Seeing Isn't Believing:
Collaborative Debugging with VEX AIM

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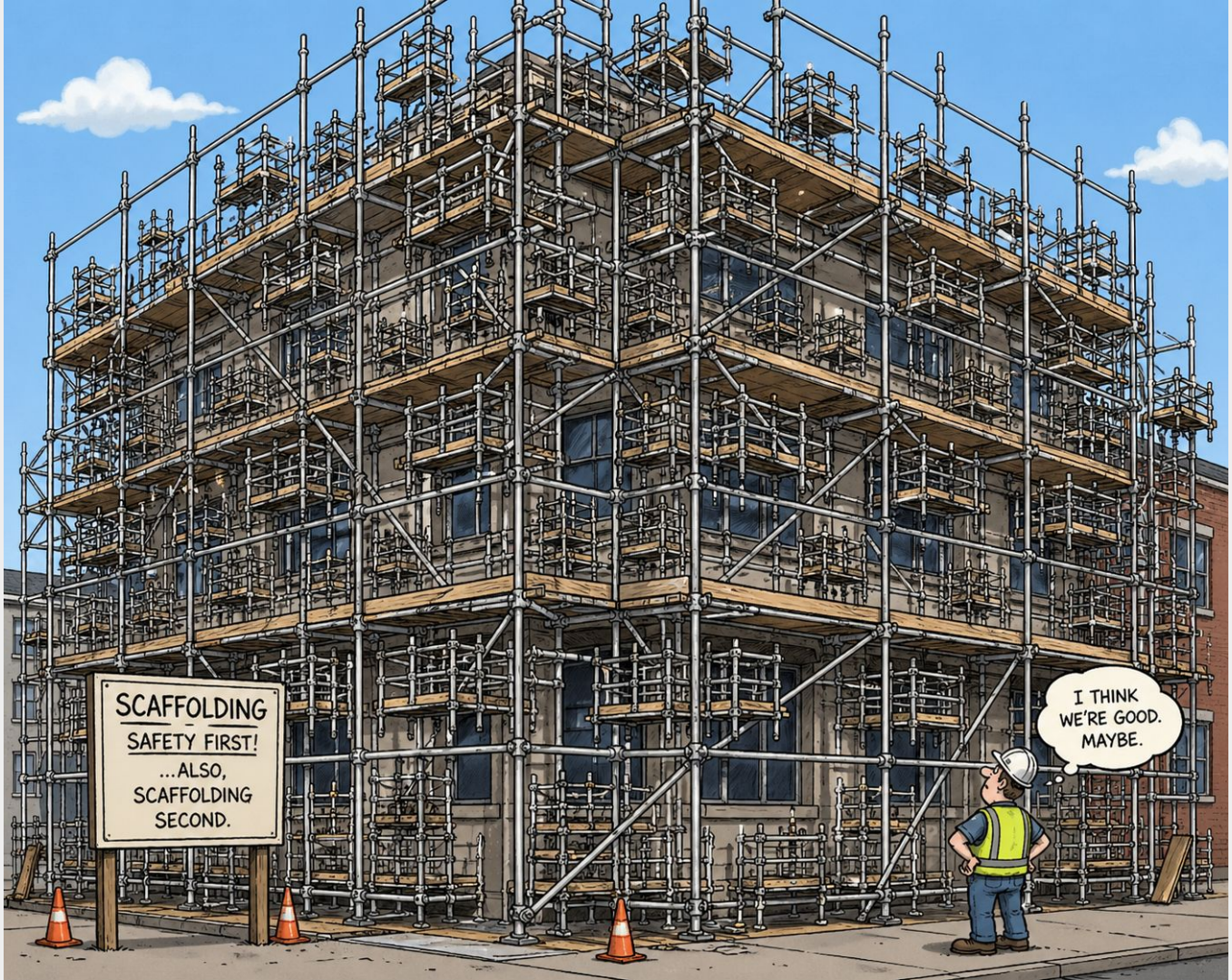
Senior Education Developer

VEX AIM

Workshop Goals

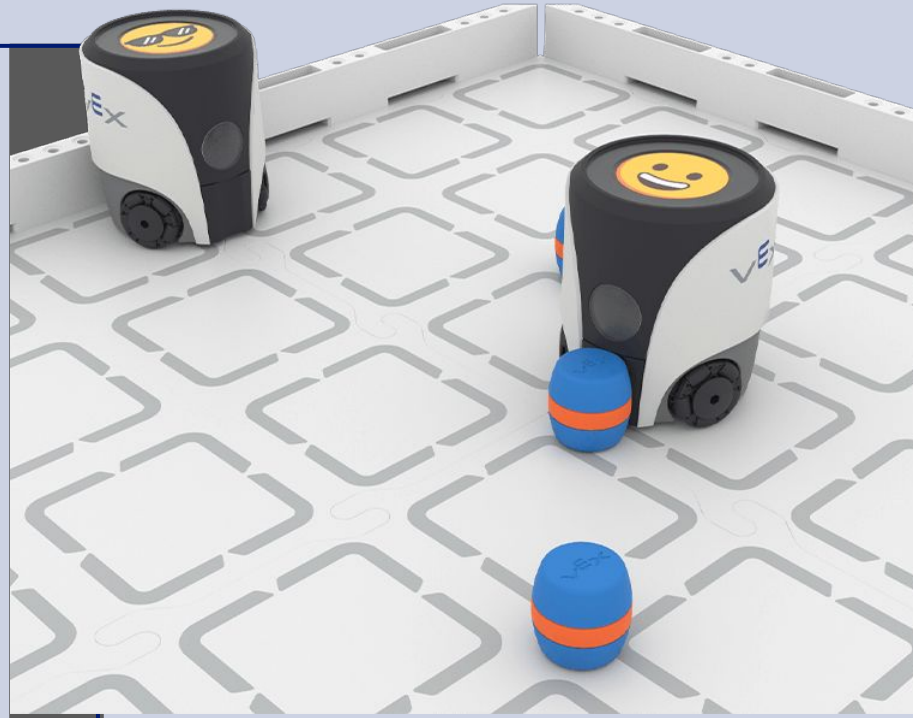
- Learn about how bugs in a project can be powerful learning tools
- Build your troubleshooting toolbox
- Practice debugging AIM projects together
- Create your own bugged projects


