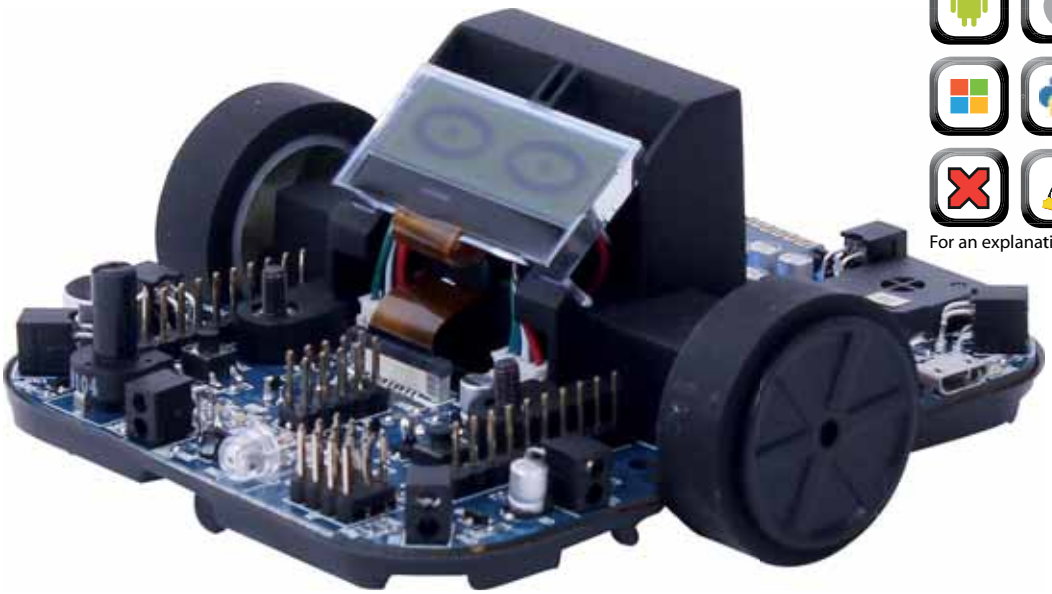
FORMULA //ALLCODE™

Formula AllCode is host independent and can be used with:

- Raspberry Pi
- Android
- iPhone
- Windows & MacOS
- And many more…

For an explanation of icons please see page 6



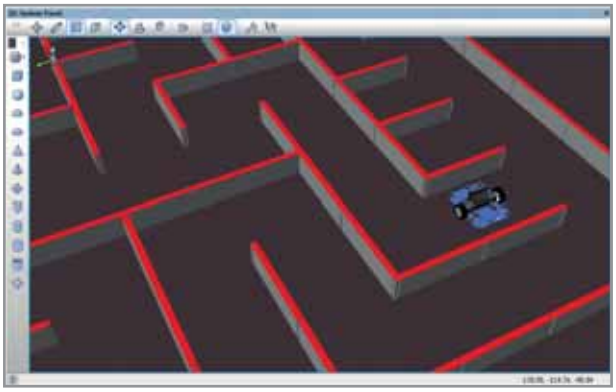
Learn robotics your way

Formula AllCode is a complete robotics course consisting of a high specification robot buggy, a course, and a range of accessories that present learning activities for students. The robot is Bluetooth compatible and is shipped with a full Application Programming Interface. This means that it can be controlled via Bluetooth from any computer, tablet or phone with a Bluetooth interface using a host of different programming languages from Python to C++.

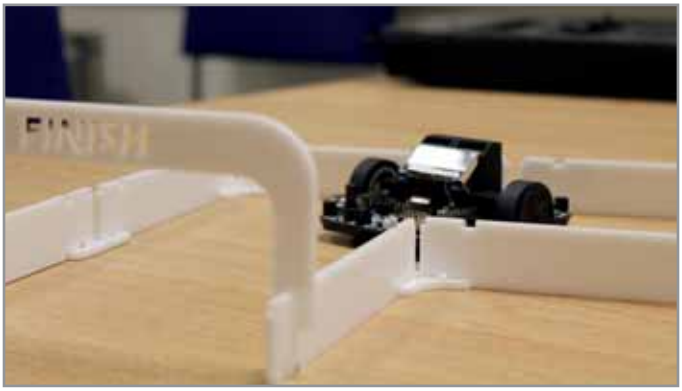
The free, accompanying course includes a range of activities with varied levels of difficulty; from flashing an LED through to maze solving. Students are guided through the activities by a suite of worksheets. To get students started example programs on all major platforms are provided: including: Flowcode, MATLAB, LabVIEW, Python and AppInventor. Flowcode simulation environments and components are provided for Flowcode users (dsPIC version required). Programs written in Flowcode or C can be downloaded to the robot to make it behave autonomously.

