under Playground

Using the VRC Over Under Playground Window

Using the Pre-Match Checklist in VRC Virtual Skills

Submitting a Score for VRC Over Under Virtual Skills in VEXcode VR

Get Started with the VRC Over Under Playground

Understanding Robot Features in VRC Over Under

Get Started with VIQC Full Volume Playground

The Field in the VRC Tipping Point Playground in VEXcode VR has the same dimensions and setup as the Field for an in-person Skills Match in the 2021-2022 VRC Tipping Point Competition game. This information can be useful when creating projects in VRC Tipping Point for VEXcode VR.

Field Dimensions

Each tile on the Field is 600mm by 600mm (~24 inches by 24 inches).

The Field is six full tiles long. In total, the Field is 3.65m (~12 feet) long, as indicated by the blue line in this image.
The Field is six full tiles wide. In total, the Field is 3.65m (~12 feet) wide, as indicated by the red line in this image.

Measurement Notes

Each full tile measurement begins and ends at the edge of the tile.

The total Field measurements begin and end at the inner edge of the Field perimeter.

Understanding the VRC Tipping Point Field Layout

The Field in the VIQC Pitching In Playground in VEXcode VR has the same dimensions and setup as the Field for an in-person Skills Match in the 2021-2022 VIQC Pitching In Competition game. This information can be useful when creating projects in VIQC Pitching In for VEXcode VR.

Field Dimensions

Each full black square on the Field is 300mm by 300mm (~12 inches by 12 inches).

Each half black square on the Field is 150mm by 300mm (~6 inches by 12 inches).

Each corner on the Field is 150mm by 150mm (~6 inches by 6 inches).

The Field is 5 full black squares, and two half-squares long.
In total, the Field is 1.8m (~6 feet) long.

The Field is 7 full black squares, and two half-squares wide.
In total, the Field is 2.4m (~8 feet) wide.

Measurement Notes

Each full square measurement begins and ends at the center of the black line on the Tile.

Each partial square measurement begins at the center of the black line and ends at the inner edge of the wall.

The total Field measurements begin and end at the inner edge of the walls.

Understanding the VIQC Pitching In Field Layout
The Field in the VIQC Slapshot Playground in VEXcode VR has the same dimensions and setup as the Field for an in-person Skills Match in the 2022-2023 VIQC Slapshot Competition game. This information can be

useful when creating projects in VIQC Slapshot for VEXcode VR.

Field Dimensions

Each full black square on the Field is 300mm by 300mm (~12 inches by 12 inches).

Each half black square on the Field is 150mm by 300mm (~6 inches by 12 inches).

Each corner on the Field is 150mm by 150mm (~6 inches by 6 inches).

The Field is 5 full black squares, and two half-squares long.
In total, the Field is 1.8m (~6 feet) long.

The Field is 7 full black squares, and two half-squares wide.
In total, the Field is 2.4m (~8 feet) wide.

Measurement Notes

Each full square measurement begins and ends at the center of the black line on the Tile.

Each partial square measurement begins at the center of the black line and ends at the inner edge of the wall.

The total Field measurements begin and end at the inner edge of the walls.

Understanding the VIQC Slapshot Field Layout

The VEX IQ Competition (VIQC) Slapshot Playground in VEXcode VR and the accompanying VIQC Activity Lab, can be used as part of your curriculum. This Activity Lab walks you through coding the robot to remove discs from dispensers and then score the discs.

Overview of the VIQC Slapshot Activity Lab

VEXcode VR Activity Labs are sequenced Activities with some additional scaffolding and supports added to help students as they complete the Lab. The Activities are all designed to be student-facing so they can be used to extend student engagement with VEXcode VR Playgrounds, like VIQC Virtual Skills - Slapshot. Activity Labs are designed to be flexible, so that students can engage with them as is, or activities can be extended or adapted to best meet your students needs and your teaching style.

Each Activity in the Lab includes an overview of what the robot should accomplish, a bulleted list to help break down the task into smaller

components, and helpful hints if students need assistance while coding.

