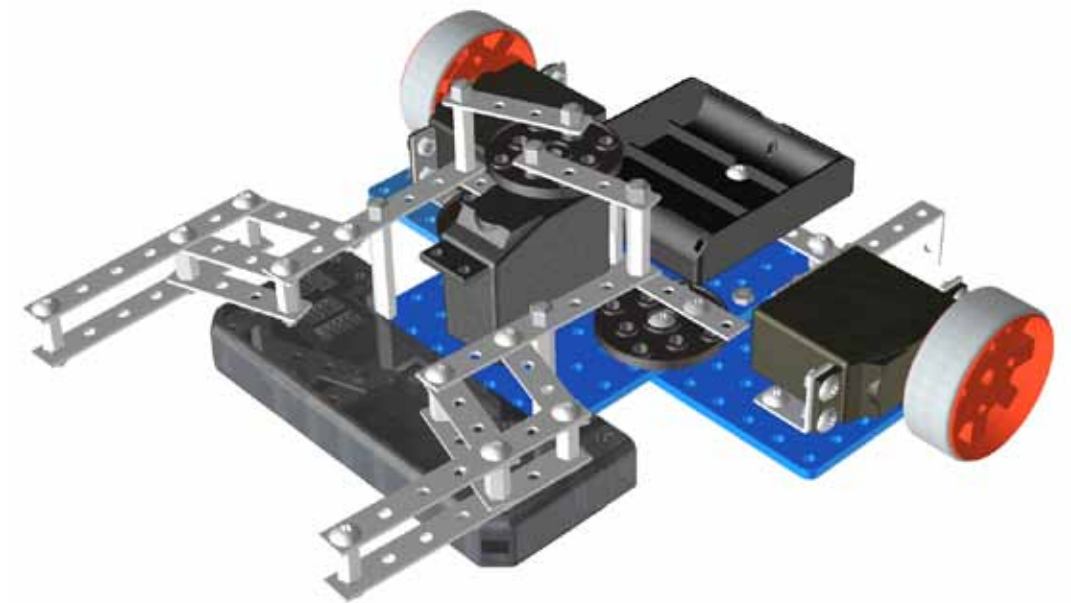


11. Mission-oriented Line Tracer



Introduction and working principle

– Principle of the Lever



A lever is a machine consisting of a beam or rigid rod pivoted at a fixed hinge, or fulcrum. A lever amplifies an input force to provide a greater output force, which is said to provide leverage. A lever has three points; a fulcrum (or pivot point), an input force (or effort), an output force (or load or resistance). Fulcrum is the support about which a lever pivots.

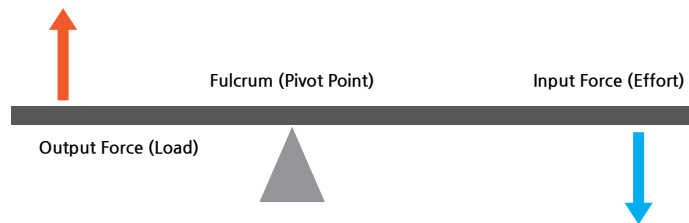


Figure 1. Principle of the Lever

It has been found that, when the distance from the point of load to the point of fulcrum is constant, the longer the distance from the point of effort and the point of fulcrum gets, the greater the output at the point of load becomes; and the less at the point of effort becomes requiring. Mission-oriented line trace uses the principles of lever in designing fork part to lift up objects.

