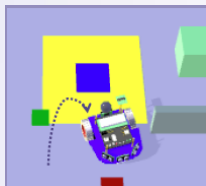# RCJ CoSpace Rescue Game

Target: Collect as many points as possible

Strategy: Avoid traps and obstacles
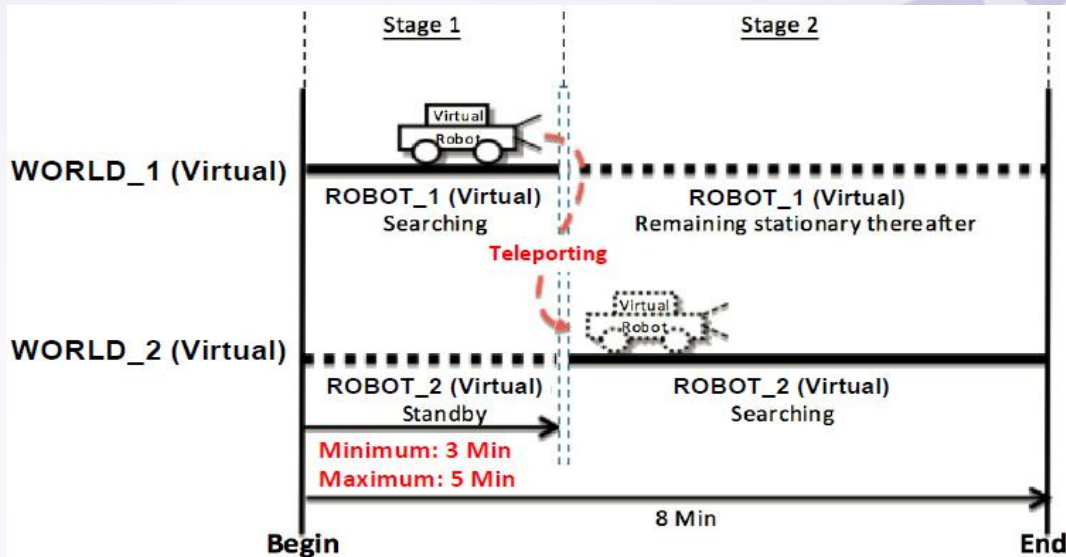
Points:

Red	Green	Black	Purple
10	15	20	120

Special Zone

Red	Green	Black	Purple
20	30	40	240

Bridging Virtual and Reality

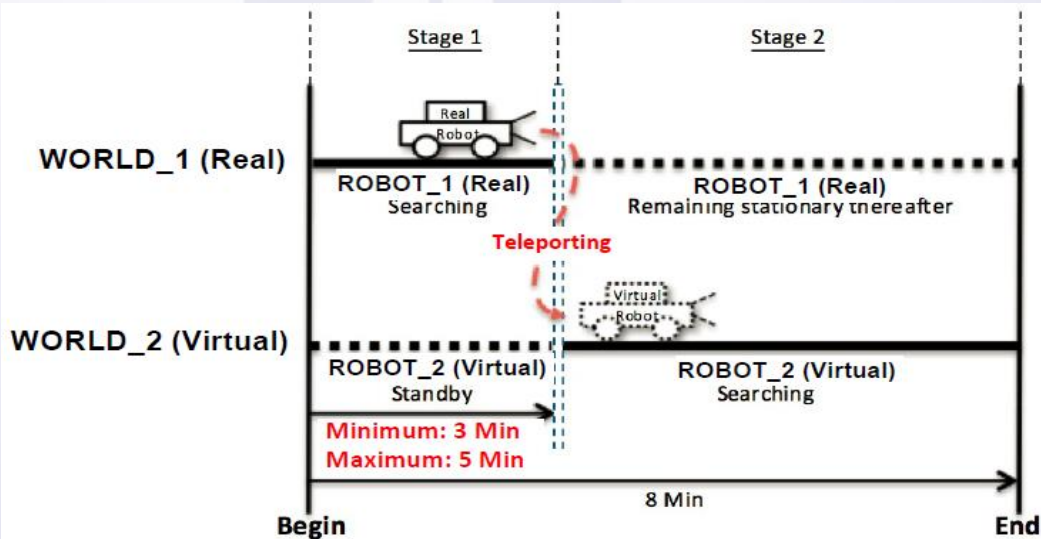**Advanced Robotics & Intelligent Control Centre**
SINGAPORE POLYTECHNIC