There are 10 Activities that make up the VIQC Slapshot Activity Lab. All of these Activities are listed below, including what concepts are covered, and the number of each activity.

In Knock the Dispensers (1) and Spin the Dispensers (2), students will code the robot to remove discs from all three types of dispenser (blue, yellow, and purple). They will learn how to use the Intake and Arm motors in order to accomplish each of the tasks.

In Take It and Score It (3), students will build on their code to pick up one of the discs released from a dispenser using the Intake, then score the disc. This furthers their understanding of the Intake motor to get a higher score in Slapshot.

In Where to Start (4) and Time It! (5), students will explore the different starting locations available and then put together all of their skills from the previous activities to clear discs from three dispensers in the fastest time possible.

In Explore Locations (6) and Follow the Shortest Route (7), students will create a coordinate system for the VIQC Slapshot Playground and use the coordinates to perform calculations to move from one location to another using the shortest possible route.

In Aim the Goal Zone (8) and Multitasking Snapshot (9), students continue to use their coordinate grid to move to dispensers and remove discs from the dispensers. They are challenged to change the velocity of the Intake to score as many discs in the 4-point zone as possible. They will apply their skills with the coordinates to plan the trajectory of the disc.

In Smart Planner (10), students will apply all of the skills they have learned in Activities 1 through 9 to get their highest possible score in VIQC Slapshot!

Teacher Resources

The VIQC Slapshot Activity Lab is a sequenced version of the Dispenser Dash, Take a Shot, and Aiming Disks VEXcode VR Activities. Solutions for each activity can be found in the VEXcode VR Teacher Portal and is also linked here.

To help facilitate your students completing this Activity Lab, you can also use the following VEX Library articles.

View this article to learn more about facilitating coding conversations with students.

Learn more about using pair programming to support student collaboration in this article.

Read this article to learn about helping students to build resilience as they work through a project.

To learn about the robot used in the VIQC Slapshot Playground, the features of the Playground, and more, see these articles from the VEX Library.

Teaching with the VIQC Slapshot Activity Lab

Welcome to the VRC Over Under Playground in VEXcode VR! As a registered VRC Team for the 2023-2024 season, you can play VRC Over Under Virtual Skills in VEXcode VR and submit your score to the VRC Virtual Skills Leaderboard during the season. View this article to learn more about accessing VRC Over Under with your team registration information.

If you are not a registered VRC team for the 2023-2024 season, you must have a VEXcode VR Premium License to use the VRC Over Under Playground in VEXcode VR. Once you have a Premium License, you will activate your License Key to log in to VEXcode VR and access the VRC Over Under Playground.
Watch the following video to learn how to get started with the VRC Over Under Playground in VEXcode VR.

Articles to Help You Get Started

To get started, learn about the ways to score points in the Over Under game manual. Then, for added challenges, learn more about Striker, the Hero Bot for the game, and other details about the Field in order to strategize and improve your score.

Before diving into coding, it is important to understand Over Under and how it is played . Read the scoring section of the Game Manual to learn more, and begin developing your scoring strategy.

Try using the Example Projects to see possible ways to code Striker to move and score in different ways. To learn more about accessing Example Projects in VEXcode VR, view this article for Blocks projects, or this article for Python projects.

Get familiar with the Over Under Playground Window in VEXcode VR and its features, like the camera angles, so that you can strategize your gameplay. View this article to learn more about the Playground Window.

Learn about starting locations and the rest of the Pre-Match Checklist in this article.

Read about the Field dimensions and layout on the VRC Over Under Playground to help plan your project. View this article to learn more.

Check out Striker, the Hero Bot for Over Under, and all of its controls, sensors, and features, so you can code the robot to score in different ways. Learn more about the robot's features in this article.

Virtual Striker is equipped with a GPS Sensor so that you can you use location details and sensor feedback to navigate the Field. Learn more about using the GPS Sensor in Over Under in this article.

Looking for more?

Want to learn more advanced coding to help you beat your high score? VEXcode is used with all VEX Robotics platforms. Check out the Computer Science Level 1 – Blocks course or the Computer Science Level 1 – Python course and learn more about coding with VEXcode!