SCAFFOLDING
SAFETY FIRST!
...ALSO,
SCAFFOLDING
SECOND.
I THINK WE'RE GOOD. MAYBE.


I'VE GOT THE LADDER. YOU'RE GOOD.

A Paradigm Shift...

> “ ...bugs not as *accidents to be solved* but as objects-to-think-with and objects-to-share-with. ”



Fields, Deborah A., et al. "Debugging by design: A constructionist approach to high school students' crafting and coding of electronic textiles as failure artefacts." British Journal of Educational Technology 52.3 (2021): 1078-1092.

A Paradigm Shift...

“ The idea of designing bugs for learning

—or *debugging by design*—

makes learners agents of their own learning and, more importantly, of making and solving mistakes.”

-Yasmin B. Kafai

"Mischievousness and fun as well as empathy and sensitivity…were ***productive emotions*** exhibited during bug design, and ***shifts away from frustration to increased comfort, security, and a sense of control with bugs*** were expressed retrospectively weeks afterward."

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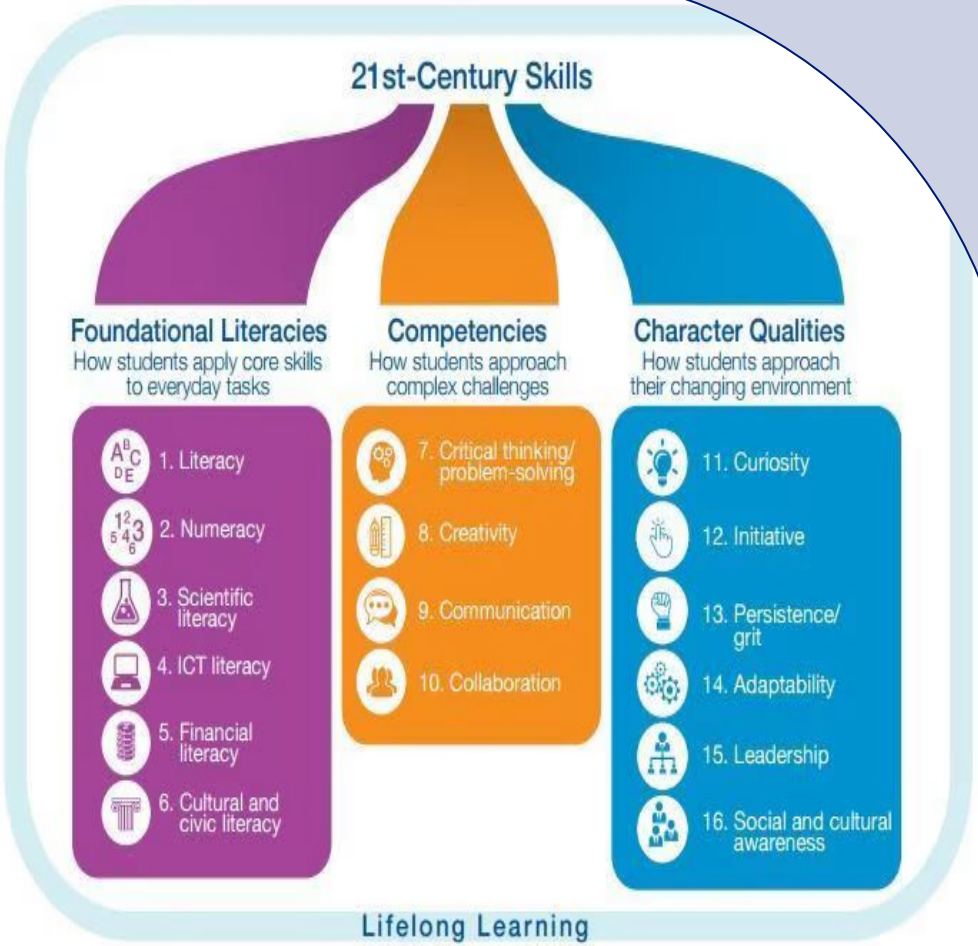
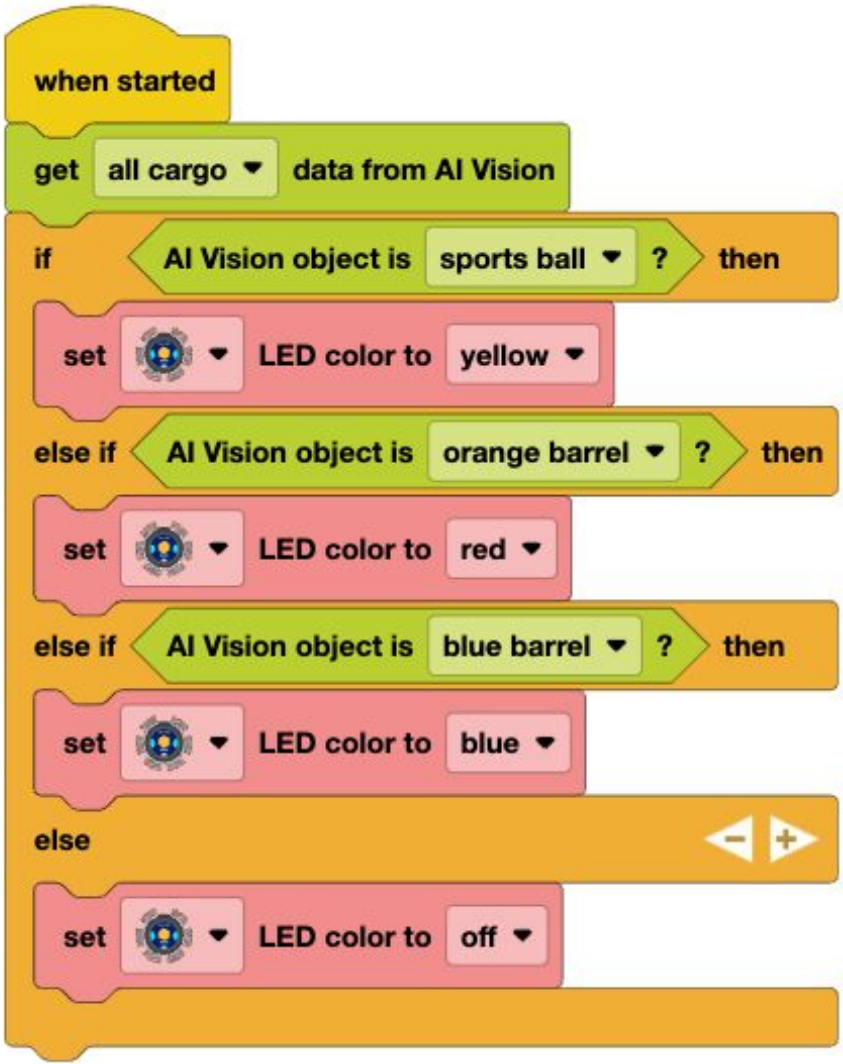