Primary Age Group:
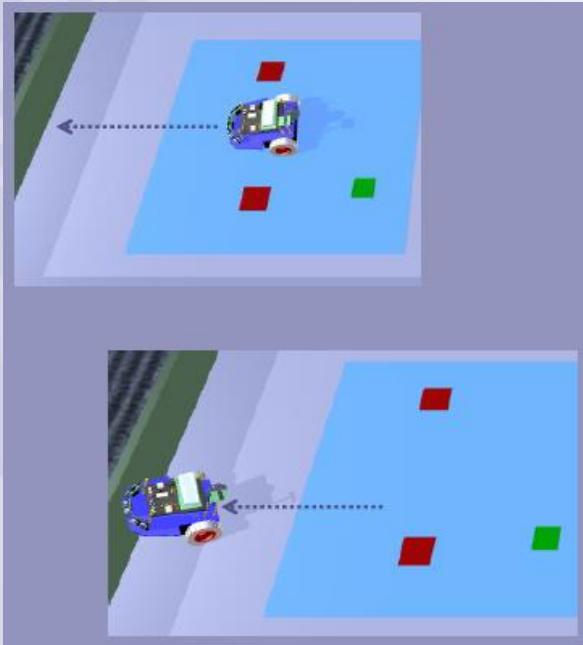Game takes place in two virtual worlds

Secondary Age Group:
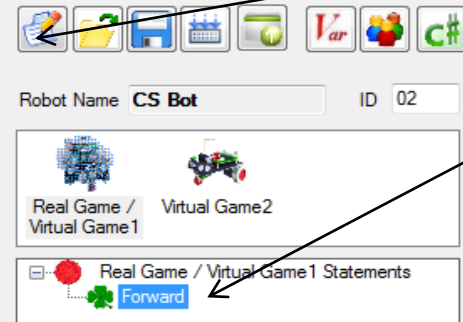Game takes place in real and one virtual worlds

Moving Forward

Can you make your robot move forward?

Challenge

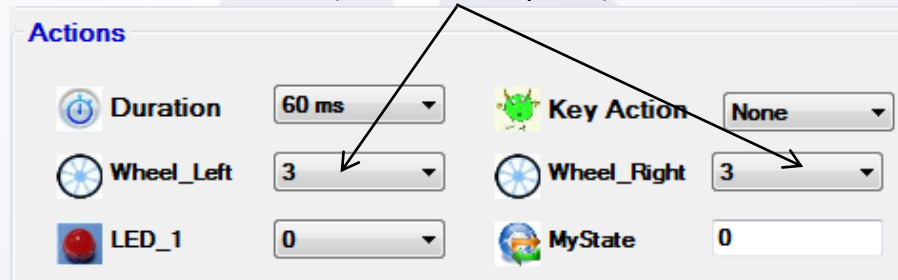o Can you make your robot move backwards or spin around?

Get Ready

Start a new project

Add a new statement

Robot Name **CS Bot**   ID 02

Real Game / Virtual Game1   Virtual Game2

Real Game / Virtual Game1 Statements
Forward

Program it

Set the left wheel and right wheel speed to 3 (60% of full speed)

Actions

Duration	60 ms	
Wheel_Left	3	
LED_1	0	

Key Action	None	
Wheel_Right	3	
MyState	0	

Save it, Build it, Load it, Run it

Load AI

Competition

Start

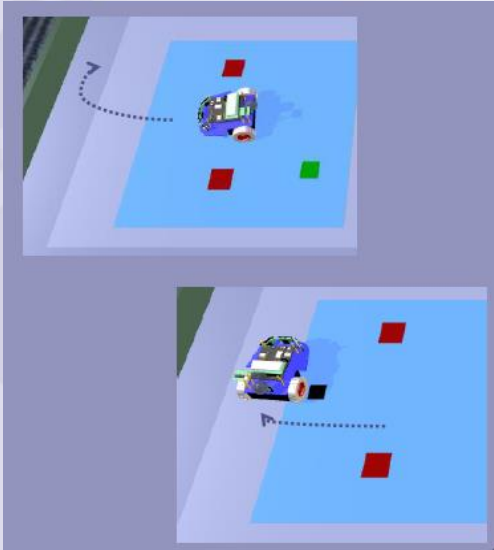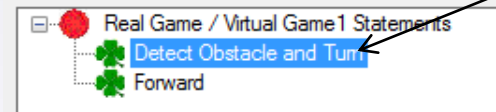Save   Build   Load   Run

Turn

Can you make your robot move forward and then turn before hitting the wall?

