# Detailed Guide to Get Started with Robot Virtual World

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- last updated in Feb 11 of 2019 -
**RVW, OR NOT RVW**

ROBOTC© is a cross-robotics-platform programming language for popular educational robotics systems. It can run on NXT, EV3, and VEX-IQ.

RobotC © Manufactured with intellectual properties from **Carnegie Mellon Robotics Academy**

Which software you may use

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**If you own a robot kit such as EV3 or NXT hardware**

**Either Or**

**RobotC or Graphical RobotC**

~$80 for a retail license (free upgrade until the next version)

---

**If you do not own the Robot Kit - such as EV3, nor NXT**

**RobotC Virtual World**

$10 thru Storming Robots special 180-days license

OR

~$80 for a retail license (free upgrade until the next version)

---

**IMPORTANT:** RVW usage is only for about 180 days in order to allow beginning students to practice without a physical robot. However, in order to advance to higher levels in the future, students are encouraged to own a robot set. This is meant to allow parents to gauge their children’s interest before investing in physical robot set.
SETUP YOUR ROBOT VIRTUAL WORLD.

1-- Create an account at www.cs2n.org and then login.

2—Download your software.

   Download and install RVW (select “RVW LEGO”)

3-- Need to activate license after installation.

Start your RobotC software:

- If you use Graphical RobotC, (usually Gr. 4 to 6), you should choose:

   ![Graphical Robot Virtual Worlds - LEGO 4.x](image)

- If you use text-based RobotC (usually Gr. 7+), you should choose:

   ![Robot Virtual Worlds - LEGO 4.x](image)

Open the RobotC software and select the “Help” from the top menu toolbar.

Do note: You license will state the duration.

If you get $10 license through SR, it will last for 180 days usage

Enter your License ID & password
3—Select the proper platform.

TIME TO WORK ON YOUR FIRST ROBOTIC PROGRAM IN VIRTUAL WORLD.

1-- Select the proper Challenge Package

2-- Select the robot model.

2.a) Create a new file first

Do note: If you use Graphical RobotC, you should also select the Natural Language as well.
2.b) Select the robot model.

Don’t forget to click Apply after selection.

Pay attention to the sensors and motors setup.

Pay attention to the variables for motors.

Pay attention to the variables for sensors.
3-- Edit a new program.

IMPORTANT: When learning from a sample program, you MUST ALWAYS:
- understand the goal of the program first.
- Read each single line of code and try to understand what each line is supposed to do.

Sample RobotC program:

```c
#pragma config(StandardModel, "EV3_REMBOT")
/*
What does this code do?
1) left spin turn for one second
2) right spin turn for one second
*/

task main()
{
    setMotorSpeed(leftMotor, -100); // same as motor[leftMotor] = -100;
    setMotorSpeed(rightMotor, 100);
    sleep(1000);

    setMotorSpeed(leftMotor, 100);
    setMotorSpeed(rightMotor, -100);
    sleep(1000);
}
```

Graphical RobotC version:

Save your code first; and make correction if there is any syntax error.
4-- Save your program.

Should always pay attention where you save your work.
Do note that the folder path shown here is ONLY an example. Yours most likely will be different.

5-- Compile your program.

Make sure you Compile first.
You must correct all syntax errors before you proceed.

Same in Graphical RobotC, you should always compile your code first; and make correction if there is any syntax error.
**TIME TO EXECUTE YOUR CODE**

1-- Select the Virtual World Compiler Target.

By default, the menu selects Physical Robot. You must manually select “Virtual Worlds” instead.

2-- Download …

3-- Choose Challenge pack.

You will need to login first. Then, click on “START CHALLENGE”.

After that, you will see the challenge field shown below. That’s where you will execute your code.
Two methods to execute your code:

Method #1: click on ✅ to execute your code.

However this may render a bit of delay from time to time if your computer does not have a fast graphics card.

Now, observe if the robot does what you expect based on your program.

- ✅ to restart
- 🔁 to go back to the Challenges Pallet.

Rest of buttons on this screen are very self-explanatory. Go ahead to experiment with them.

Method #2: Start it from RobotC top menu toolbar.

You may toggle between editing your code and testing the changes on the Challenge Pack screen.

Make the changes, then click ✅ to view the latest result from your change.
**START, RESUME, OR STOP IT.**

At the RobotC window, you may also use the top menu toolbar bar to start, resume or stop your program.

Do note that the “Start” won’t show up until you “Stop” your program.
Let’s try another challenge field with both sensor and motor controls

Sample Program to get around this simple maze:

Remember: Divide and conquer! The following sample will show you just the 1st set of movement:

```c
#pragma config(StandardModel, "EV3_REMBOT")

// Go forward until detecting a wall within 10 cm. Turn left.

task main()
{
    while (SensorValue[sonarSensor] > 10) {
        setMotorSpeed(leftMotor, 30);
        setMotorSpeed(rightMotor, 30);
    }
    motor[leftMotor] = -25;
    motor[rightMotor] = 25;
    sleep(700);
}
```

Graphical RobotC version

![Graphical RobotC version of the program](image-url)
Select the Sensor Challenge Pack and click on “Maze Challenge”

Click ▶ to execute your code, or click from the RobotC editor window. Then, observe the result.

Your robot’s position will then look similar to this after it completes. If not, examine your program, troubleshoot and fix the issue.
To retest:
   a) May resume to retest after you have click on (restart). OR
   b) Click on the to resume.

To edit the code and retest without quitting from the Challenge Pack:
   a) Stop the execution from RobotC top menu toolbar.
   b) Edit your code.
   c) Click start from the RobotC window.

