

Lesson2 PartI: Basic Concept of VPL (To build a Text-to-speech program)

【OS & Software】

Windows 7/XP 、 Microsoft Visual Programming Language 4 、 ASU Visual Programming Environment

【Learning Outcomes】

Be able to program in MVPL.

【Instructions】

1) Introduction to MVPL

1. Install MVPL.
2. Start MVPL.
3. To know the “Basic Activities”
4. To find out the services.
5. Drag with activities and connect with activities.

2) VPL activities

1. Be familiar with Variable、Calculate、Data、Join、Merge、If、Switch.
2. Understand the basic principle of “TexttoSpeechTTS”
3. Understand the basic principle of “SimpleDialog”.
4. Programming by using the aforementioned activities.

3) Complete the program of “TexttoSpeech”

1. A dialog should be output, and user must be writing a sentence.
2. Calculate the length of the input sentence, and read out.

【Instructions】

1) Introduction of VPL

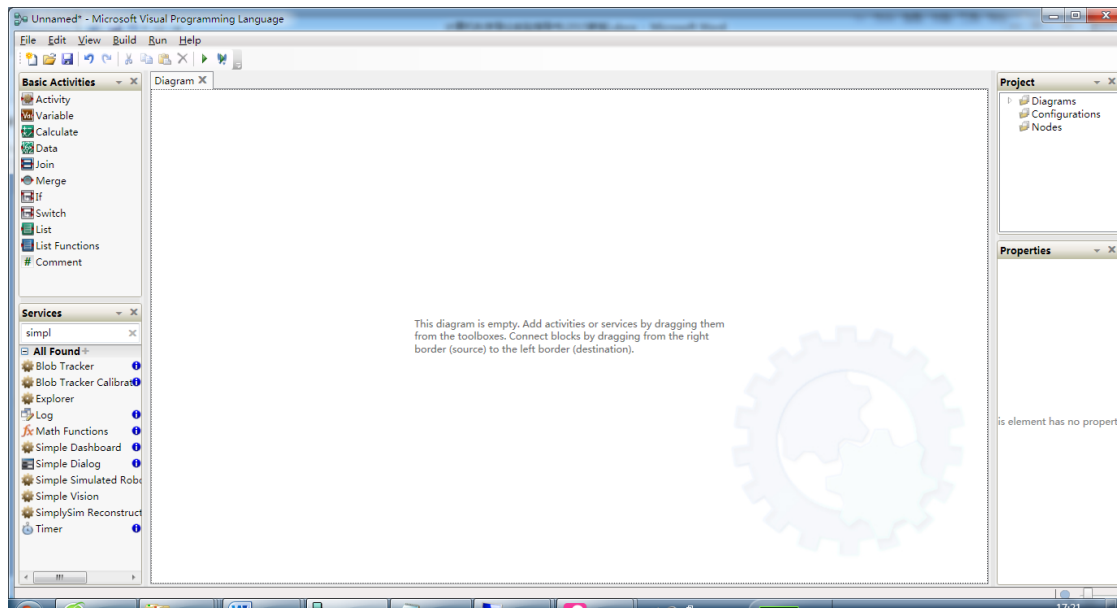
Microsoft VPL is a milestone in software engineering and robotics from many aspects. It is service oriented; it is workflow-based; it is event-driven; it supports parallel computing; and it is a great educational tool that is simple to learn and yet powerful and expressive.

Unfortunately, Microsoft stopped developing and supporting VPL recently, without

further support. Particularly, the current version of VPL does not support LEGO's third generation of EV3 robot, while the second generation NXT is out of the market.

To keep our course running and also help the other schools, we take the challenge and responsibility to ASU VIPLE supported by YINONG Chen.

1. Downloading from <http://172.18.5.98/CELesson-STU.rar> to get Microsoft Visual Programming Language 4.
2. Running Microsoft Robotics Developer Studio 4.exe.
3. Start-"Microsoft Visual Programming Language 4":



4. Introduction to functional areas:
Left side lays on Basic Activities, Services; panel is on the middle of the screen.

2) VPL Basic Activities

1. There are 10 basic activities that can be used for constructing programs. These activities are briefly explained in right Figure, and they will be exercised in the following programming exercises.

