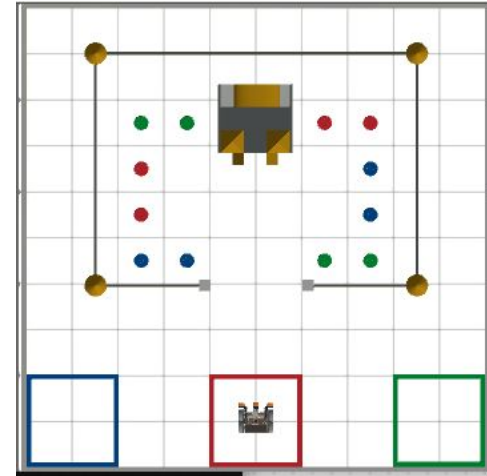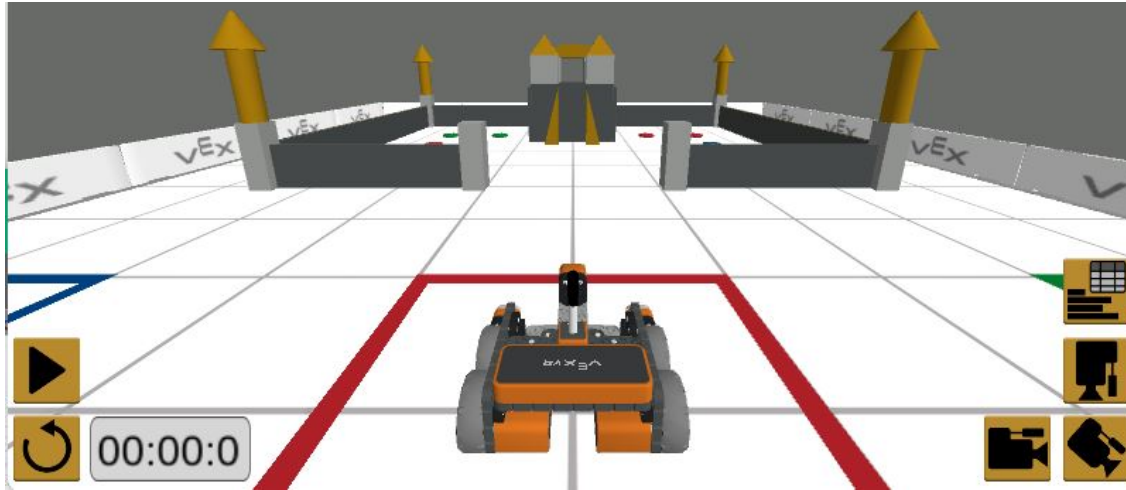# PLTW Project 3.1.7 Machine Control Design

Operation: Vaccine Transport

Name:
Class:
Date:

The local hospital needs your help. They are currently storing their vaccines in a giant freezer kept at -90° F. Because it is so cold, they need a robot to go in a bring out the vaccines one at a time.

There are three different vaccines coded blue, red, and green. The hospital does not know which kinds and how many of each kind they will need until the bus with patients arrives. When the bus arrives, the staff determines who has the priority and places an order with the pharmacy.

MISSION: Program the robot to go into the freezer and retrieve the correct type and quantity of vaccine in the correct order. Good luck and always take pride in your work!

The only images of the area you have received are the two black and white images on the previous slide. (Yes, you could just look at the color image on the computer, but you must pretend you do not know the color of the disks ahead of time.)

What you know: This mission uses the VEX Playground: Disk Transport
The freezer is a four sided square with only one entrance on the south side. The walls are solid and cannot be moved by the robot.
The freezer components are located inside the freezer along the north side. They are solid and cannot be moved by the robot.
You know the location of all of the disks of vaccine. The are evenly spaced along grid lines 200mm apart.
You know there are 4 blue, 4 red, and 4 green disks of vaccine.
You know the receiving areas for the disks are located at the bottom of the map. They are 400mm x 400mm squares. You do know these colors. The blue is on the left, the red in the center, and the green on the right.

What you do NOT know:
You do not the the colors of the vaccine disks at the start of the mission. The only way to identify the disk color is with the down eye of the robot.

PLTW Project 3.1.7 Mission Guidance

What will you receive at the start of the mission:
You will receive a vaccine order form in the following format:

	Color	Quantity
First	X	X
Second	X	X
Third	X	X

Example

	Color	Quantity
First	Green	1
Second	Red	3
Third	Blue	2

You must program the robot to retrieve the correct color and the correct number of vaccines in the correct order and place them in the correct receiving areas at the bottom of the map.
Note: 0 (zero) is a valid quantity. So the quantity options are 0, 1, 2, 3, and 4.