Bugs support creativity, resiliency, and learning.

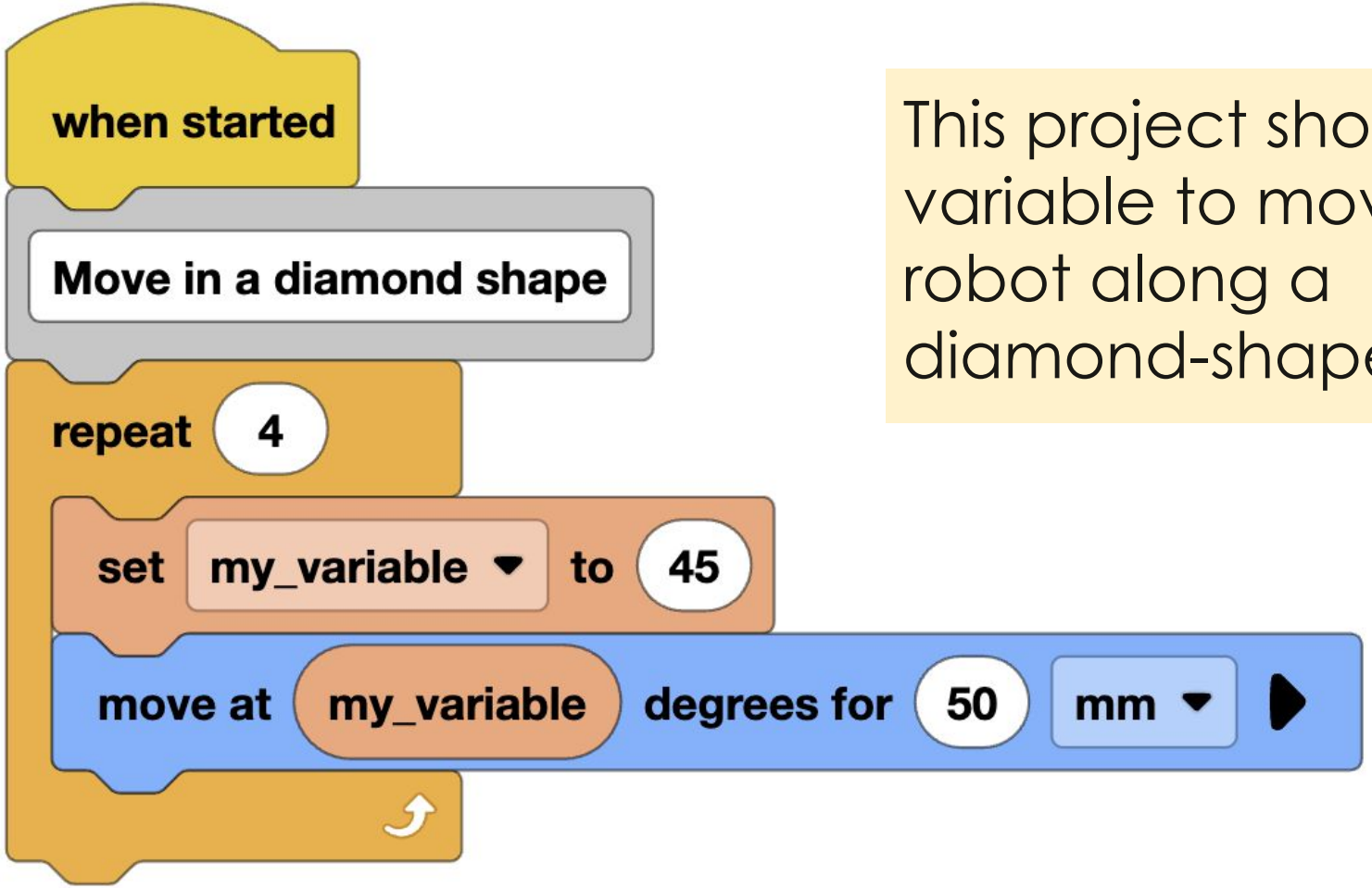
What do you need to know to debug a project?

