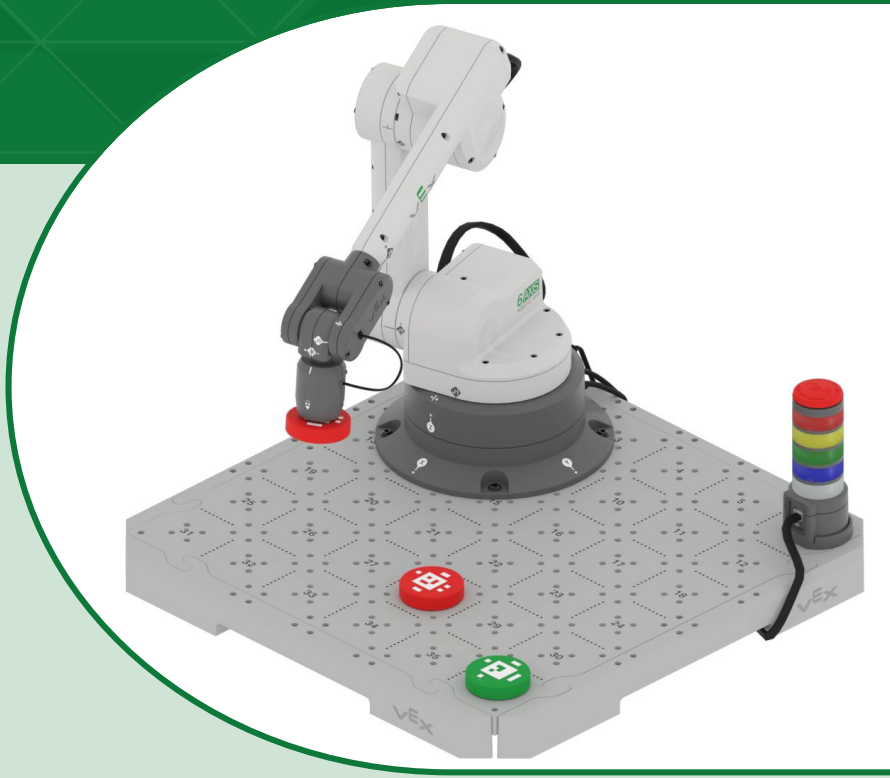
Robotics for Career and Technical Education

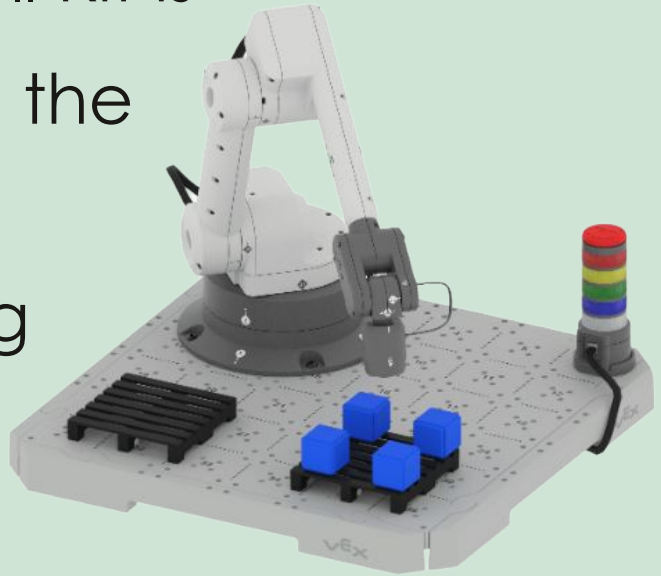


Audra Selkowitz
Senior Education Developer, VEX Robotics

VEX CTE

Workshop Goals

- Identify what a 6-Axis Robotic Arm is
- Understand what the CTE Workcell Kit is
- Practice using the 6-Axis Arm with the Teach Pendant
- Identify how to get started coding the 6-Axis Arm in VEXcode EXP
- Move objects with the 6-Axis Arm