Restrictions:
You may use any of the coding blocks available in the VEX VR Code Block Program
You must write all of your own code. Exception: you may use the Goto x,y code that has been given to you.
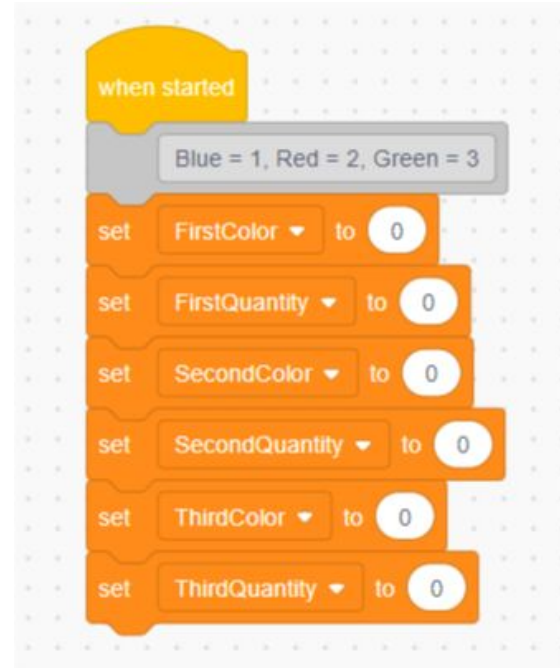
Mandatory Coding Requirements:
You must use the following six variable names for this project:
FirstColor, FirstQuantity, SecondColor, SecondQuantity, ThirdColor, ThirdQuantity

The opening line of your main program should like like this:

At the start of the mission, you will receive the values
to these six variables as shown in the previous slide.

Place the inputs into you program and then execute
the mission.

when started

Blue = 1, Red = 2, Green = 3

set   FirstColor ▼   to   0

set   FirstQuantity ▼   to   0

set   SecondColor ▼   to   0

set   SecondQuantity ▼   to   0

set   ThirdColor ▼   to   0

set   ThirdQuantity ▼   to   0

PLTW 3.1.7 Step 1: Brainstorming

The hardest part of this challenge is figuring out your strategy to collect the proper color disk. Brainstorm 3 different ideas and write them below. You may use additional slides if required. You may use words or pictures.
This is NOT code. Just ideas.

3.1.7 Step 2: Develop an idea

Pick one of your ideas from Step 1 and develop it further by creating an outline using words.
Again, this is not block coding yet. This is pseudocode where you develop your idea into an outline you can code. You may use additional slides if required.
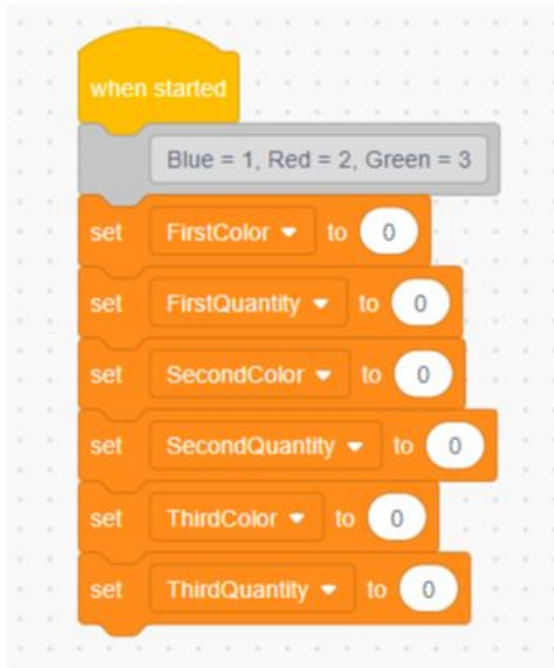
PLTW 3.1.7 Step 3: Program the Robot

Name:
Class:
Date:

Using your outline from Step 2, create the block code required to complete the mission.
The main code can go on multiple slides. On the first slide of the main code, paste the entire text code of the program into the speaker notes.

Note: The most amount of lines of block text I can read on a slide is between 10 and 14.
Please do not shrink you code so much that it can't be read. Break it into additional slides.
See the Goto x,y example in a few slides.

PLTW 3.1.7 Step 3: Function

Name:
Class:
Date:

You are allowed and encouraged to create functions (red My Blocks) for this program. Each function you create must go on a separate slide. The text code of just that function must go in the speaker notes.
At the top of the slide, provide the following information:
In the title of the slide: Name of Function
Just under the title:
Inputs
Outputs

An example for the function Goto x,y is on the next page

Note: If you use Goto x,y, you are allowed to simply copy the next slide into your Portfolio.

Note how the text of just the function is copied into the Speaker Notes.

Name:
Class:
Date:

Inputs: x and y coordinates   Outputs: robot drives to the given x and y coordinates

PLTW 3.1.7 Step 4: Test and Refine

Name:
Class:
Date:

Test your robot using multiple scenarios.
Provide the video of two tests as evidence that your robot works properly.
Over the course of the two documented tests, you must test for the quantities 0, 1, 2, 3, and 4.

Here is an example:

Test #1

	Color	Quantity
First	Red	2
Second	Blue	3
Third	Green	1

Place link to Test #1 here.

Test #2

	Color	Quantity
First	Blue	2
Second	Green	0
Third	Red	4

Place link to Test #1 here.

3.1.7 Step 5: Demonstration

Name:
Class:
Date:

On test day, we will have live demonstrations of your program.

I will pick the vaccine order and your robot will go and execute your code.

While your code is executing, you will record yourself giving a play by play of how you solution works.

Bonus:
For a chance to earn an additional +5 points for this project, accomplish the following:
When the robot retrieves the disks, give each disk its own, individual square inside the receiving area. In other words, don't let them stack up. Place them each in their own square inside the correct color receiving area.