- What is the intention of the project?
- How are you trying to do that?
- Where does it go wrong?

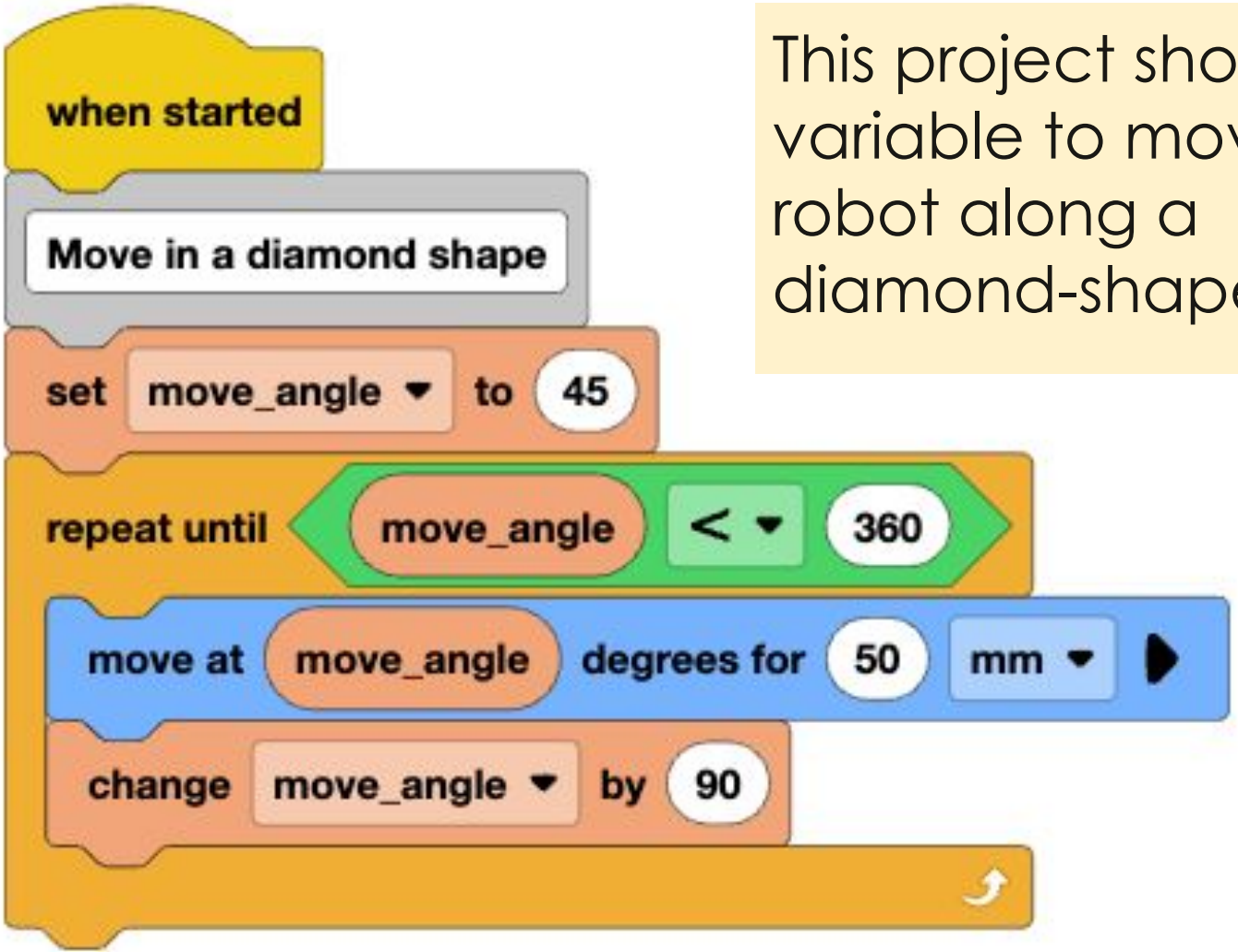
Find the Bug!



This project should make the robot show a different color for each object that is detected repeatedly.



This project should use a variable to move the robot along a diamond-shaped path.



