

LogoBlocks – Basic Line Following

(A tutorial by *Technotutorz*)

The RoboBox robotic kit is one of the robots used as standard in the Technotutorz workshops. Two versions can be built up: the O₂Robot and the NanoTank. The RoboBox can be used for collision detection, distance measurement, line tracking and remote control operation. The RoboBox is ideal for a 1-day workshop as the students spend little time building up the robot before they can start with basic programming.

The RoboBox uses the i-Box III microcontroller, which includes the Logo interpreter. LogoBlocks is a simple, easy to learn icon-based program. You just drag blocks from the palette (on the left of the screen) and snap them together on the canvas (on the right side of the screen). The buttons on the bottom left let you switch between palettes, each containing a different set of commands.



The standard parts used in this tutorial are:

1. The NanoTank with two infrared reflector sensors for line following.
2. LogoBlocks software.
3. Download the code for the test program and line following.

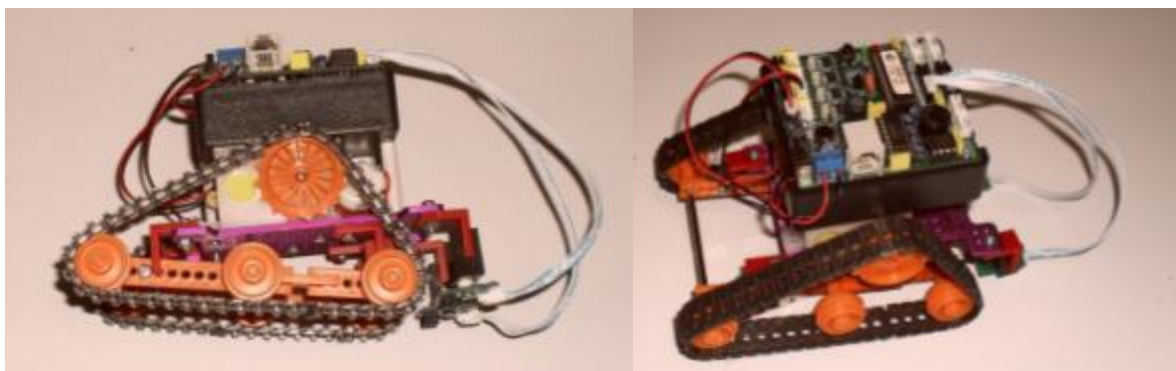
The RoboStamp is available from Robokits and all the required code and user manuals are supplied with the kit.

The following tutorial explains step by step instructions to help you program the NanoTank using infrared reflectors for line following. This information will be exactly the same for the O₂Robot.

1 Preparation

1.1 **Build up a standard NanoTank with motors and sensors connections as below:**

- a. Left motor → Connect to black connector of channel A input
- b. Right motor → Connect to white connector of channel B input
- c. Left infrared reflector → SENSOR1
- d. Right infrared reflector → SENSOR0

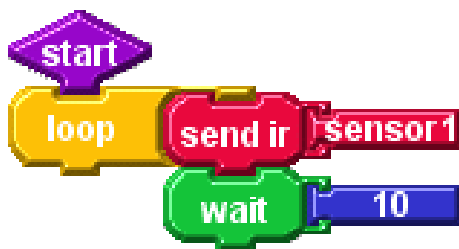


1.2 Testing the sensors

Infrared reflectors are used to detect perimeters and lines. The value returned by the infrared reflectors is an analogue value that depends on the light in the room. It is therefore important to measure the value for different shades of black and white. The Cricket Monitor (Under Projects on the menu bar or ctrl M) is used to display the value.



Create the following code. See below.



All programs start with a



The send ir block is used to send a serial message back to the Cricket Monitor.



This code will loop continuously until the run button pressed on the robot or the robot's power turned off.



The wait gives the processor time to complete other processes on the robot and PC as well.



Measurements:

Measure some values for white, black and other colours .

Colour	Value	Notes	Colour	Value	Notes
White 1			Black 1		
White 2			Black 2		
White 3			Black 3		
White 4			Black 4		

When you are finished write a simple rule for detecting the white and black line:

White areas will give a reflection value of approximately _____ to _____
 Black areas will give a reflection value of approximately _____ to _____.

1.3 Following a black line

Enter the following code. The variables used depend on a couple of situations that needs to be considered. Firstly the batteries strength, the light in the room will influence the value returned from the sensors, the “blackness” of the line, the “whiteness” of the empty space and the “sharpness” of the turns.

The code starts with a 'start' block followed by a 'loop' block. Inside the loop, two 'sets' blocks are used to initialize global variables: 'sets0 sensor0' and 'sets1 sensor1'. These are followed by two 'if then' blocks that check the values of s0 and s1 against the number 350. The first 'if then' block checks if both s0 > 350 and s1 > 350. The second 'if then' block checks if both s0 < 350 and s1 < 350. The third 'if then' block checks if s0 < 350. The fourth 'if then' block checks if s1 < 350. Each 'if then' block contains specific motor control commands (ab, pwr, ab, <<<, ab, onfor) to adjust the robot's position based on sensor readings.

Annotations with red arrows:

- Two arrows point to the 's0' and 's1' variable blocks: "Create to global variables called s0 and s1. After this you will have access two four more commands: sets0, sets1 and two numbers s0 and s1."
- An arrow points to the first 'if then' block: "This code is when both sensors “see” white. Motor moves forward."
- An arrow points to the second 'if then' block: "This code is when both sensors “see” black. Motor moves forward to cross black line."
- An arrow points to the third 'if then' block: "This code is when right sensor “sees” black. Left motor (B) moves forward and right motor (A) moves back to return to “normal” position."
- An arrow points to the fourth 'if then' block: "This code is when left sensor “sees” black. Left motor (B) moves back and right motor (A) moves forward to return to “normal” position."