Challenge

o How close can you get to the obstacles before turning?
o What is the effect if the turning speed or turning duration changes?

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Bridging Virtual and Reality

Advanced Robotics & Intelligent Control Centre
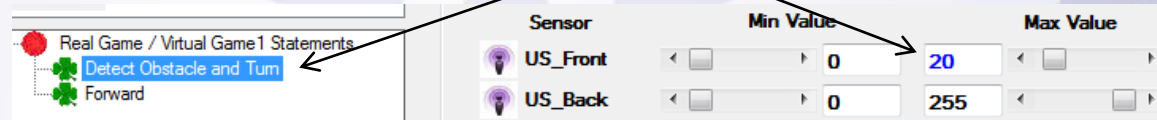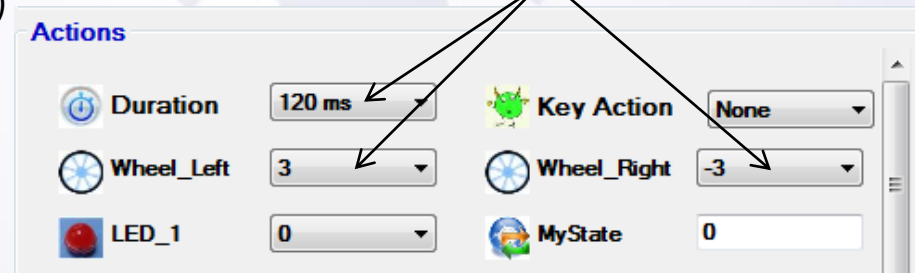SINGAPORE POLYTECHNIC

Get Ready

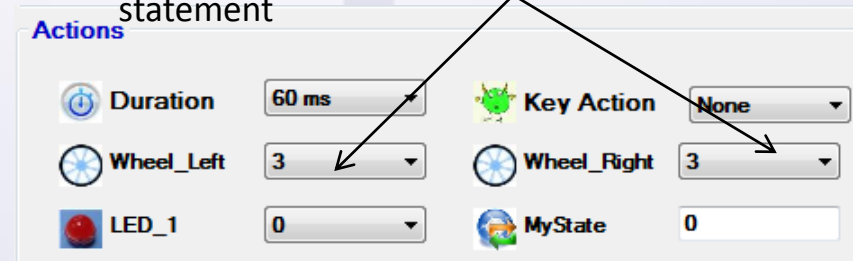Add a new statement "Detect Obstacle and Turn"

Program it

Set the condition for the statement to be TRUE if the distance to the obstacle is less than 20 cm

Set the duration to 120 ms. Wheel_Left = 3; Wheel_Right = -3 (Right Turn)

Actions

Duration	120 ms	Key Action	None	
Wheel_Left	3	Wheel_Right	-3	
LED_1	0	MyState	0	

Don't forget to set actions for the "Forward" statement

Actions

Duration	60 ms	Key Action	None	
Wheel_Left	3	Wheel_Right	3	
LED_1	0	MyState	0	

Save it, Build it, Load it, Run it
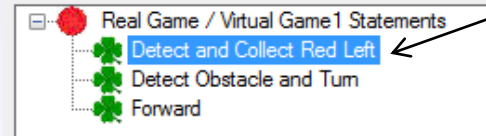
Find Red Blocks

Can you make your robot move around until it finds a RED block? It should then stop and collect the block.
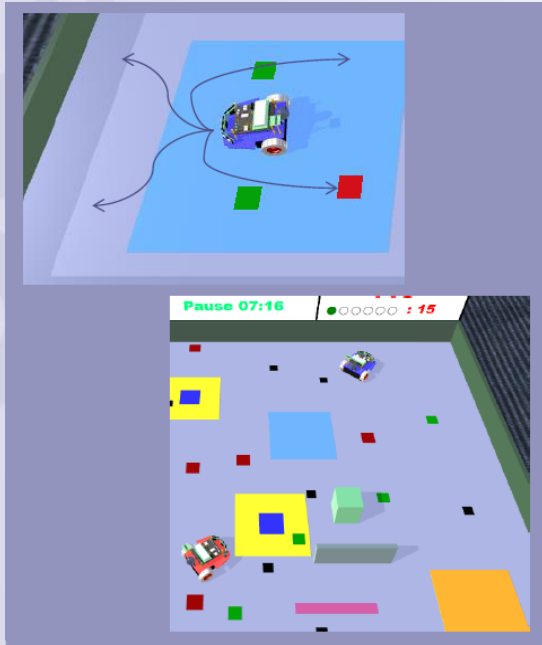
Challenge