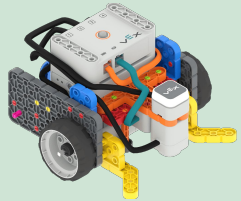


The VEX Continuum

VEX 123

Coding Starts Early

Ages 4+



VEX GO

STEM Starts Early

Ages 8+

VEX AIM

Real World Coding

Ages 8+

VEX IQ

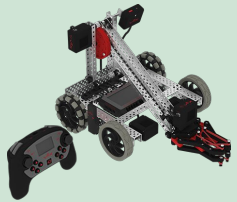
Applied STEM Learning

Ages 11+

VEX EXP

Real World STEM for Classrooms

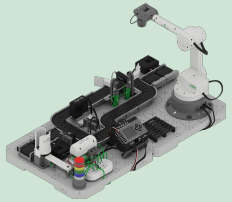
Ages 14+



VEX V5

Real World STEM for Competition

Ages 14+



VEX CTE

Workforce Readiness

Ages 14+

VEX AIR

STEM Skills Take Flight

Ages 14+

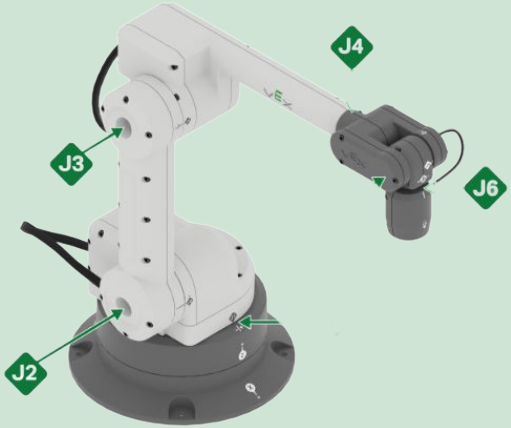
VEX CODE VR

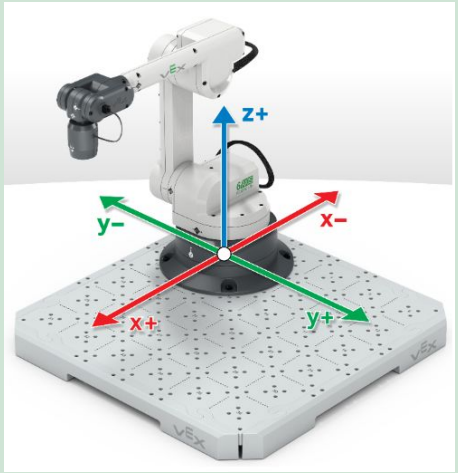
Virtual Robot Coding

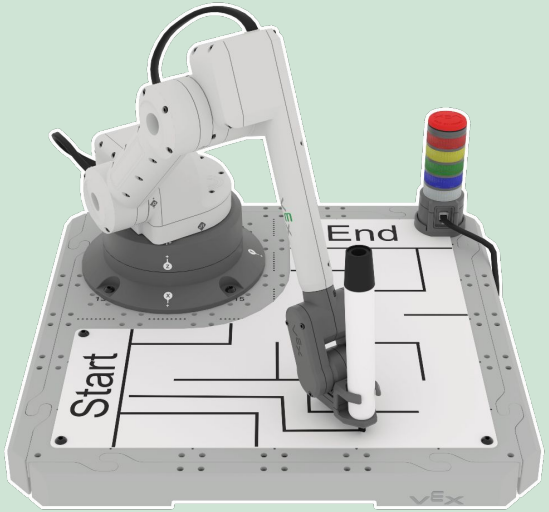
Ages 8+

Introducing the 6-Axis Robotic Arm

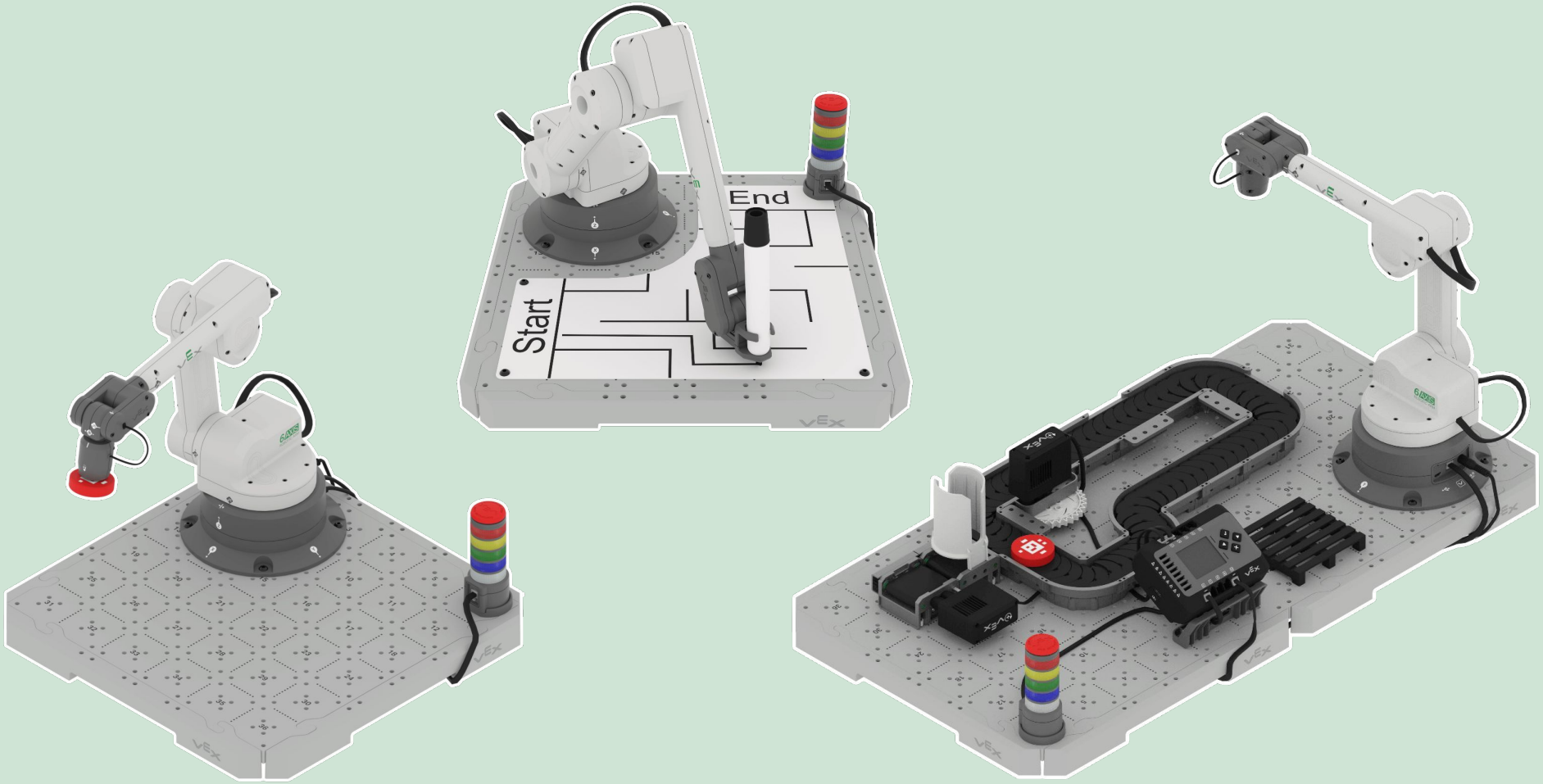
- 6-Axis corresponds to 6 Degrees of Freedom
- Moves in the Cartesian Coordinate System
- 2 End Effectors — Magnet Pickup Tool and Pen Holder Tool
- Direct Connection or EXP Brain