*** Now, you should try to complete the rest of the challenge yourself, i.e. complete to navigate around the maze.

You are good to go now and trying programs that you have learnt in the Roboclub.
While I highly encourage you to experiment and not to limit yourself only with materials learnt in class, you must follow thru the process of development:

1) Define your goal
2) Write out a flowchart
3) Identify sub-tasks (if any)
4) Divide and conquer. Do each sub-task and test before integrate all sub-tasks together.
VIDEOS TO SHOW YOU HOW TO PRACTICE

The following links serve as samples to get the students started. The Robot Virtual World offers a game like environment to enable students to learn robotics programming without the cost of a physical robot.

When they are at the center, they will have the opportunity to actually interact with a physical robot. With a physical robot, they will gain more in-depth insight where mechanical and physical environment come into play as well.

- **Execute your Basic Movements code with the default field Challenge.** Students should create own code to execute at the default field.
- **Customize your own Square Race Movements Test Field.** Students customize a Square field for testing.
- **Execute your movements code with a custom Square Race field.** Students execute their own Square Race Movements code at their customized field.
- **Execute your line tracing code with a customized built Line Tracing field.** Another sample for students to run their line tracing code at their own customized field.

**IMPORTANT LEARNING HABIT**

1) Be inquisitive
2) Take extra effort to explore.
3) This Virtual World simulation IS NOT MEANT to be an exact replica of your exercises at the roboclub. However, it will utilize what your learnt in class instead.
4) Do not stop just because it does not exactly like the mat used in class.
5) As always, do not skip the flowchart design, and follow the divide and conquer steps you have gone through in class.

**WHAT IFS...**

1-- I want to switch machines after installation?

This is a special 180-days license, ONLY good for ONE activation as per CMU Robotic Academy terms. If you intend on switching computers before the 180-day license expires, you will have to deactivate it and reactivate it on the new computer. Storming Robots will not be able to reissue another one for you under this circumstances.

You wish to use it on another computer, you will need to purchase a new one, another $10.

*(Please do note that SR absorbs much cost in order for us to offer you this learning tool at such low cost. We are subject to the restriction dictated by the RobotC Virtual World provider.)*
2-- I could not find the RVW Level Builder or Challenge Pack feature?

- Start the RobotC Virtual World IDE.
- Click on Robot --> Compile Target --> Virtual World
- Click on Robot --> Platform Type --> LEGO Mindstorms EV3
- Click on Window --> Select Virtual World To Use --> Download More Packages
- Select RVW Level Build, and/or Challenge Pack for EV3 and/or Curriculum Companion

3-- I want to use the PC-emulator for programming

If you do not see this option, or this option is not selectable, you need to install “ROBOTC for VEX Robotics” from www.robotc.net. VexIQ version is free. You can now utilize the PC-Based Emulator.

Select PC-Based Emulator.

This allows you to practice programming logic without involving any robot motions, nor sensing, sound, etc. For RobotC – Level B students, this is always the first thing we do – Chapter 1 and 2 on https://learn.stormingrobots.com
CHECK OUT OTHER CHALLENGE PACKS

CHECK OUT ALL PRE-DEFINED ROBOTS CHASSIS

Click the button to view all the pre-defined robots and their sensors and motors configuration.

Go ahead to click on different ones.

Important:
- Robot dimensions and measurement.
- Carefully review the locations of the sensors by simply hover your mouse on it.
- Know the motors and sensors ports.
SOME OTHER RECOMMENDATION

Turn on Super User mode to view all categorized functions list
Use the Debugger – for RobotC (not Graphical RobotC)

The steps are just like how you do the debugging at the center.

This sample will use the PC-emulator.

1— Complete test code and make sure it compiles.

Sample code:  //Simple counter loop sample

```
task main()
{
    float ct;

    ct = 0;
    while (ct <= 10) {
        ct = ct + 1;
        displayTextLine(ct,"%dx%d= %d", ct, ct, ct*ct);
        wait(2, seconds);
    }
}
```

2— Compile, Download

**Make sure you will fix syntax errors, if any, before you download.**
3-- Open Debugger Manually.

![Image of Open Debugger Manually]

4-- Open the remote debug window:

![Image of Remote Debug Window]

The following will show up...

![Image of Debug Status]

![Image of Remote Debug Window with Robot]
5— Step through the code…

Click on the “Step Over” to view the execution step by step.
ADVANCED …

Download more Challenge Packages

![RVW Package Manager]

RVW Level Builder – allow you to create your own field

Download and install RVW Level Builder for creating your virtual field.
Download and install the Challenge Pack for more additional fun activities.

< under construction >
 TAKE THRESHOLD VALUE

```
valReflect = 0.00
valName = 5.00
valReflect = 34.00
valName = 0.00
valReflect = 0.00
valName = 1.00
valReflect = 89.00
valName = 6.00
```

<table>
<thead>
<tr>
<th>Data</th>
<th>Type</th>
<th>Range</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colour</td>
<td>Numeric</td>
<td>0-7</td>
<td>Used in Colour mode.</td>
</tr>
</tbody>
</table>
<pre><code>               |       |       | 0 = No Colour             |
               |       |       | 1 = Black                 |
               |       |       | 2 = Blue                  |
               |       |       | 3 = Green                 |
               |       |       | 4 = Yellow                |
               |       |       | 5 = Red                   |
               |       |       | 6 = White                 |
               |       |       | 7 = Brown                 |
</code></pre>

getColorReflected(colorSensor) on red
getColorName(colorSensor) on red
getColorReflected(colorSensor) on blue
getColorName(colorSensor) on blue
getColorReflected(colorSensor) on black
getColorName(colorSensor) on black
getColorReflected(colorSensor) on white
getColorName(colorSensor) on white