o Go ahead and add statements to detect the Green and Black blocks.


Get Ready

Add a new statement "Detect and Collect Red"

Program it

Set the condition for the statement to be True if the left colour sensors detect RED. You can move the robot around using the joystick so that it is over a RED block and note down the value the sensor returns. This requires a little trial and error, but here are some numbers to get you going

CSLeft_R	◄ ☐ ►	150	255	◄ ☐	►
CSLeft_G	◄ ☐ ►	0	20	◄ ☐	►
CSLeft_B	◄ ☐ ►	0	20	◄ ☐	►

To collect an object the robot must stop and flash the LED for 3 seconds to signify that it has detected and picked up an object.

Actions

Duration	3000 ms	Key Action	FindObject
Wheel_Left	0	Wheel_Right	0
LED_1	1	MyState	0
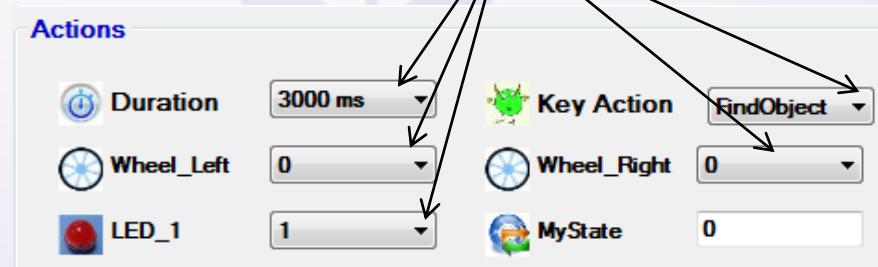
You need to add another statement using right colour to detect RED

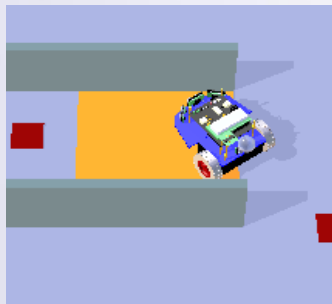## Save it, Build it, Load it, Run it

4

Deposit a Block

Can you make your robot collect a RED block and deposit it into the orange box?

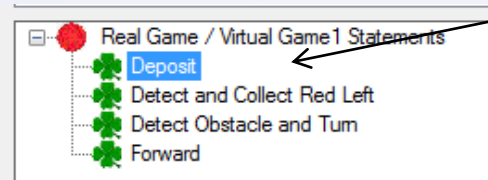Find a RED block and pick it up

Orange deposit area detected. Robot stops and deposits the blocks

Challenge

o Experiment with the colour sensor values until your robot stops on the orange area every time

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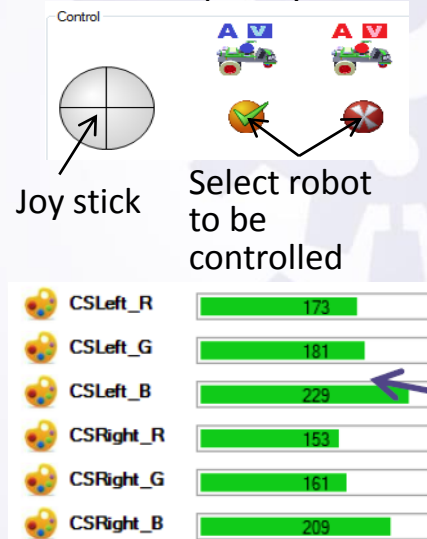S I N G A P O R E   P O L Y T E C H N I C

Get Ready

Add a new statement "Deposit"