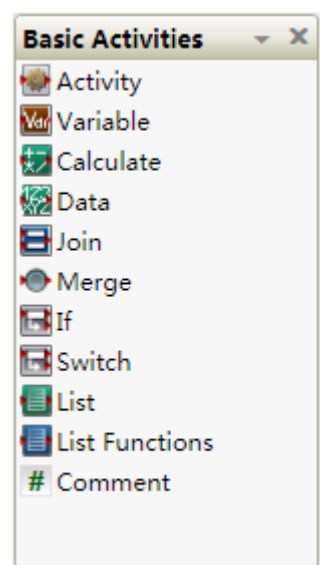
Activity: for creating components

Variable: supports basic types (Int32, Double, String, Boolean, etc.)

Calculate: Calculate the value of typical expression that is supported by C++, Java

Data: Introducing constant values in regular programming language

Join: proceeds when all threads arrive; Can be used for parallel data or threads.



Merge: proceeds when one of the data or threads arrives. It can be used for creating the return point of a loop;

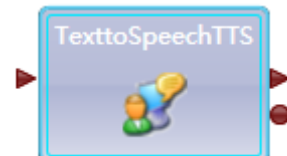
If: same as regular programming language construct; It allows multiple conditions.

Switch: same as regular programming language construct;

While: start a loop; Break: exits a loop, and

End While: returns to While

2. The service of TexttoSpeechTTS can read out the input string.

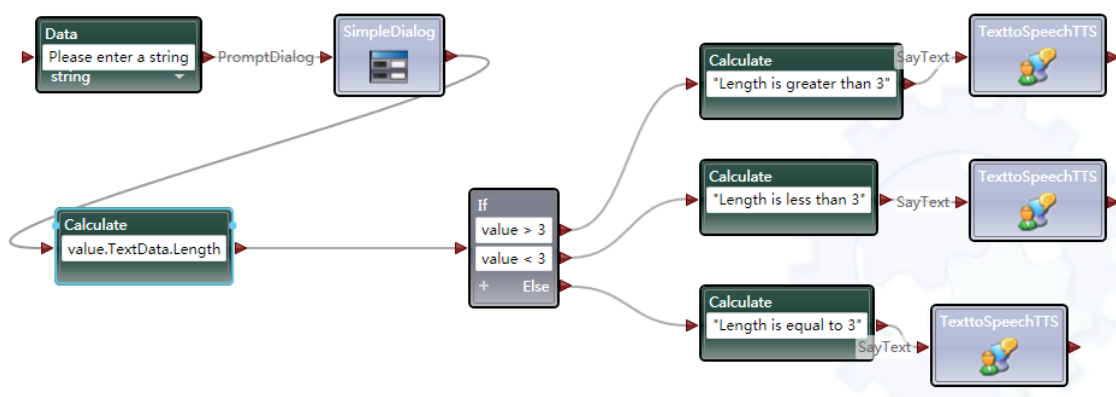


3. SimpleDialog could be used for tips or for input.

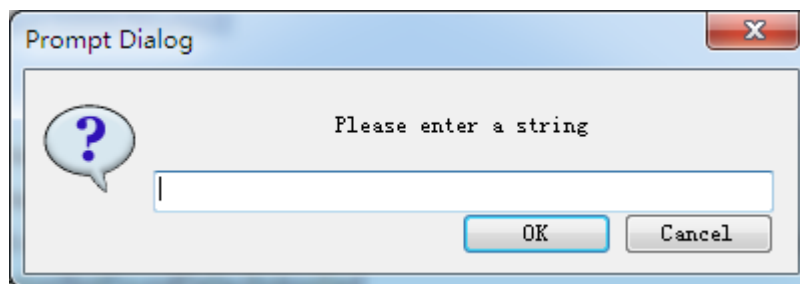


3) TexttoSpeech Program

Follow with the flowchart to complete the program.



Results:



【Assessments】

No lab reported is required.

But students should hand out (*.mvpl) with the name of ID and student name to the specify url.