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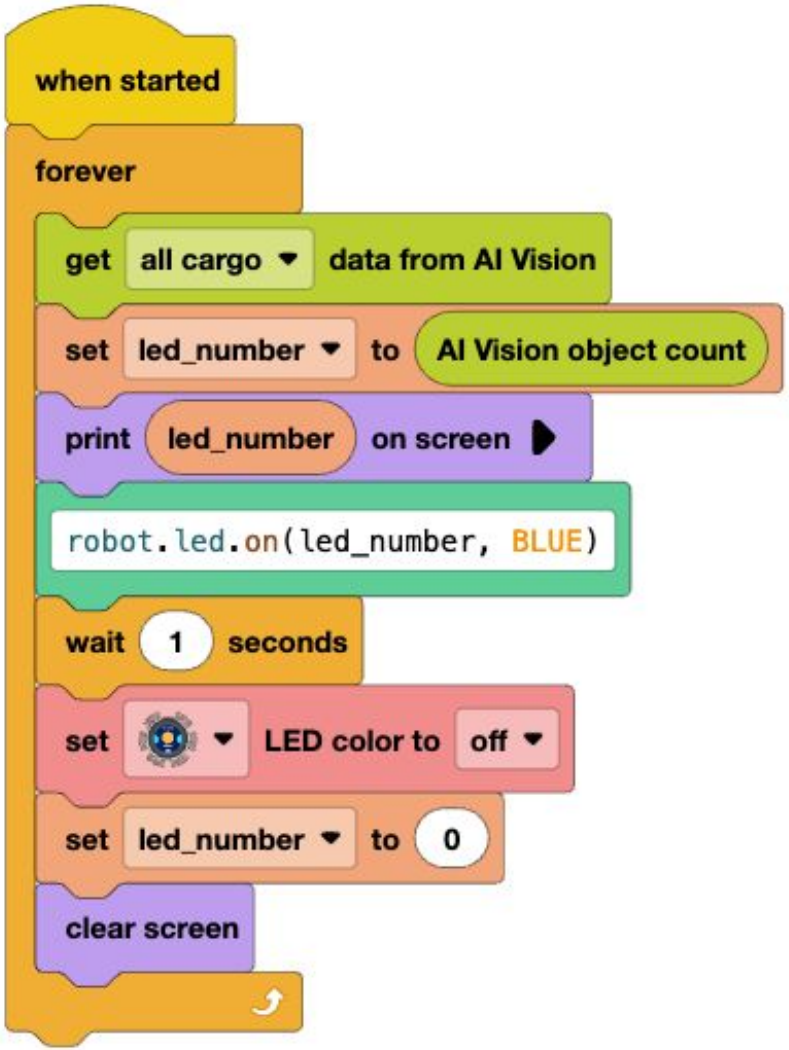
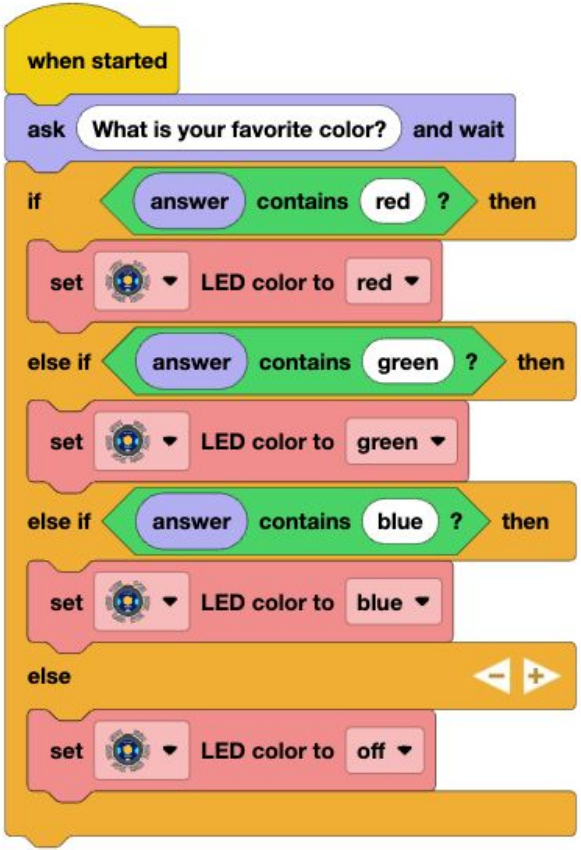


This project should detect how many objects are in view, and glow that number of LEDs.