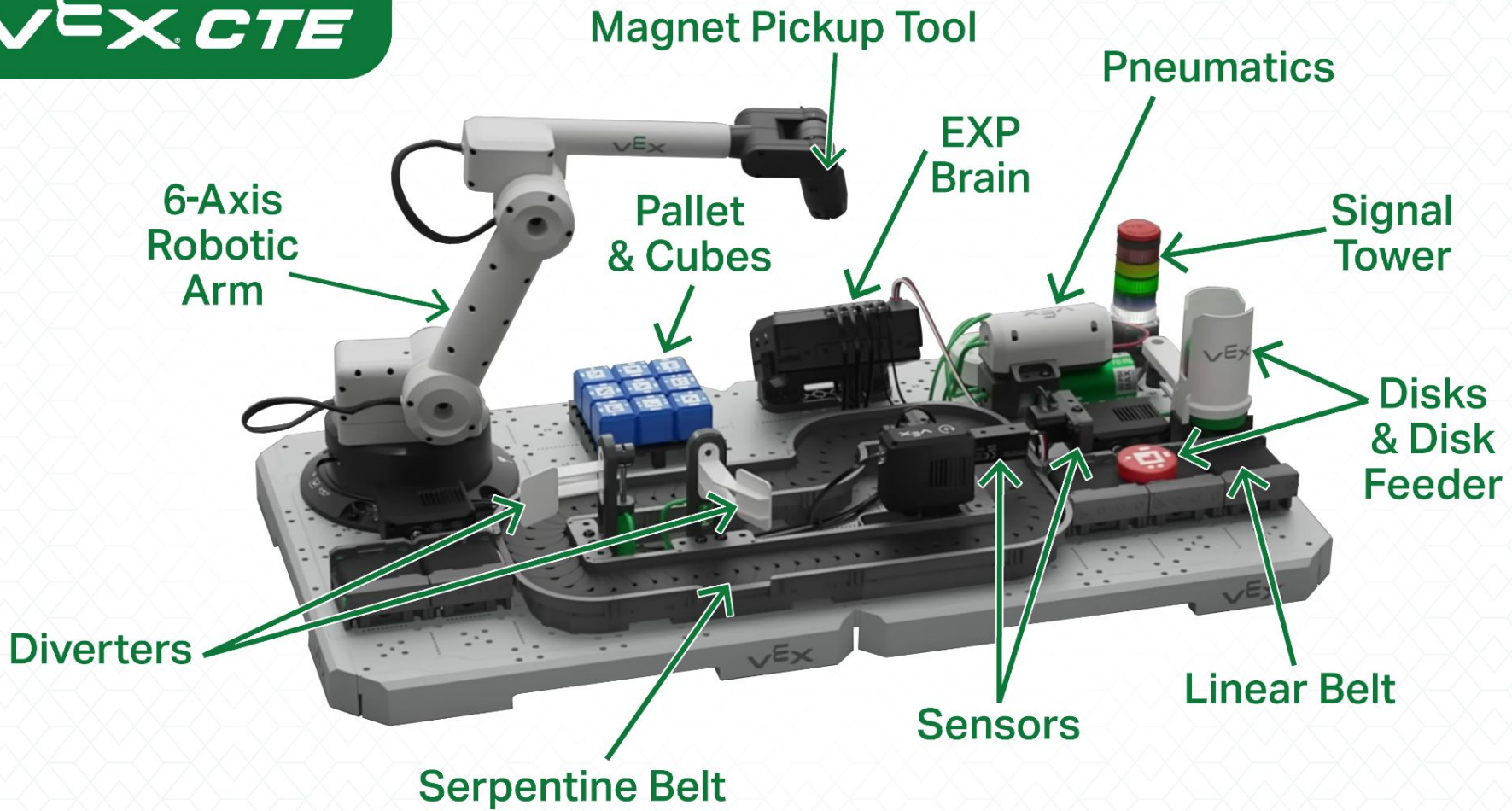


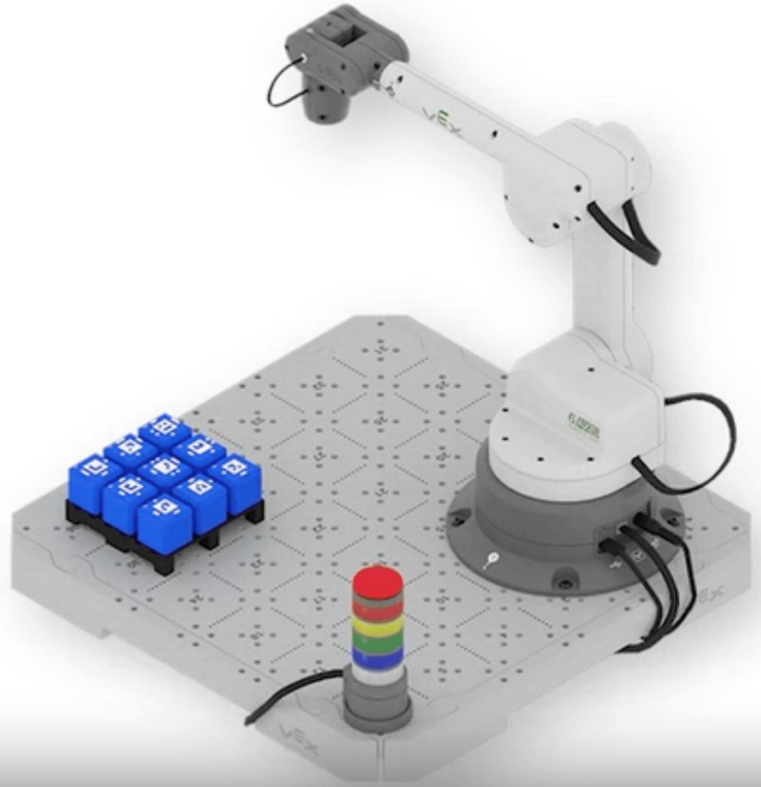


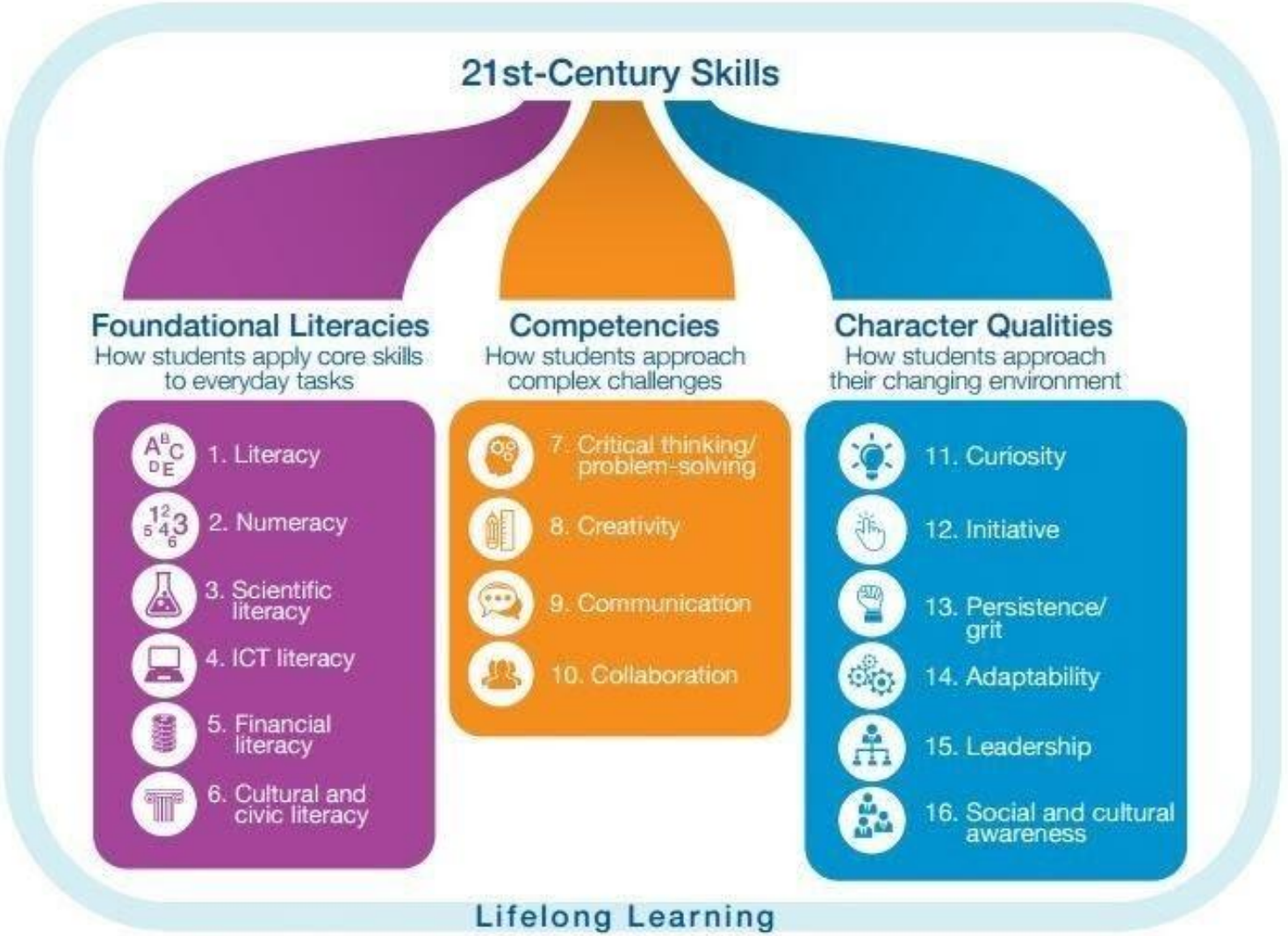
Building up with the VEX CTE Workcell


End
Start

VEX CTE


Magnet Pickup Tool
Pneumatics
EXP Brain
6-Axis Robotic Arm
Pallet & Cubes
Signal Tower
Disks & Disk Feeder
Diverters
Sensors
Linear Belt
Serpentine Belt




21st-Century Skills
Foundational Literacies
How students apply core skills to everyday tasks
1. Literacy
2. Numeracy
3. Scientific literacy
4. ICT literacy
5. Financial literacy
6. Cultural and civic literacy
Competencies
How students approach complex challenges
7. Critical thinking/ problem-solving
8. Creativity
9. Communication
10. Collaboration
Character Qualities
How students approach their changing environment
11. Curiosity
12. Initiative
13. Persistence/ grit
14. Adaptability
15. Leadership