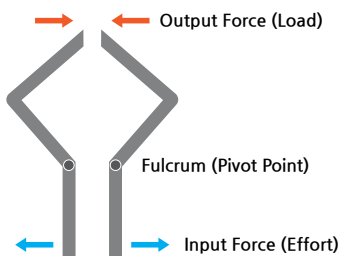
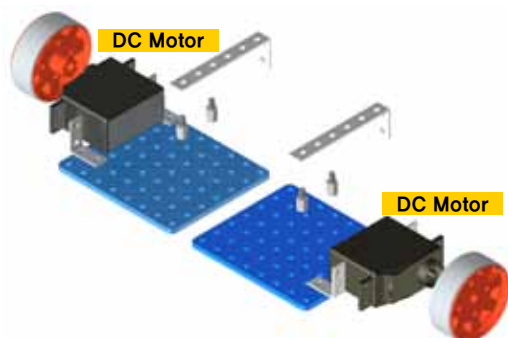


Figure 2.
Application of Lever

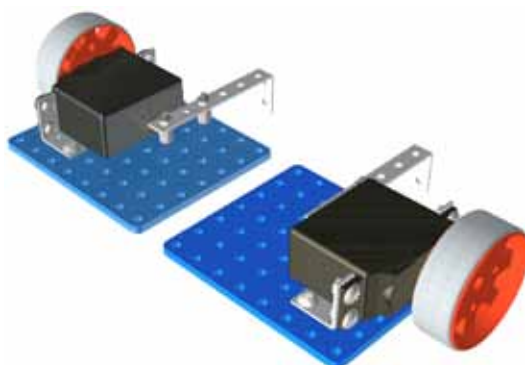
Servo motor is connected to the points of effort at both ends; pivot point is formed by a support; and an object to be lifted up is positioned at the point of load. When servo motor rotates and applies forces on the point of effort, fork part of the robot comes to grip the object located at the point of load. As the torque of servo motor is fixed, if you desire to grip the object with a stronger force, it can be done by expanding length of the distance between the pivot point and the point of effort.

The fork part of mission-oriented line tracer uses the principle of cam, which transforms circular to linear motions, other than the principle of lever. You can see circular motions of servo motor transforming to linear motions, while objects are being lifted up and down.