Lesson3 PartII: Simulation Robotic Programming

【OS & Software】

Windows 7/X 、 Microsoft Visual Programming Language 4 、 ASU VisualProgrammingEnvironment

【Learning Outcomes】

Programming with VPL

Programming with VPL to control the simulating car

Using ASU VisualProgrammingEnvironment to control LEGO EV3 robotics

【Instructions】

1) MVPL (Microsoft Visual Programming Language 4) and
simulating robotics

1. Programming with MVPL.
2. Running with the simulating car.
3. Control the car through the panel.

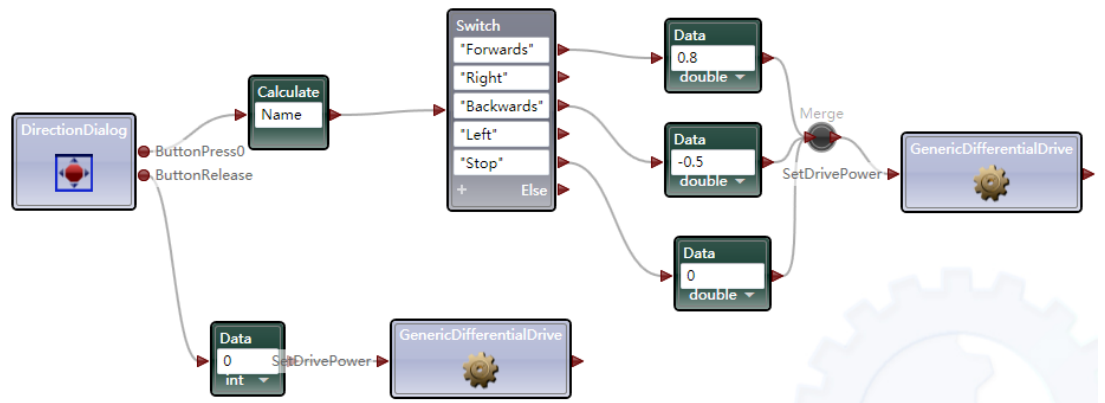
2) ASU VisualProgrammingEnvironment and LEGO EV3 robotics

1. Compare the difference between ASUVPE and MVPL.
2. How to power on LEGO EV3、the connection on Bluetooth of LEGO EV.
3. Connect LEGO EV3 to PC.
4. Programming in group at most five people.
5. Writing a program to control LEGO EV3 by using the direction key.

【Instructions】

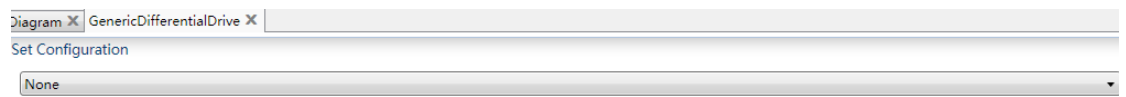
1) MVPL and Simulating car

1. Follow the flowchart to complete a program in MVPL(caution: the flowchart is not a complete one, you should to complete it by yourself)

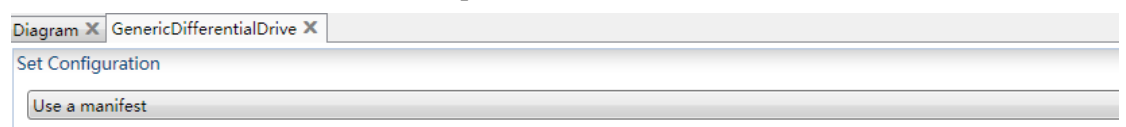


2. Configure the running environment, click “Generic Differential Drive” as follows:

Double click “Generic Differential Drive” icon, and then:



Choose “Use a manifest” from the dropdownlist.