16. Social and cultural awareness
Lifelong Learning

Let’s Get Our 6-Axis Arms Moving!

Using the VEXnet Server

VEXnet Server

Everything you need to teach with VEX can be accessed directly from this local server. The VEXnet Server is ideal for classrooms, workshops, and events where internet access is limited.

Select a platform tile below to access VEXcode, curriculum, build instructions, and resources from the VEX Library and API Reference.

← Return to Home

VEX CTE Workcell

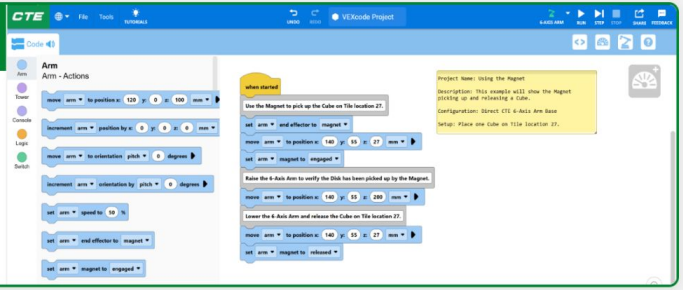
Everything you need to get started coding, teaching, building, and learning with VEX CTE is provided below.

VEXcode

Code your robot with VEXcode.

Open VEXcode EXP (web-based)

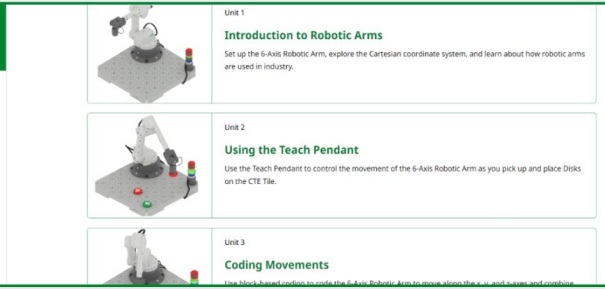
Install VEXcode EXP to your device



Curriculum

Access STEM Labs, Activities, and Activity Series to teach with VEX.