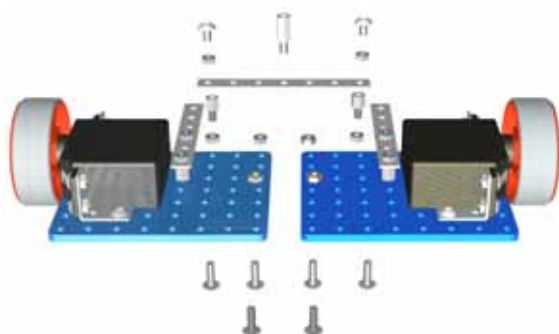
1





 X 2
  7mm X 4

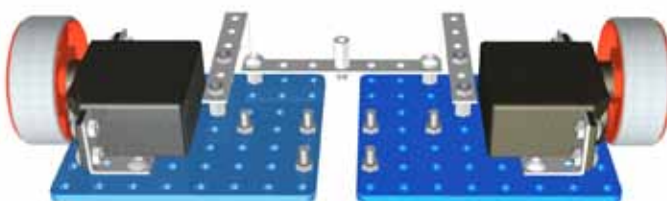


2



 5mm X 2
  10mm X 1

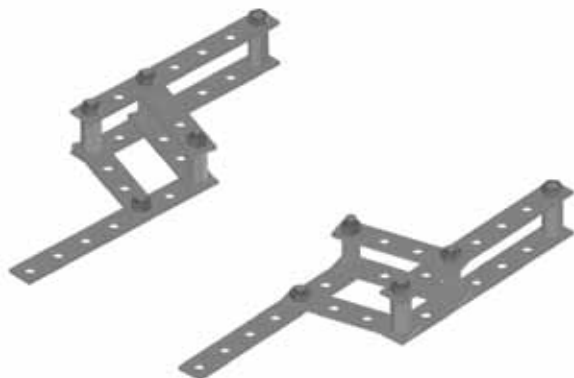
 X 6



3

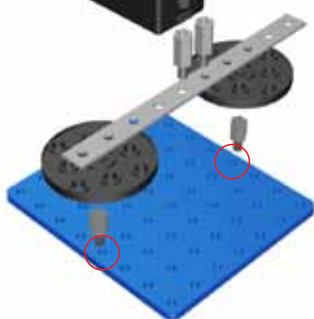


10mm X 8



4

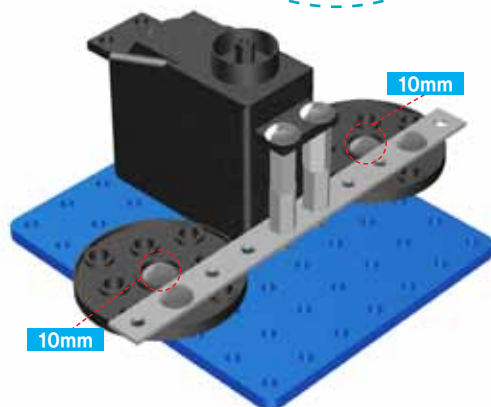
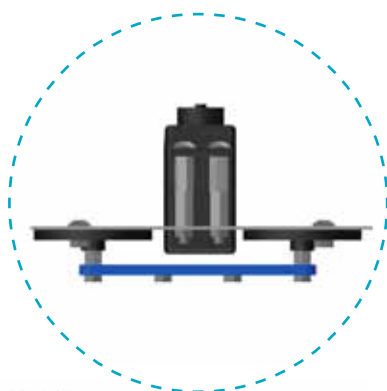
Servo Motor