Use a manifest

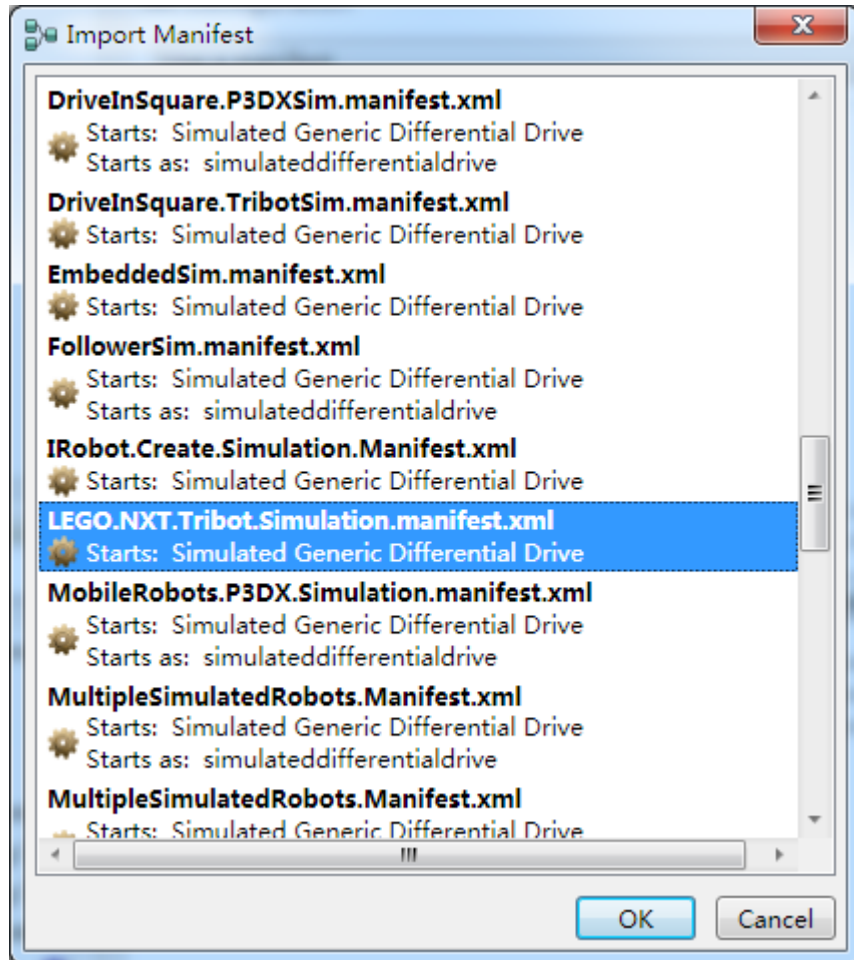
A manifest contains a list of services that are started together. Use the dropdown list to select a service suitable to associate with this activity.



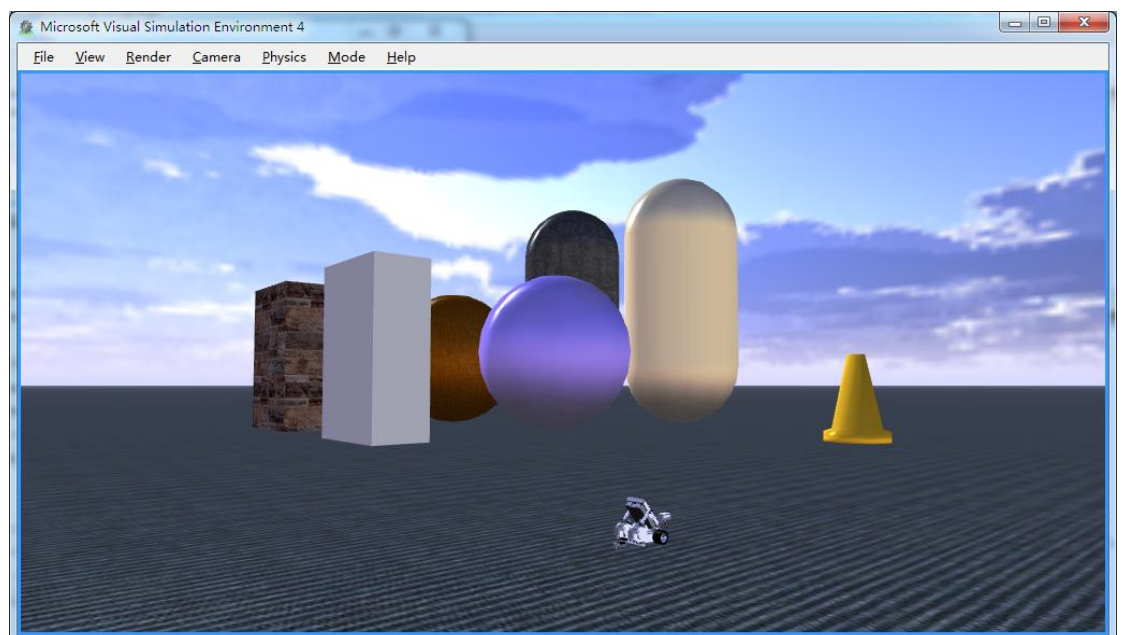
Import Manifest...

To use a manifest, the manifest (and its configuration files) must be included in this project. Use the Import Manifest command to copy all necessary file into the project's folder.