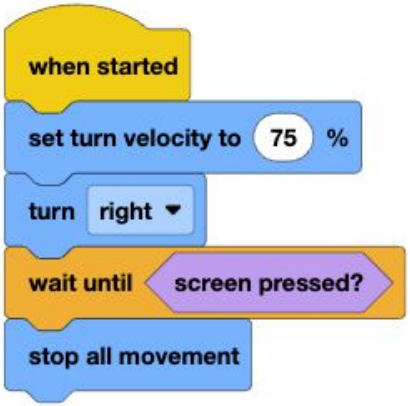
Monitor

Vision Dashboard ▶

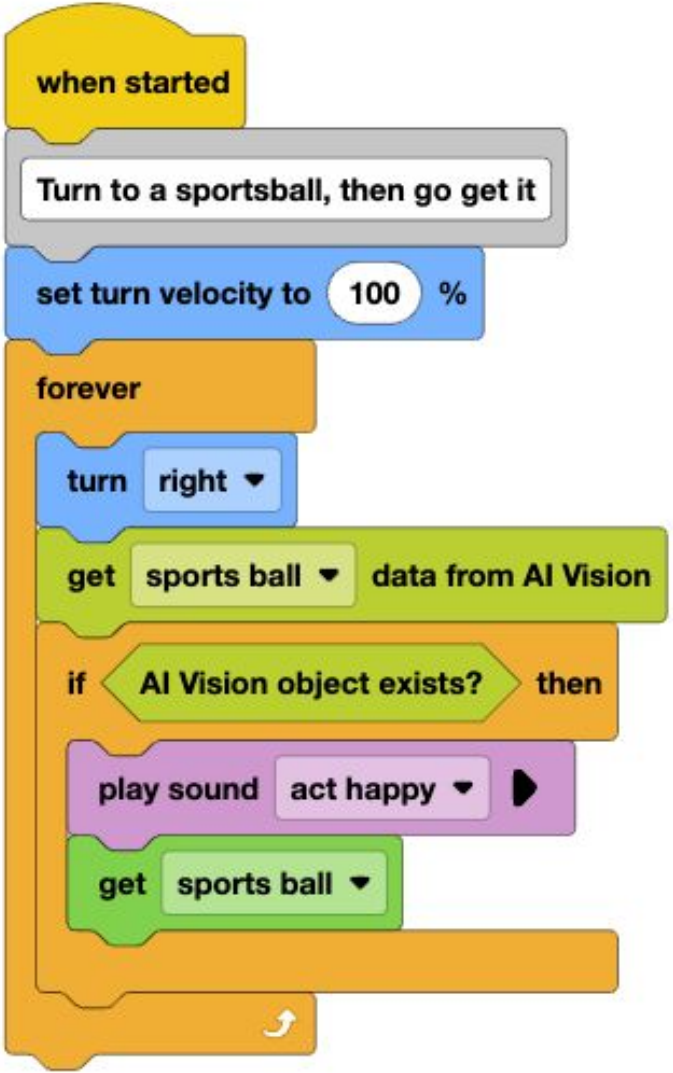
Console ▼

```
What is your favorite color?
>>> purple
```

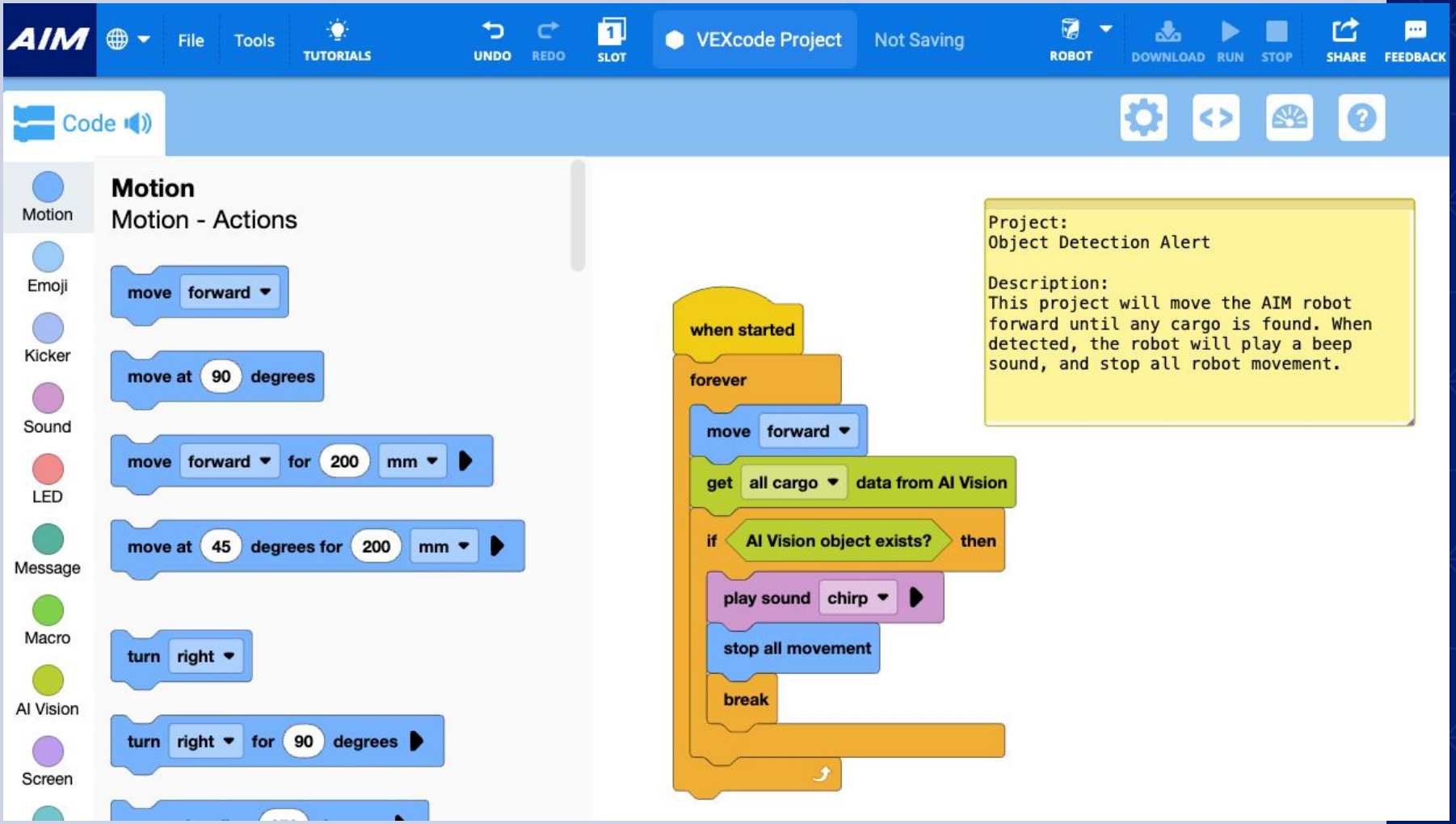
This project should glow the LEDs the same color as the answer given in the console.