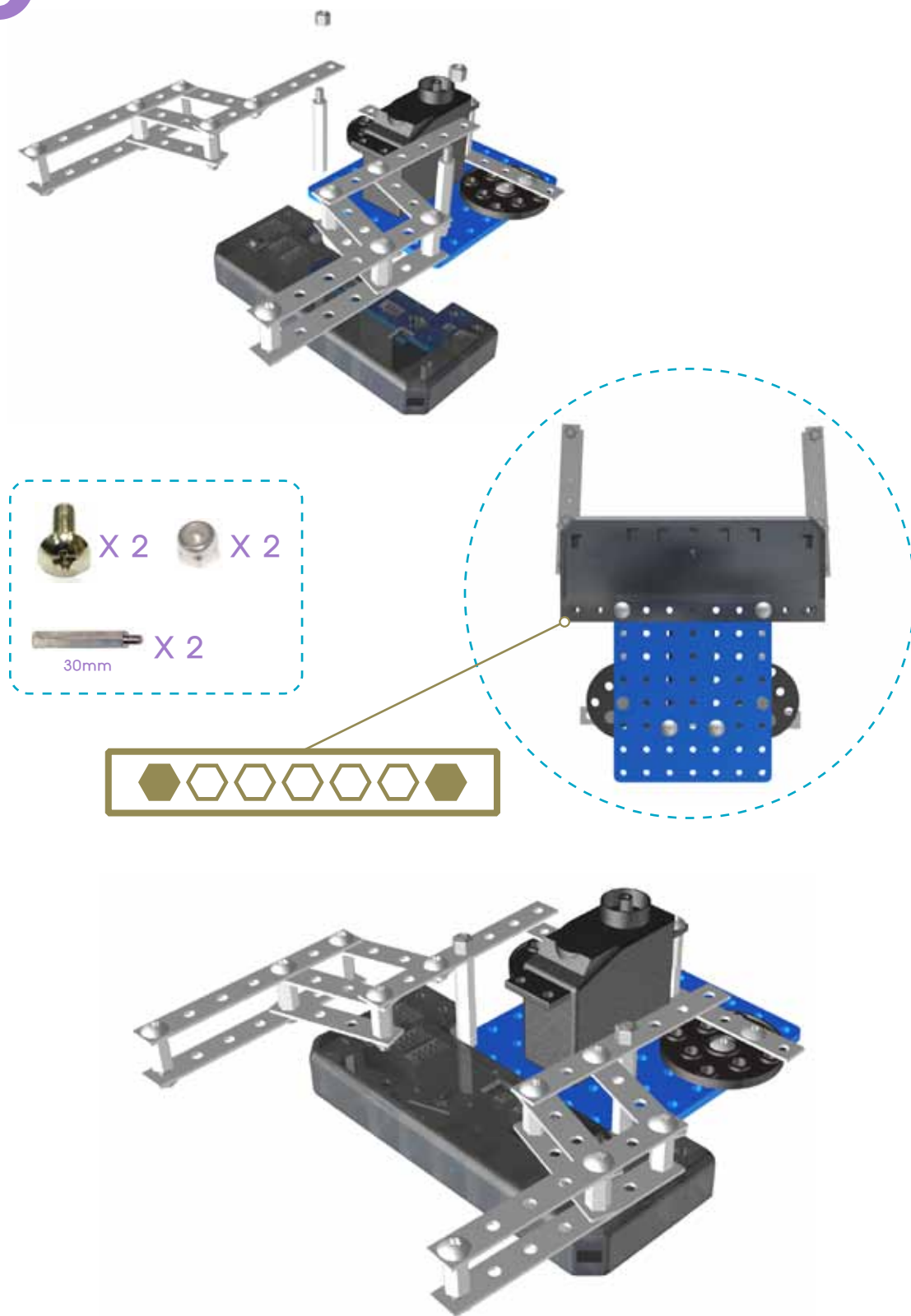


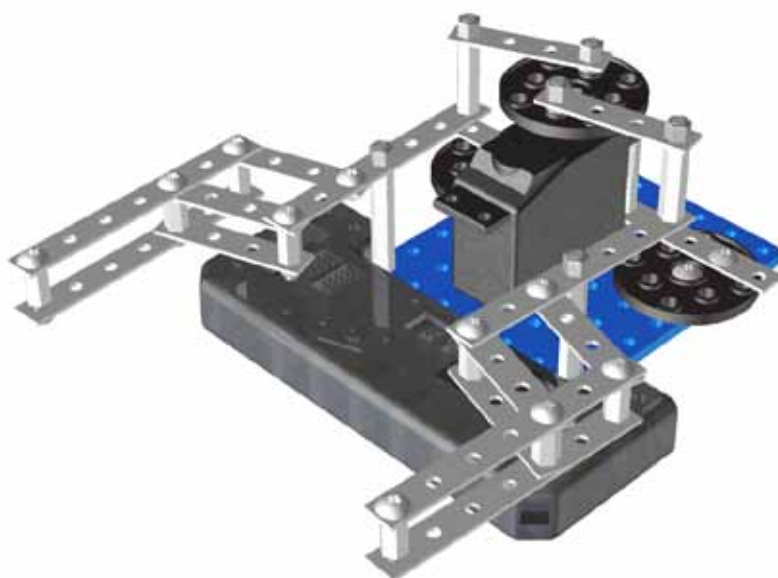
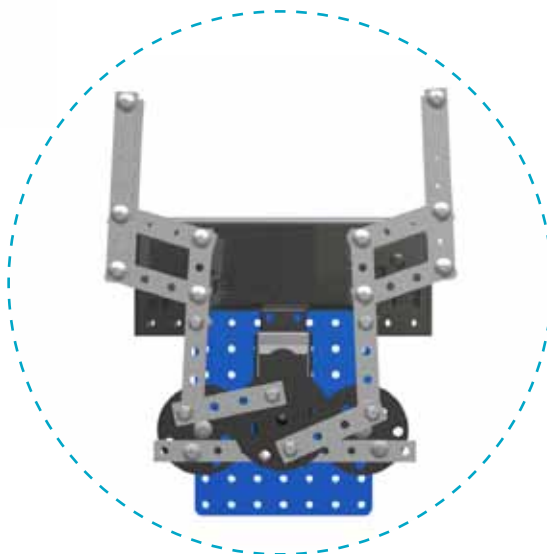
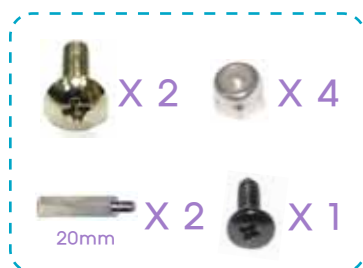
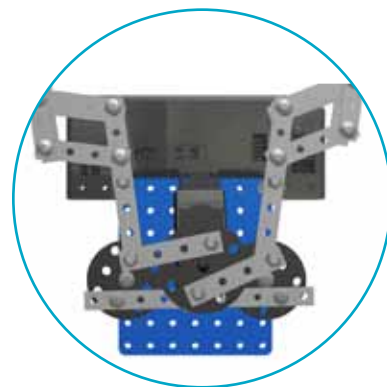
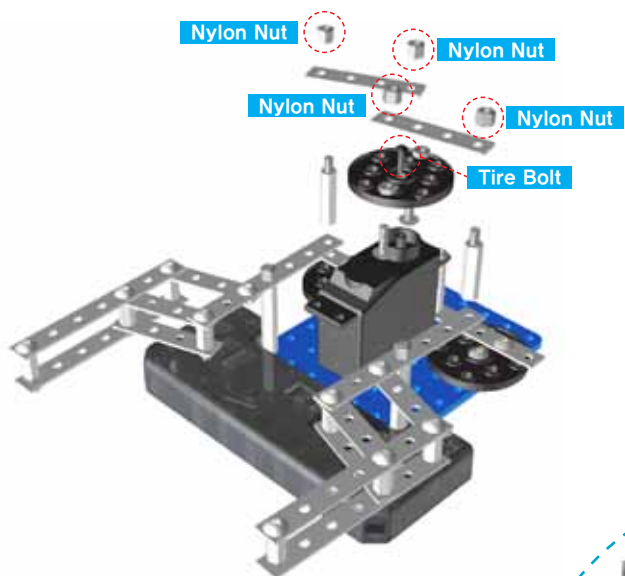
X 2 X 4