Get Started with the VRC Over Under Playground in VEXcode VR
Welcome to the VIQRC Full Volume Playground in VEXcode VR! As a registered VIQRC Team for the 2023-2024 season, you can play VIQRC Full Volume Virtual Skills in VEXcode VR and submit your score to the VIQRC Virtual Skills Leaderboard during the season. View this article to learn more about accessing VIQRC Full Volume with your team registration information.
If you are not a registered VIQRC team for the 2023-2024 season, you must have a VEXcode VR Premium License to use the VIQRC Full Volume Playground in VEXcode VR. Once you have a Premium License, you will activate your License Key to log in to VEXcode VR and access the VIQRC Full Volume Playground.
Watch the following video to learn how to get started with the VIQRC Full Volume Playground in VEXcode VR.

Articles to Help You Get Started
To get started, learn about the ways to score points in the Full Volume game manual. Then, for added challenges, learn more about Byte, the Hero Bot for the game, and other details about the Field in order to strategize and improve your score.

Before diving into coding, it is important to understand Full Volume and how it is played. Read the scoring section of the Game Manual to learn more, and begin developing your scoring strategy.

Try using the Example Projects to see possible ways to code Byte to move and score in different ways. To learn more about accessing Example Projects in VEXcode VR, view this article for Blocks projects, or this article for Python projects.

Get familiar with the Full Volume Playground Window in VEXcode VR and its features, like starting locations and camera angles, so that you

can strategize your gameplay. View this article to learn more.

Check out Byte, the Hero Bot for Full Volume, and all of its controls, sensors, and features, so you can code the robot to score in different ways. Learn more about the robot's features in this article.

Curious about the dimensions and features of the VIQRC Field? Learn more about the Field in this article, to help you as you start planning your project.

Looking for more?
Want to learn more advanced coding to help you beat your high score? VEXcode is used with all VEX Robotics platforms. Check out the Computer Science Level 1 - Blocks course or the Computer Science Level 1 - Python course and learn more about coding with VEXcode!
Get Started with VIQRC Full Volume Playground in VEXcode VR

Understanding Robot Features in VIQC Full Volume for VEXcode VR

Understanding the VIQC Full Volume Field Layout

Using the VIQC Full Volume Playground Window

Submitting a Score for VIQC Full Volume Virtual Skills in VEXcode VR
You can use the GPS Sensor to help you navigate the VRC Over Under Playground in VEXcode VR, with the (X, Y) coordinates of locations.

How the GPS Sensor Works in VRC Over Under in VEXcode VR

The GPS (Game Positioning System) Sensor, uses the VEX Field Code on the interior of the Field to triangulate X, Y position and heading. That checkerboard pattern in the Field Code is used to identify the location for each individual block in that pattern. The VEX GPS is an absolute position system, so it does not drift nor does it require calibration on a per-field basis.
To sense the Field Code, the VEX GPS Sensor, a black and white camera, is mounted on the rear of the robot and faces rearwards.
The GPS Sensor reports the (X, Y) coordinates of the center of rotation of Striker on the Field, in millimeters or inches.

Identifying (X, Y) Coordinates on the VRC Field
The VRC Over Under Field in VEXcode VR ranges from approximately -1800mm to 1800mm for the X and Y positions. The starting location of

Striker depends on the starting position selected.
The center location, or the origin (0,0), is located in the center of the Field.

Identifying the (X, Y) Coordinates of the GPS Sensor

The GPS Sensor can be used to identify the X and Y coordinates of Striker on the Field. These coordinates reflect the location of Striker's center of rotation, which is located between the front wheels, as indicated in this image.

Reporter blocks from the Sensing category in the Toolbox can be used to report positional values from the GPS Sensor in your project.

The current X and Y coordinates of Striker's GPS Sensor on the Field can be displayed in the Print Console using blocks from the Looks category in the Toolbox.

Using the GPS Sensor to Help Striker Navigate the Field
You can use the GPS Sensor to help Striker navigate the Field by driving to specific locations using your knowledge of the Cartesian coordinate system. Using the GPS Sensor, Striker can drive along the X or Y-axes until the value of the sensor is greater than or less than a threshold value. This allows Striker to drive using sensor feedback instead of set distances.