Curriculum for VEX CTE



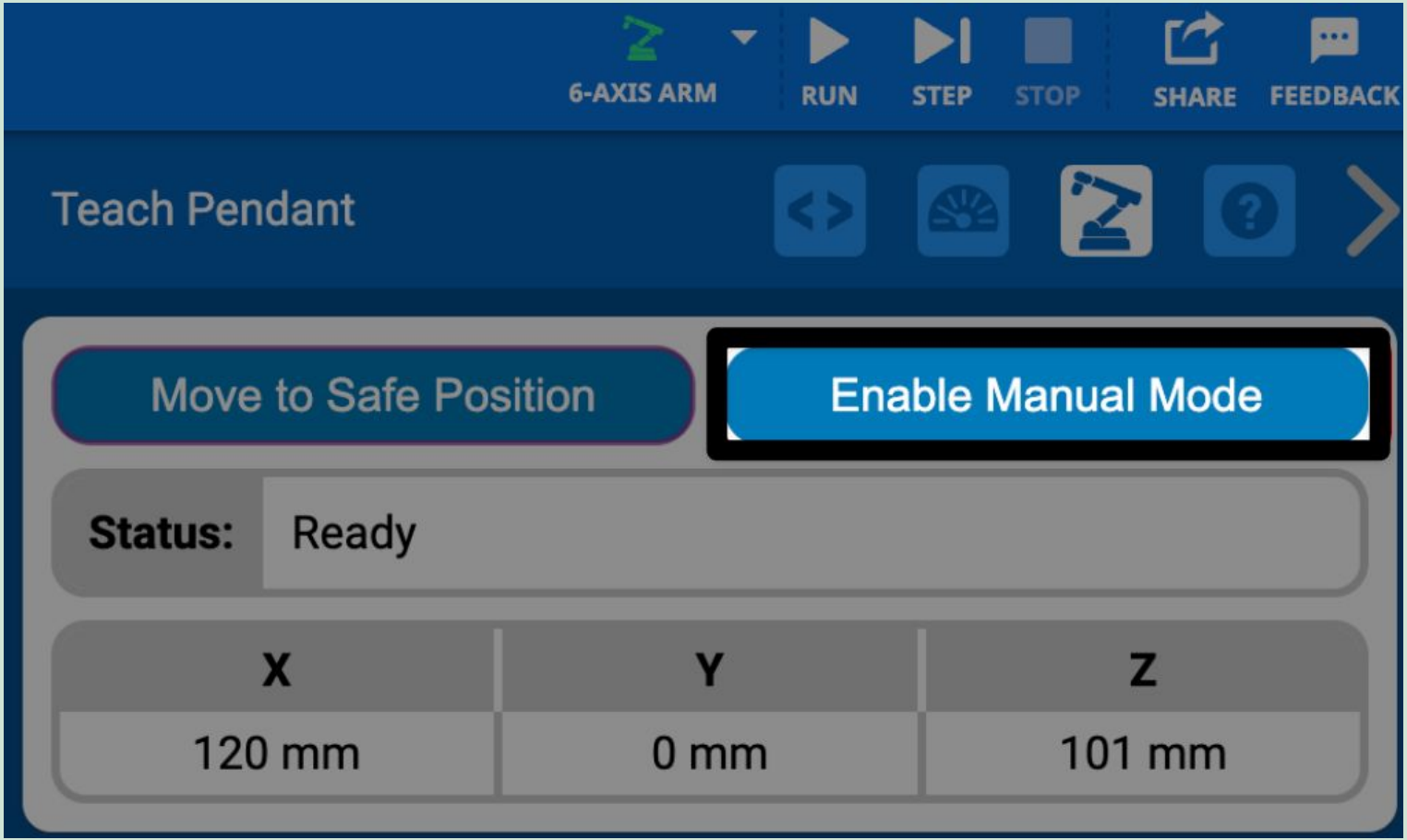
What is a Teach Pendant?

A Teach Pendant is...

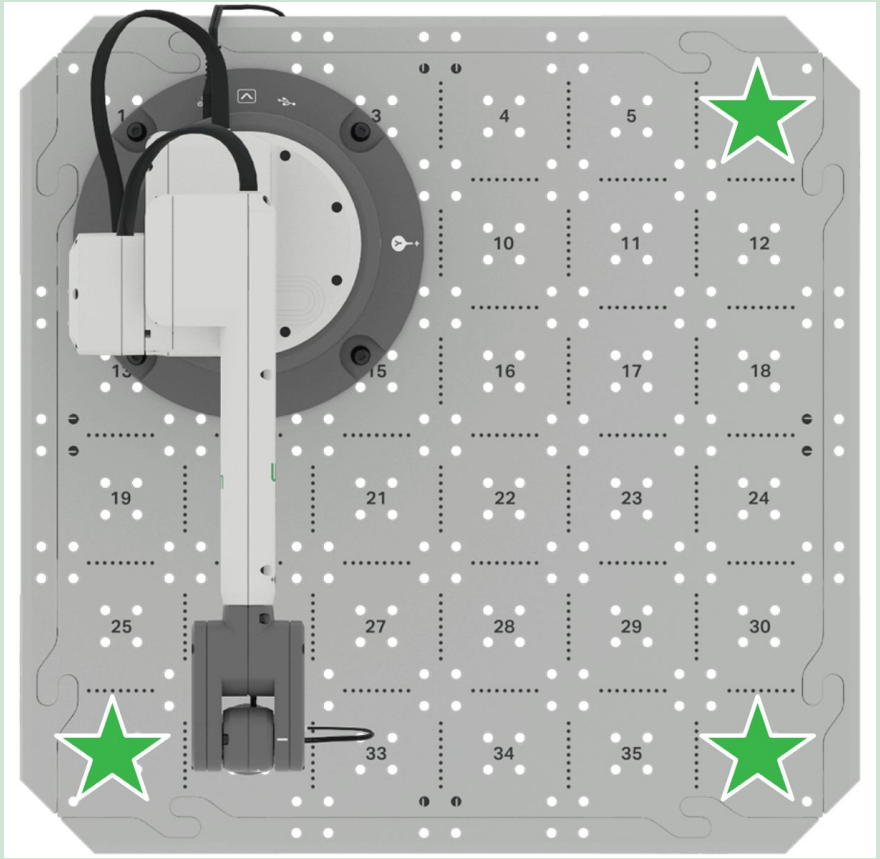
- A common device in industrial robotics – allows a user to control a robotic arm remotely and manually
- Used to execute a series of movements, and test and refine them from a distance

A Teach Pendant was built into VEXcode to offer a scaffolded step to learn about how the 6-Axis Arm moves in space.