7mm

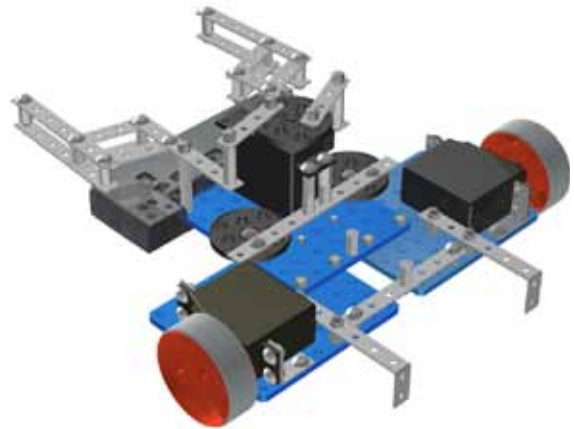
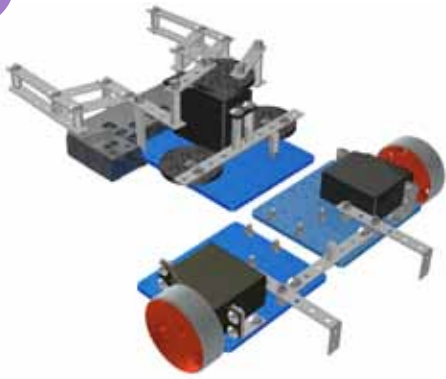
10mm X 1