This project should make the robot turn continuously and use the LEDs to glow a disco pattern when the screen is pressed.

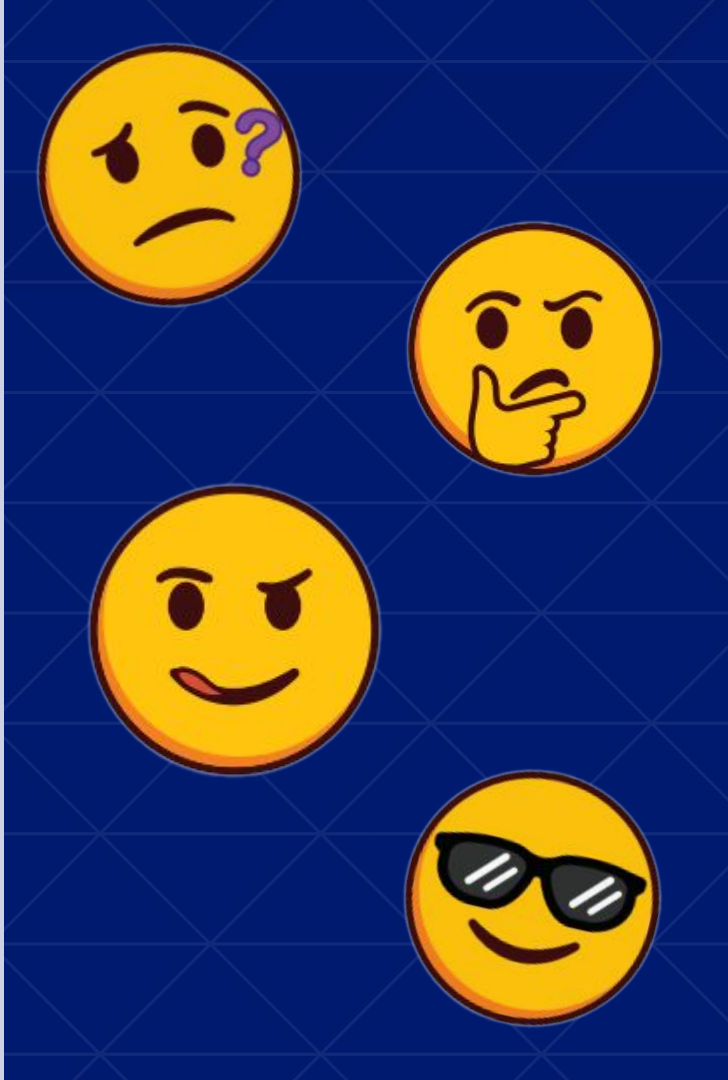


This project make the robot turn until it finds a sports ball, then act happy and go get it.


AIM
File
Tools
TUTORIALS
UNDO
REDO
SLOT
VEXcode Project
Not Saving
ROBOT
DOWNLOAD
RUN
STOP
SHARE
FEEDBACK
Code
Motion
Emoji
Kicker
Sound
LED
Message
Macro
AI Vision
Screen
Motion
Motion - Actions
move forward
move at 90 degrees
move forward for 200 mm
move at 45 degrees for 200 mm
turn right
turn right for 90 degrees
Project:
Object Detection Alert
Description:
This project will move the AIM robot forward until any cargo is found. When detected, the robot will play a beep sound, and stop all robot movement.
when started
forever
move forward
get all cargo data from AI Vision
if AI Vision object exists? then
play sound chirp
stop all movement
break

What did you notice?

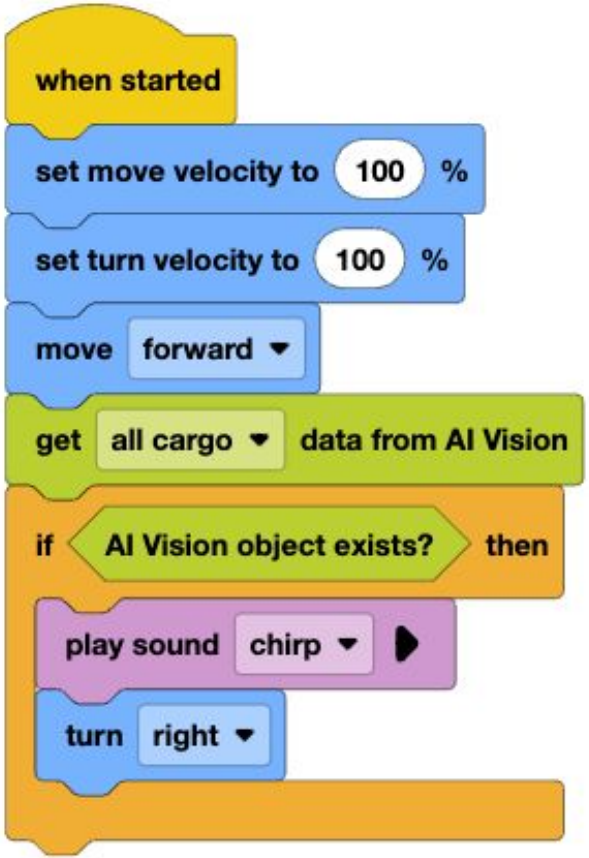
- How was this experience for you?
- How does it feel when you find a bug?
- Can we think about bugs in the same ways we think about challenges?