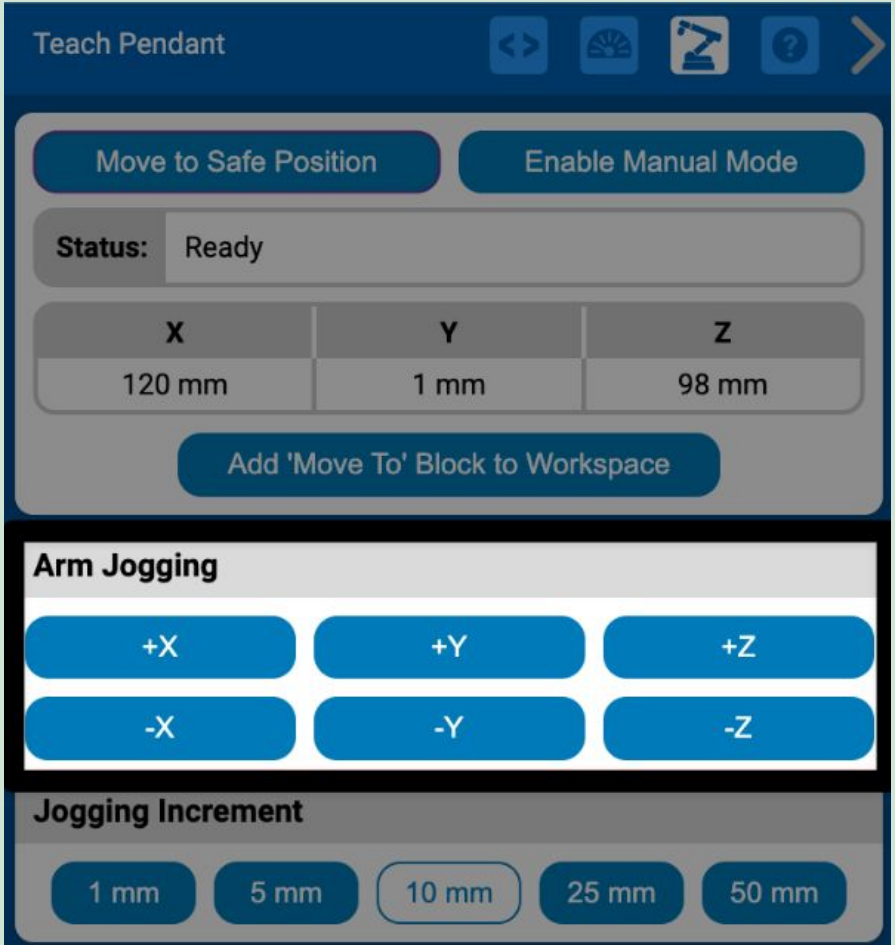
Moving in Manual Mode



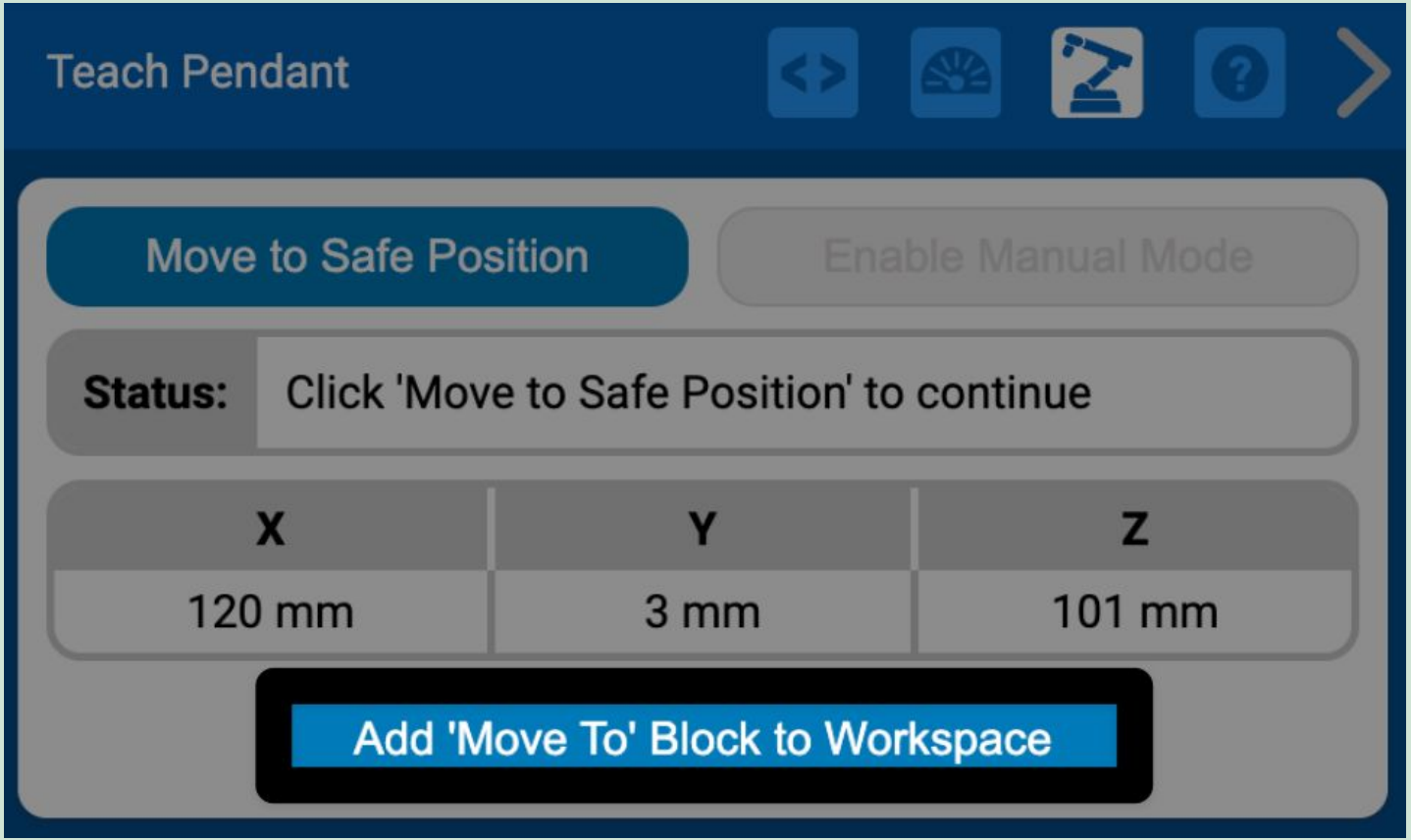
Find These 3 Coordinates



Jogging the 6-Axis Arm



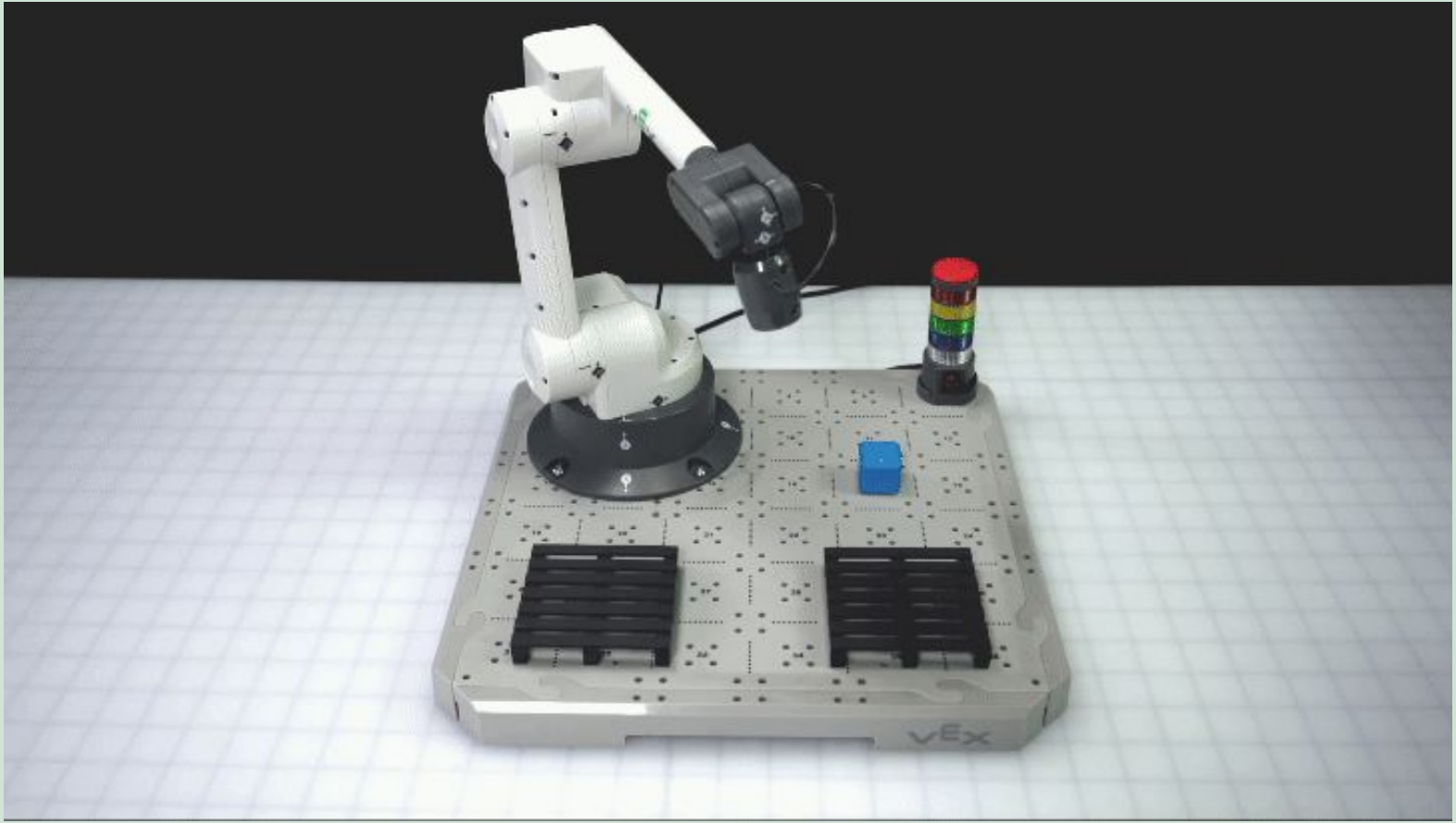
Generate a block with coordinates



What do you notice about how the 6-Axis Arm moves?

- Built-in kinematics allow the 6-Axis Arm to move smoothly without complex coding
- Multiple joints enable precise positioning
- This lowers the classroom entry barrier and safely introduces students to concepts like kinematics without needing large, expensive equipment or the space to house it