In this project, Striker will drive forward from starting position A, until the value of the Y-axis is greater than -1000 millimeters (mm), then stop, placing Striker in position to turn and collect a Triball.
Note: You may have to account for the robot’s inertia or drift when setting your parameters.

GPS Sensor Location and the Center of Rotation on Striker

The GPS Sensor is mounted in the rear of the robot, whereas Striker's center of rotation is located in the front of the robot.
The GPS Sensor is configured in VRC Over Under in VEXcode VR to account for this offset (approximately -150 mm on the X axis, and -295 mm on the Y axis), so that the values that are reported reflect the center of rotation of Striker.

(X, Y) Coordinates of Game Elements in VRC Over Under for VEXcode VR

Knowing the coordinates of game elements, like the Triballs and scoring zones, can help you plan your projects in VRC Over Under in VEXcode VR.
The following reference is provided as a guide, based on the Field setup at the start of each Match, for the approximate center point coordinate locations of the game elements on the VRC Field in the Playground.
Scoring Zone Coordinates

Triball Coordinates

Post Coordinates

Identifying the GPS Heading of Striker

The GPS Sensor can also be used to identify the GPS heading. The heading ranges from 0 degrees to 359.9 degrees, following a compass heading style.
When using the GPS Sensor to detect location, the GPS heading will remain constant in relation to the Field, regardless of the starting position of the robot.

Identifying Location Details Using the GPS Sensor in the VRC Over Under Playground

To begin your Virtual Skills Over Under Match, you must use the Pre-Match checklist to select your robot starting location, your robot starting direction, whether or not your robot has a preload, and the Field preload location.

For more information about Match Load Triballs, view the VRC 2023-2024 Over Under Game Manual and Appendix B - Robot Skills Challenge.

How to Choose a Starting Location

When you open the VR Virtual Skills Over Under Playground, the Pre-Match Checklist will be visible. The first item in the checklist is the starting location.

The default starting location is "E". To choose a different starting location, select the Edit button in the Pre-Match Checklist.

Then select the letter that corresponds to the desired starting location.

How to Choose a Starting Direction

Select the Starting Direction box in the Pre-Match Checklist. Two arrow buttons will appear beside Striker.

Select the arrow button to rotate Striker to face your chosen starting direction.

How to Select Robot Preloads and Field Preload Locations

The Robot Preload setting defaults to 'Yes.' If you do not want to start with a preload, select the toggle switch to turn it to 'No.' The preloaded Triball will removed from Striker.

To change your Field Preload Location, select the Field Preload Location Box in the Pre-Match Checklist, and then select the Edit button.

Next, select the number that corresponds to your desired Field Preload Location. Select the 'Done' button when you are finished.

How to Close and Reopen the Pre-Match Checklist

When you open the VRC Over Under Playground, the Pre-Match Checklist will be open. After you have finished making your selections, select the 'Begin Run' button to close the Pre-Match Checklist.

To reopen the Pre-Match Checklist, select the 'Starting Position' button on the left side of the Playground Window.
For additional information about using the VRC Over Under Virtual Skills Window, see this article.

Using the Pre-Match Checklist in VRC Virtual Skills

The Field in the VRC Over Under Playground in VEXcode VR has the same dimensions and setup as the Field for an in-person Skills Match in the 2023-2024 VRC Over Under Competition game. This information can be useful when creating projects in VRC Over Under for VEXcode VR.

Field Dimensions

Each tile on the Field is 600mm by 600mm (~24 inches by 24 inches).

The Field is six full tiles long. In total, the Field is 3.65m (~12 feet) long, as indicated by the blue line in this image.
The Field is six full tiles wide. In total, the Field is 3.65m (~12 feet) wide, as indicated by the red line in this image.

Measurement Notes

Each full tile measurement begins and ends at the edge of the tile.

The total Field measurements begin and end at the inner edge of the Field perimeter.

Understanding the VRC Over Under Field Layout