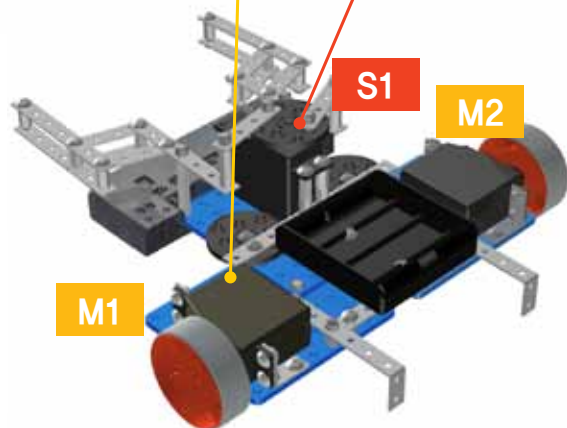
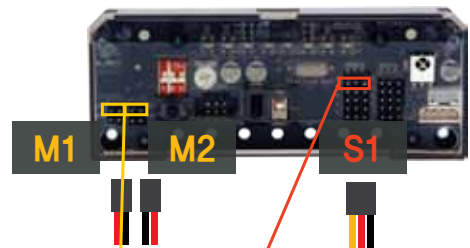
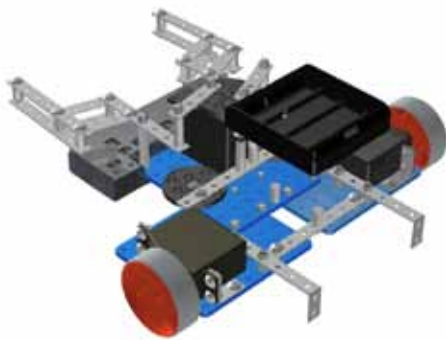


7



10mm X 1

8



Scan the QR code with your
Smart phone, and watch
How the robot is driven.



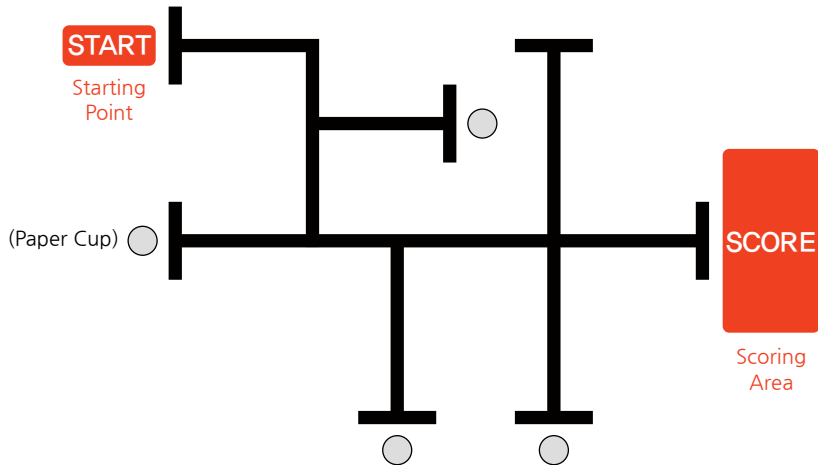
Play the Game!

– Mission-oriented Line Tracer Game



It is a game to compete for how well a mission can be executed by each line tracer. Each line tracer is tasked to pick up and carry a paper cup, while tracing the line as shown below.

The circles marked on the line-tracing map indicate the locations of paper cups. If mission-oriented line tracer picks up, carry with and put down the paper cup in the scoring area, it scores a point.



1. Before starting the game, locate the line tracer on the black line ahead of Start Marker.
2. As soon as the game is started, the line tracer moves along the programmed path while carrying on a paper cup.
3. Before programming, let's study over the most effective path to make scores.
4. Run of the whole course shall be considered to be completed when returning to start point after all of the paper cups have been transported.
5. Who has completed the mission within the shortest period of time is the winner. In case a line tracer has transported all of the paper cups but failed in running the whole course, it shall take last place in the game.
6. In case a line tracer returns to start point without having transported all of the paper cups, it shall not be treated as completion of running the whole course.
7. When all the line tracers have failed in running the whole course, then rankings shall be decided based on the number of paper cups each one has successfully transported.
8. Paper cups can be relocated to other places, different from the above illustration and guideline.