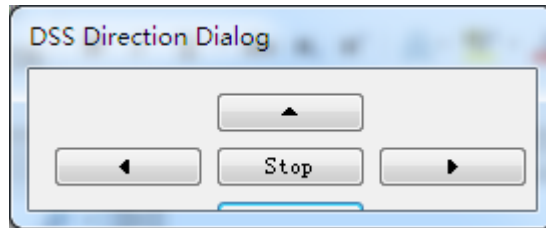
Next with “Import Manifest...” and choose LEGO.NXT.Tribot....



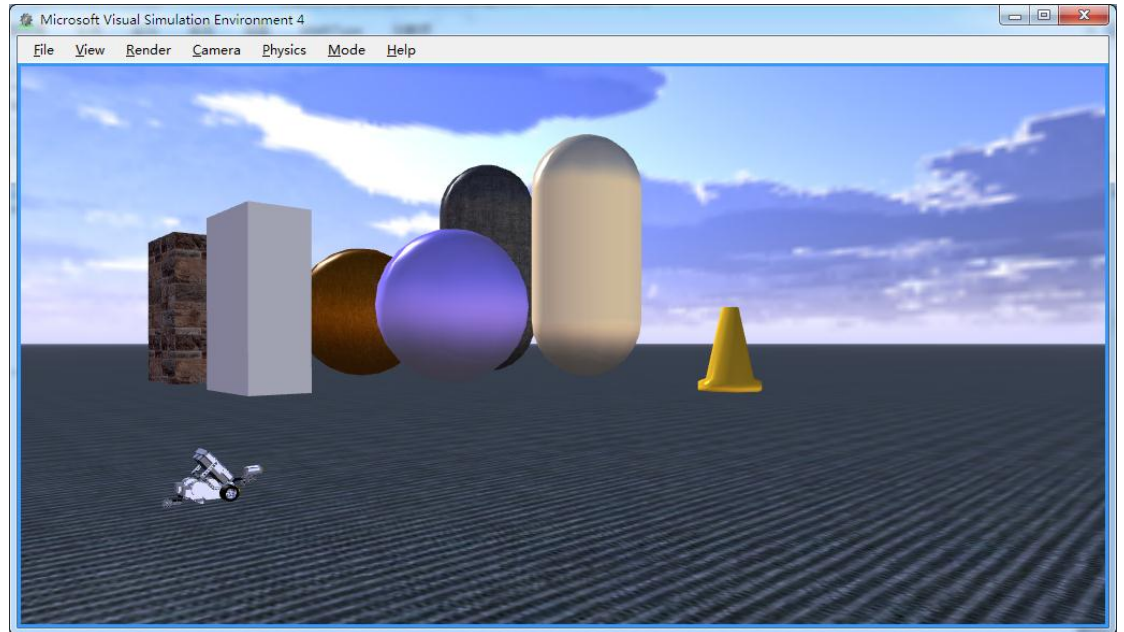
3. Running the program, and then you will see the following result. The simulating car can be controlled by the direction panel.



Direction panel is list as follows:



We press “right” button, the car run away from the original place.



Tips: if the program showing without DSS, then you can run the DSS in the start menu.

2) ASU VisualProgrammingEnvironment and LEGO EV3 Programming

1. In this part we use Visual Programming Environment (VPE) to write a program to control LEGO EV3 for MVPL cannot support LEGOEV3. Details for VPE can be seen in [2].
LEGO EV3 is figure out as right. You can use any other blocks to strength the ability of robotics.

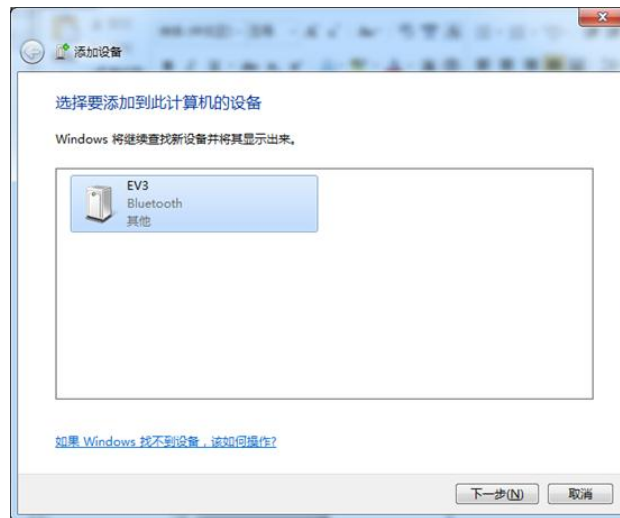


2. Connecting EV3 to PC
EV3 support the following ways to connect to PC: Bluetooth、WIFI、USB. We recommend Bluetooth as the first way to connect.

