

Program Details

Program Name	: MakeX Competition 2019
Program Code	: TRA0010
Duration	: 1.5 hrs per Lesson (approx. 3 months to complete the course)
Learning Material	: mBot + Add-on pack (exclusive)

Program Outline

Lesson 1: Your First Robot

Lesson 2: MBot programming development environment and Scratch programming

Lesson 3: Motor control

Lesson 4: Light sensor and buzzer

Lesson 5: Ultrasonic sensor and its application

Lesson 6: Programming process control

Lesson 7: Introduction of For Loop

Lesson 8: Introduction of If... else

Lesson 9: Introduction of variables

Lesson 10: Data and computations

Lesson 11: Controlling mBot with smart devices and the line follower program

Lesson 12: Custom Blocks (functions) and obstacle avoidance program

Learning Outcomes

At the end of this course, students will be able to:

1. Complete the assembly of the first robot and ensure that the components are securely mounted.
2. Identify the name of the parts inside the kit and understand how to use it.
3. Use the basic tool and understand the dimensions of all the fastening parts.
4. Install mBlock software and build a programming environment for mBot.
5. Locate and identify various functionalities in the mBlock software interface.
6. Use a various way to establish connection between the mBot and computer.
7. Complete first program to control the robot.
8. Can creatively complete the construction of basic functional structure as needed.
9. Understand sensors are specialised electronics that detect and/or respond to various environmental properties such as light, sound, temperature, humidity and etc.
10. Understand the basic parameters of the Me LED Matrix and its functional characteristics.
11. Understand the different functionalities of the blocks related to the Me LED Matrix.
12. Program the LED Matrix to display number, text or symbols.
13. Gradually master the programming control skills of Me LED Matrix through step-by-step learning and continuous experimentation.
14. Use the RGB line follower to learn the track and background colour.
15. Use motor differential speed to follow a track.
16. Use sensor status to program a basic line following logic.
17. Retrieve the output of a colour sensor using LED board and use it in conjunction with onboard LED lights.
18. Use colour sensor to detect a standard and a non-standard colour. Students can properly utilise RGB information to achieve multi-colour separation.
19. Understand the installation and setup process of the audio player and can properly process audio files into the correct format and store them into the TF memory as required by the audio player.
20. Come up with creative ideas utilising the audio player hence increasing its usability.
21. Program to use the Bluetooth controller to control mBot movement.

22. Use other display devices to read the return parameters of the joystick.
23. Use mathematical operations to complete accurate assignments.
24. Understand the advantages of precise numerical and range definitions in the program.
25. Understand the design parameters and basic usage of MakeX 9g servos.
26. Complete the connection of the servo through the RJ25 adapter to the mCore motherboard.
27. Use a servo correctly and limit it in the program according to its environment.
28. Use the Bluetooth controller to switch the steering angle and speed change.
29. Understand the concept of “debounce” in hardware control programs.
30. Use the colour sensor to count and memorise the number of appearances of a certain colour and understand the concept of logic gates.
31. Produce a complex line following program that are tailored to map features and understand the differences among three types of turning methods.
32. Use different turning methods depending on the map features and identify, utilise and resolve three common types of intersection.
33. Understand the operational relationship between speed, time and distance. Students can calculate the time it takes for mBot to move 1cm.
34. Edit the program to record the sensor multiple times and return the value automatically, and the average calculation is done automatically.
35. Students are able to consider the impact of the objective physical environment on the execution results of the program during the programming process and make a reasonable workflow split for complex tasks.
36. Structure program in blocks and describe what parameter is and produce a program picker with a reliable method of selection.