Bug “Buckets”

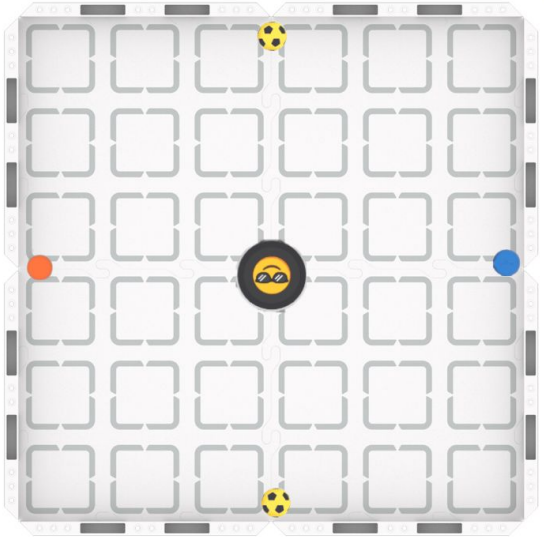
- Logic
- Sequence
- Technical
- How the robot works
- Listening/attention
- Pseudocoding
- Syntax
- Overcomplicating

Your turn!



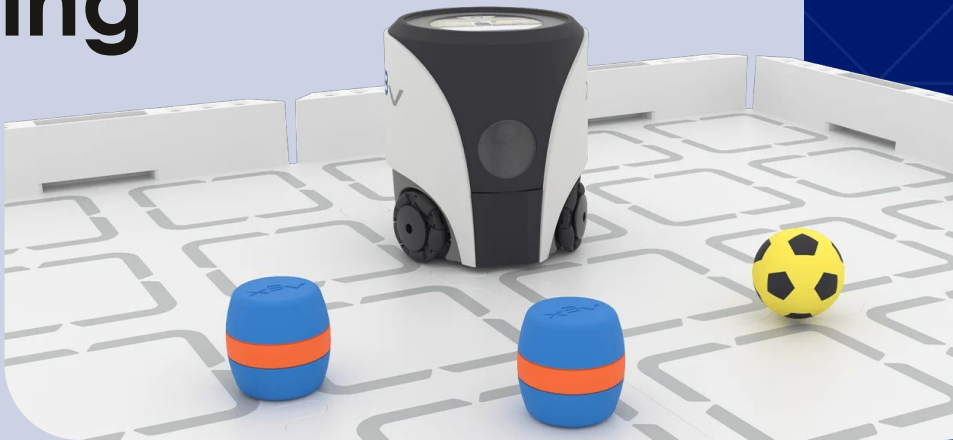

```
Project:
AI Vision navigation - cardinal directions

Description: The robot should move and
turn to face each object, using AI Vision.
It should play a sound when each object is
detected.
```



Debugging Check-in

- What were the bugs?
- How did you fix them?
- How did debugging feel for you?



Stump the Software Team!

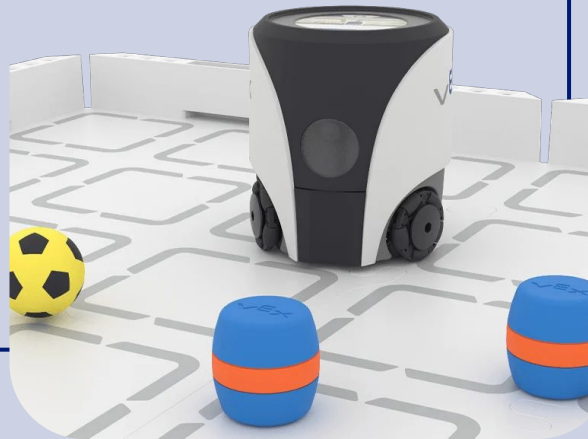
Create your own bugged project!

Create a project with at least 2-3 bugs in it.

Think creatively about the bugs you're making!

Use the bugged project or

create your own.



Plan Your Bugged Project

- **What is your robot supposed to do?**
- **How are you going to try to do that?**
- **Where/how is it going to go wrong?**
  - Think of the different “bug buckets” we identified. Which are you pulling from and why?
- **What are possible solutions for your bugs?**

Build Your Bugged Project

- **Where are the bugs?**
- **What are the solutions?**
  - Make sure you have an example of functioning code to be able to tell if our experts successfully “fixed” the bugs.

Bring This Experience to Your Students

- **Making bugs demonstrates understanding**
  - You have to know the concept in order to create a bug with it
- **Intention is important**
  - Their ideas are good – execution is the problem
  - Have to know what the coder was trying to do, to debug intentionally

Bring this experience to your students

- **There is more than 1 way to fix a bug**
  - Multiple solutions to the same problem helps us all learn
- **Creating bugs builds creativity and resilience**
  - The more you deal with bugs in non-threatening ways, the more persistent and comfortable you become in solving them

Stay Connected

Let's Connect!

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@Audra_Selkowitz

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