How to set up the Line Tracer mode

– Sensitivity Adjustment of Line Tracer



For driving Line Tracer, select and press program mode 12.

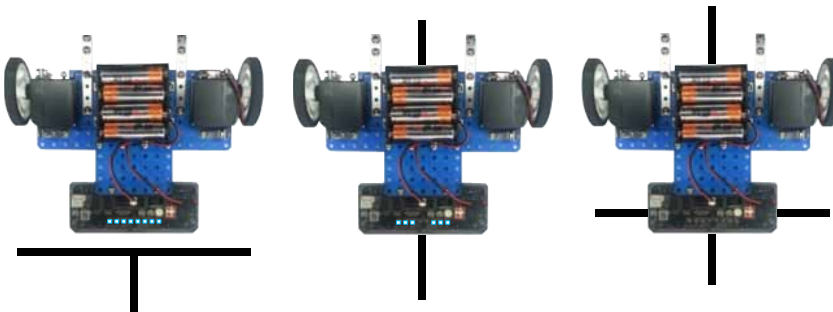


In Smart Rokit Step 2, program is due to be running on with number 2 toggle of DIP switch turned upward. In other words, Smart Rokit Step 2 basically uses channel number 3. Refer to '2. Channel set-up for remote control' in page number 15 that gives you more in details for further reference.

1. Sensitivity Adjustment of Line Tracer

As soon as the line tracer gets started, enter into **sensitivity check mode**.

On this mode, if a line tracer is placed on black line, **LED light goes off where black line is detected**. If the whole LED lights go off when a line trace is placed on black line, there is problem associated with sensitivity issues. To trouble shoot this problem, sensitivity need to be adjusted through variable resistor. Upon adjustment of sensitivity, **proceed to let the line tracer detect the sensor in the center**.



LED light goes off where black line is detected.



Execution

Upon completion of sensitivity adjustment, enter into programing mode by pressing execution button in the center of remote control.

How to set up the Line Tracer mode

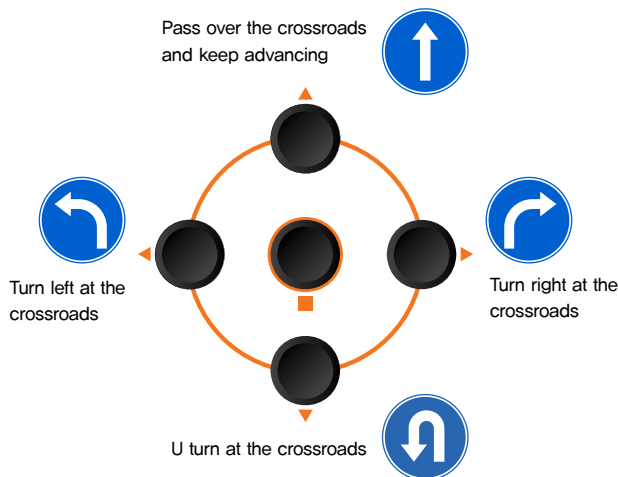
– How to Program Line Tracer



2. How to Program Line Tracer

Once sensitivity adjustment process has been done, it enters into program mode. Take a look at the illustration down below, and let's do programming in person so that line tracer may follow the line. Each time a program has been input, the LEDs where light turns on increases one by one.

If input process has been completed, run it by pressing 'Program Execution' button, the one encircled by four directional buttons at the center of remote control.



Use 'Open Gripper' and 'Close Gripper' buttons, to grab and transport objects.

When finishing input process, activate it by pressing 'Program Execution' button.

In case of a wrong input, use 'Redo' button to go back to the previous process. It can redo it step by step.