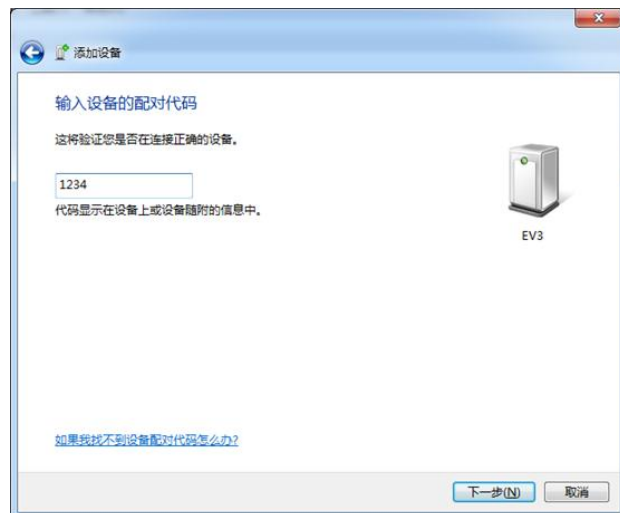
- (1) Power on EV3, and then open the Bluetooth port on EV3.
- (2) Searching Bluetooth devices from PC.



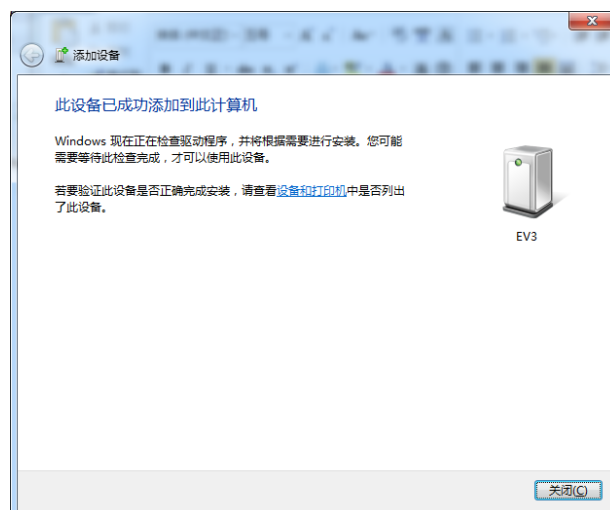
(3) When EV3 appeared, Click Next.

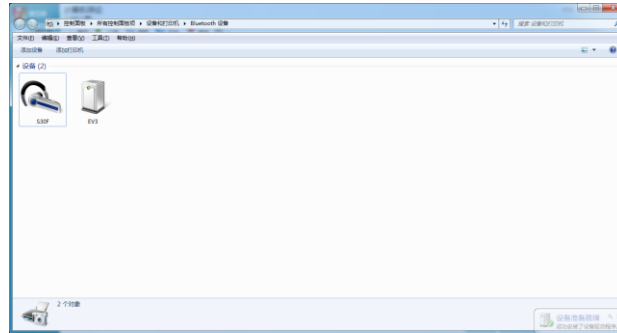


(4) And then the PIN code is needed, usually the PIN code is 1234, and also you can change the code in EV3.