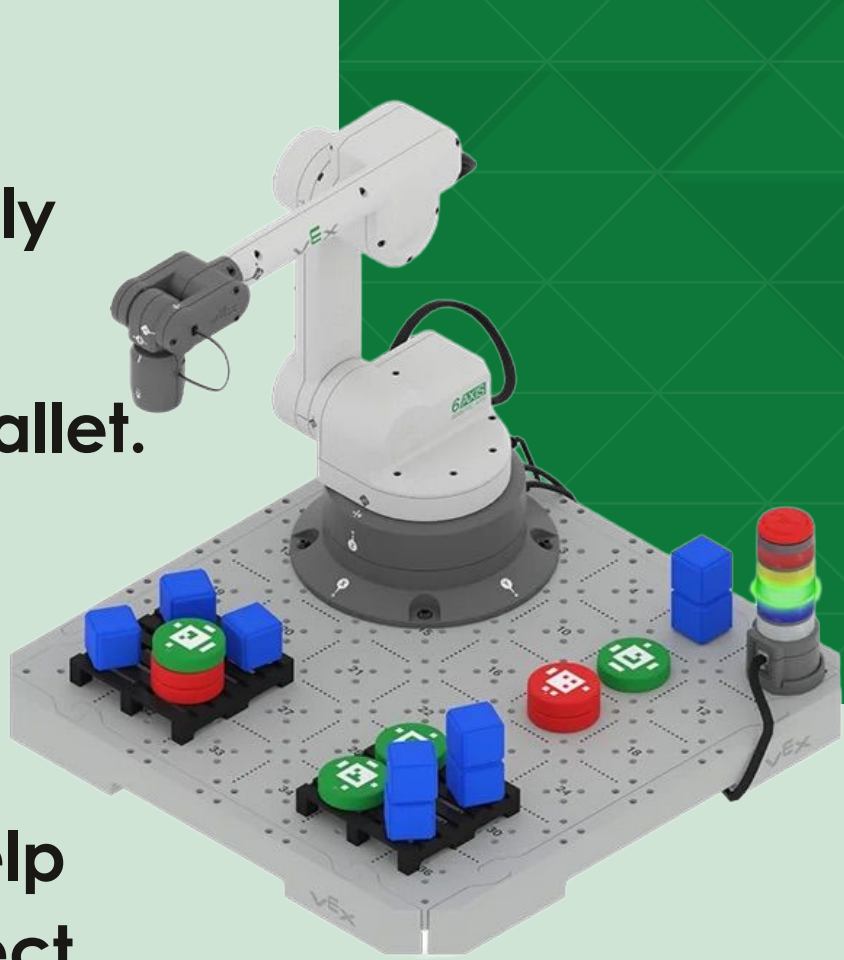
Moving a Cube with a VEXcode Project



Pack n’ Ship Challenge!

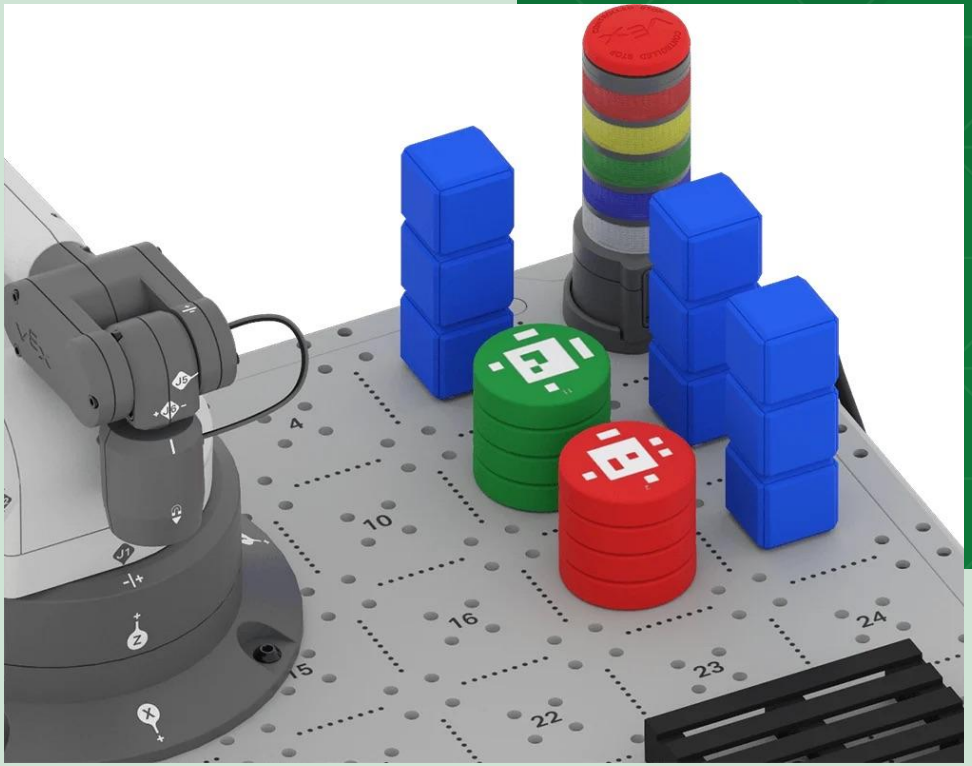
The Challenge:

- Fulfill your invoices accurately and safely.
- One invoice goes to each pallet.
- Some items will need to be stacked in order to fit on the pallet.
- Use the Teach Pendant to help you build and test your project.



Setup:

- Cubes are placed in stacks of 3 on Tile locations 5, 12, and 18.
- 4 Red Disks are placed in a stack on Tile location 17.
- 4 Green Disks are placed in a stack on Tile location 11.



Pack n' Ship Co.
123 MAIN STREET
ROBOTICS, VR 12345

Invoice

Invoice #0611

ORDERED BY

Armand Jogg
1001010 AXIS HWY
ESTOP, XY 15212

Item	Qty	Points per Item	Total Points
Cubes	6	70	420
Red Disks	1	35	35
Green Disks	1	35	35
			490

Pack n' Ship Co.
123 MAIN STREET
ROBOTICS, VR 12345

Invoice

Invoice #0333

ORDERED BY

Lenora Loop
25 OFFSET DRIVE
CONDITION, AL 27854

Item	Qty	Points per Item	Total Points
Cubes	3	70	210
Red Disks	3	35	105
Green Disks	3	35	105
			420

Wrap Up

- **How did you solve the challenge?**
  - All of the Activities and concepts we've covered today are directly from the Introduction to the 6-Axis Robotic Course.
  - Students work up to a full-scale Workcell with sensors, conveyors, pneumatics, Brain, Disk Feeder, etc. *Come on up for a demo!*

Stay Connected

Join me in the VEX PD+ Community

@Audra_Selkowitz

Want to Learn More? Join PD+ as an All-Access Member!

Schedule a **1-on-1 Session** in VEX PD+!