Program it
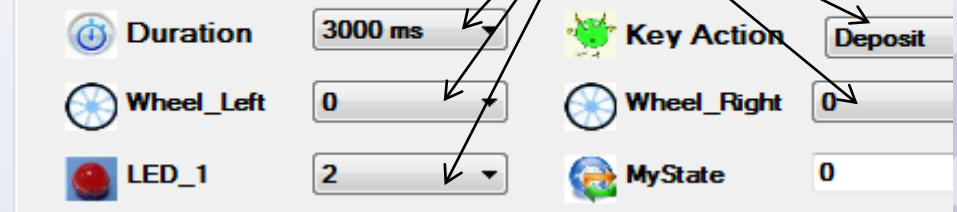
Select the Robot tab and use the joy stick remote controller to drive the robot around the World until it is completely over the orange area.

Joy stick

Select robot to be controlled

Look at the values for the colour sensors and write them down. Use these in your condition statements to tell the robot to detect orange. When **BOTH** the robots sensor detect orange it can deposit any blocks that it is carrying. To do this you must stop the wheels, set the duration to a minimum of 3000ms, the Key Action to Deposit and set the

Sensor	Value
CSLeft_R	173
CSLeft_G	181
CSLeft_B	229
CSRight_R	153
CSRight_G	161
CSRight_B	209

Actions

Duration	3000 ms	Key Action	Deposit
Wheel_Left	0	Wheel_Right	0
LED_1	2	MyState	0

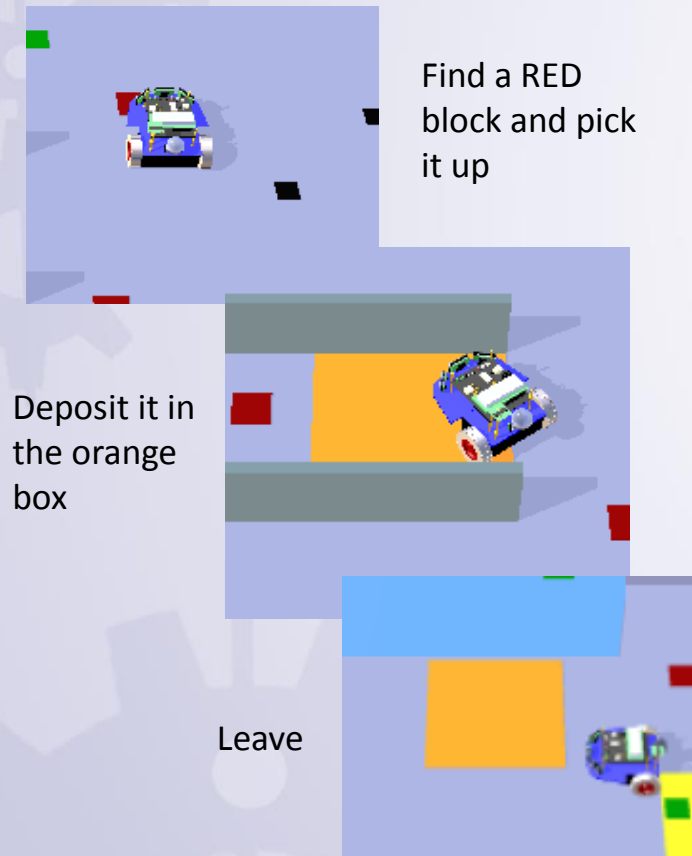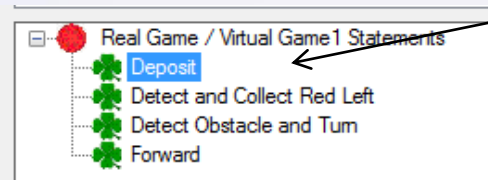## Save it, Build it, Load it, Run it

Deposit and Leave

Can you make your robot leave the orange box automatically after putting down the objects?