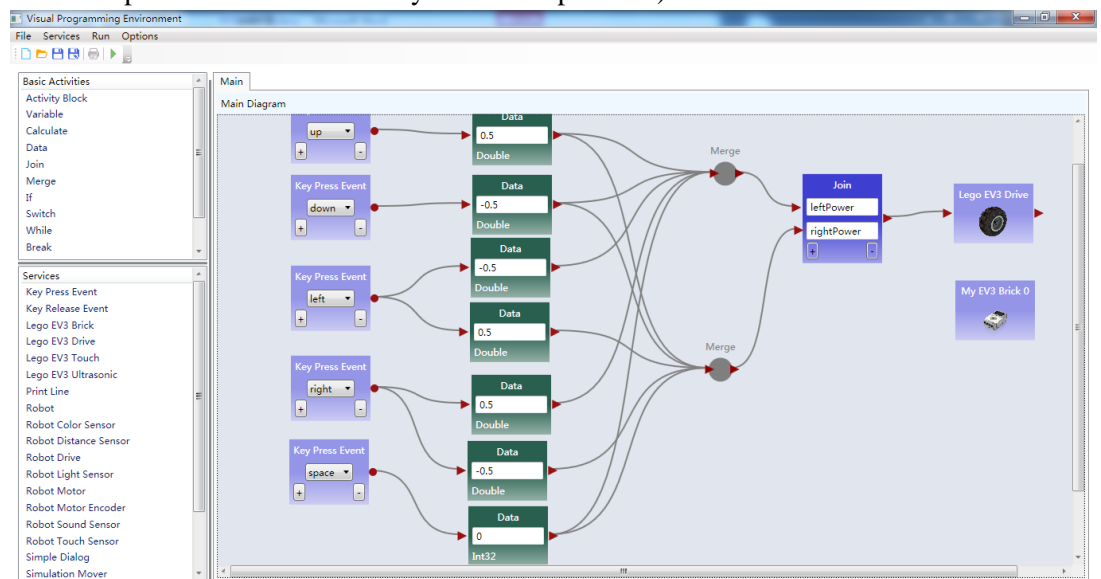
(5) You can check status of the link for EV3.





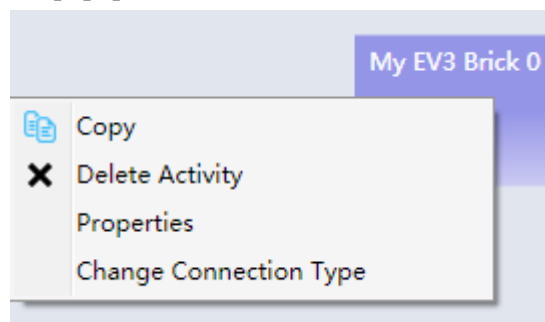
3. Programming in VisualProgrammingEnvironment to Control EV3

- (1) Running VisualProgrammingEnvironment.exe.
- (2) Programming with the help of the lower flowchart (tips: you will complete the flowchart with your own experience).

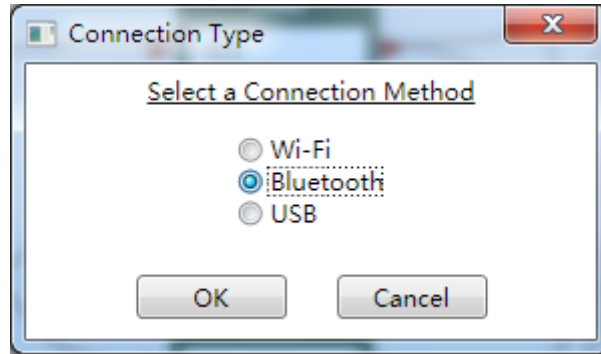


(3) Programming with EV3

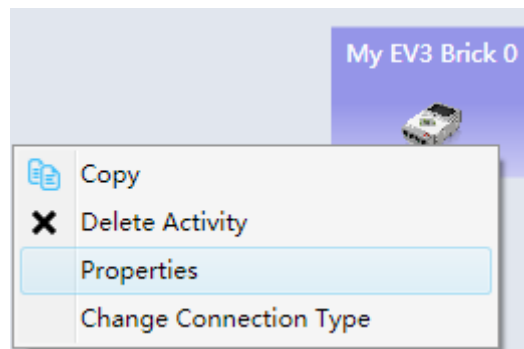
Right click “My EV3 Brick0” and choose “Change Connection Type” in the popup menu.



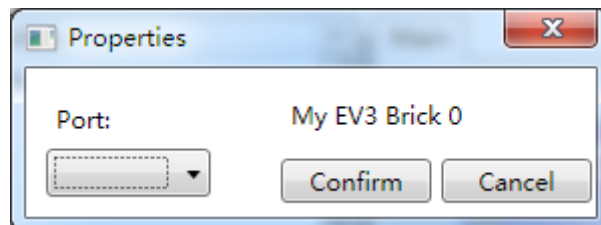
Choose “Bluetooth”



Then right click “My EV3 Brick 0” again to choose “Properties”



Here, we should choose one port to allow EV3 to communicate with PC, usually you can found out the proper port the Bluetooth properties. The following example chooses COM4, be careful you will change the port in your program.



(4) If there are not any other errors, you can control EV3 with PC keyboard.

【Assessments】

Hand out the lab report to the specify URL.

Hand out the (*.mvpl or *.xml) files at the same time.