Find a RED block and pick it up

Deposit it in the orange box

Leave

Get Ready

Real Game / Virtual Game1 Statements
- Deposit
- Detect and Collect Red Left
- Detect Obstacle and Turn
- Forward

Edit statement "Deposit" in Advanced Action

Program it

Actions

Duration	3600 ms	Key Action	Deposit	
Wheel_Left	0	Wheel_Right	0	
LED_1	2	MyState	0	

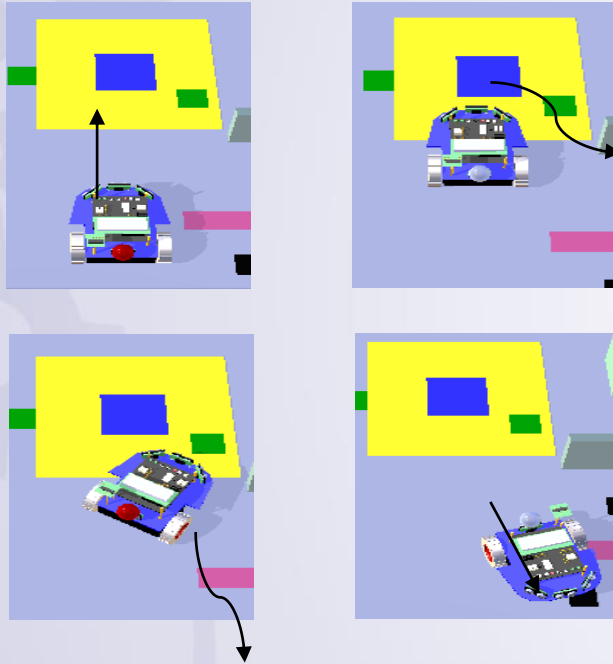Advanced Action: `if(Duration<=10)if(US_Front<50){Wheel_Left=-5;Wh`

Code Editor

```
if(Duration<=10)
if(US_Front<50)
{Wheel_Left=-5;Wheel_Right=-3;}
else
{Wheel_Left=5;Wheel_Right=5;}
```

Save it, Build it, Load it, Run it

Avoid A Trap

Can you make your robot avoid all traps?

Challenge

o Experiment with the colour sensor values until your robot avoid all of the traps every time.

Get Ready

Add a new statement "avoid the boundary and trap"

Program it

Selecting and driving the robot until it is over yellow boundary and note down the value the sensor returns.

CSLeft_R	255
CSLeft_G	255
CSLeft_B	51
CSRight_R	255
CSRight_G	255
CSRight_B	51

Use these in your condition statements to tell the robot to detect yellow. When **anyone** of the robots sensor detect yellow. The robot must turn left or right to avoid the. We can set the duration to Set the duration to 120 ms; wheel_Left to 3; Wheel_Right to -3 (Right Turn).
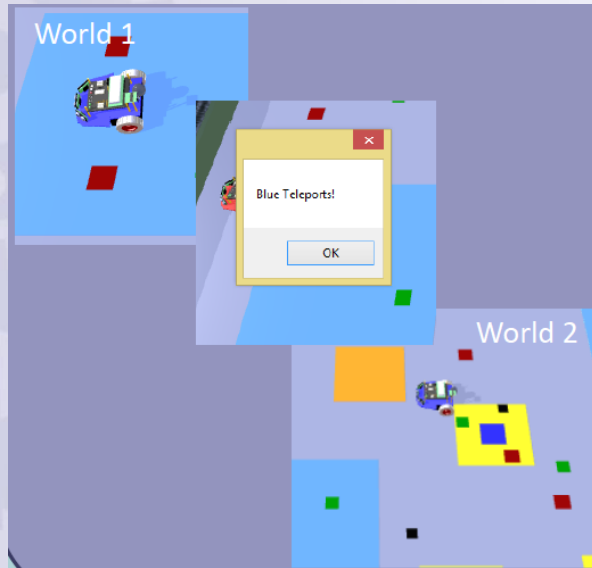
Actions

Duration	120 ms		Key Action	None
Wheel_Left	3		Wheel_Right	-3
LED_1	0		MyState	0

Save it, Build it, Load it, Run it

Teleport

Can you make your robots link together?

Challenge

o Experiment with telepoting to World_2 at different times. Remember you can only teleport between 3 minutes and 5 minutes of the competition start time.

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Get Ready

Add a new statement 'Teleport' as the first statement

Program it

Set the condition for the statement to be true if the time of the competition has been running is 181 seconds

You now need to set the key action to "Teleport" and also set the LoadedObjects = 0 to clear the loaded object counter at the stage of teleporting

Save it, Build it, Load it, Run it

CHALLENGE

Can you make your robot navigate through the field to collect objects while competing with another robot that is doing the same job.

It is advisable to record the colour sensor readings before actual programming.

	Red	Green	Black	Purple	Blue	Yellow	Orange
R							
G							
B							