This is our second generation educational robot buggy evolved from 6 years of experience in the market.

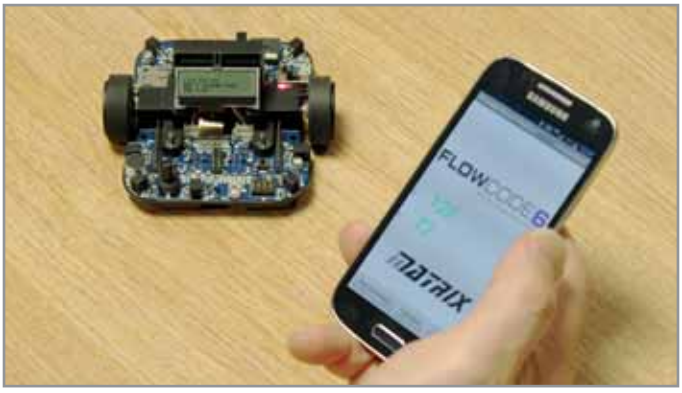
By the way: the word 'Formula' in the name refers to the popular 'Formula Ford' racing competitions where drivers race on a track using the same specification of car.



Simulating the AllCode in a maze using Flowcode

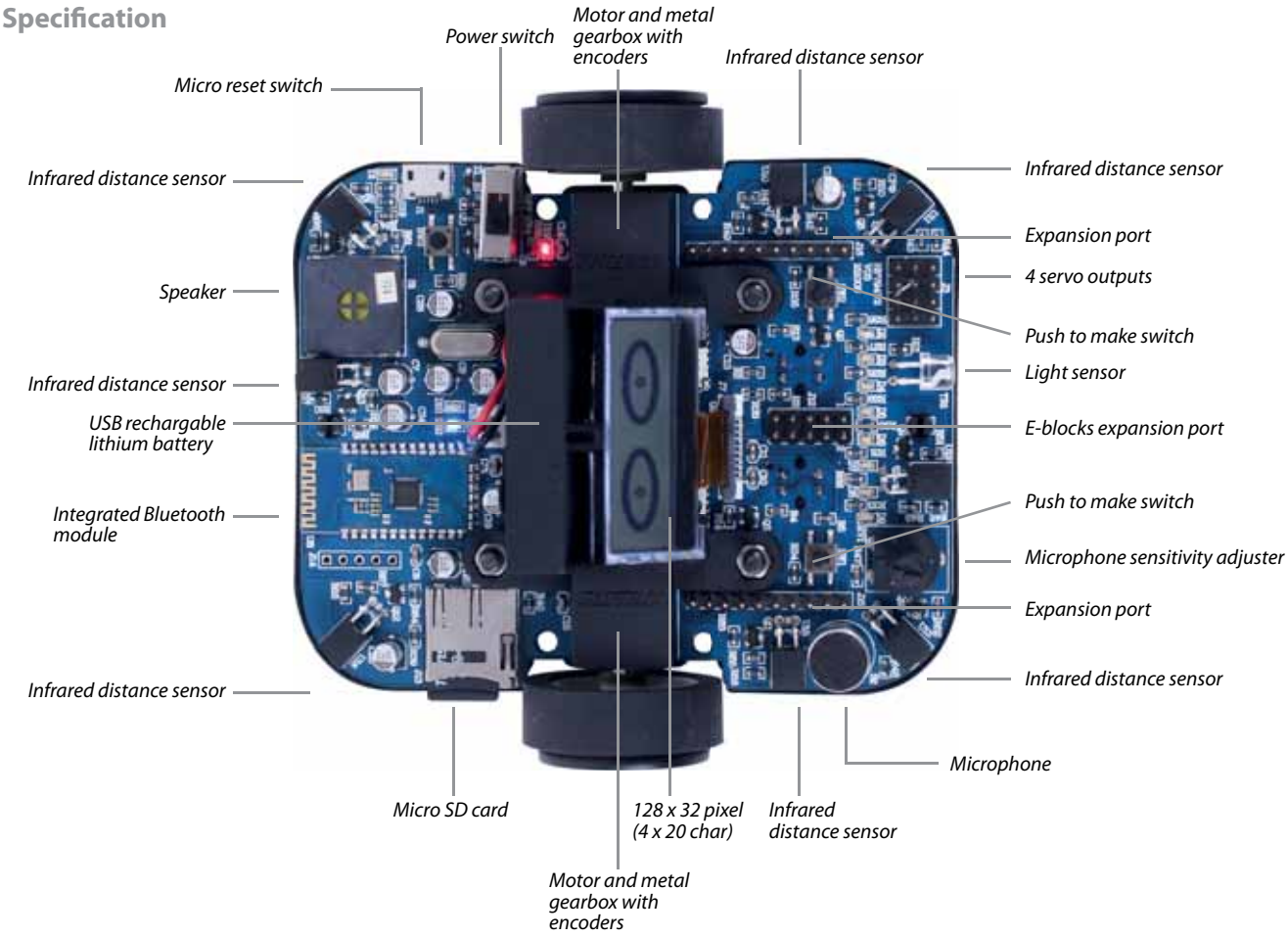


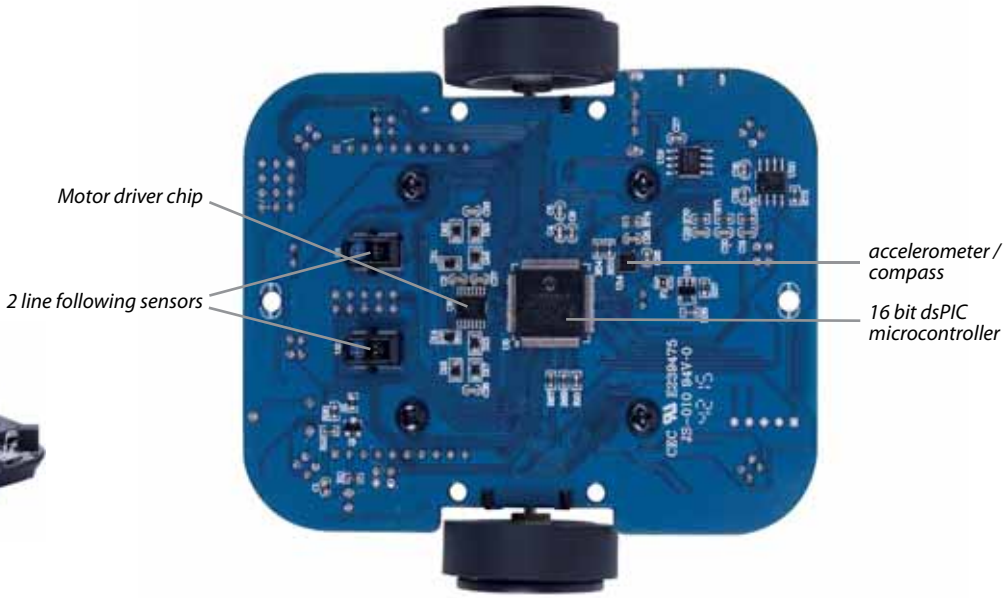
Formula AllCode uses it's high specification of sensors to follow lines and can even solve complex mazes. We are offering maze walls and maze mat with full examples to enhance your learning experience.



Program the Formula AllCode with any Android device. Use programs such as App Inventor to develop and directly control the Formula AllCode. You can even use iOS and RPi platforms to control the buggy.

Specification





Learning Activities

Learning activities are at the heart of Formula AllCode and have driven its specification.

The range of activities is what makes AllCode so powerful. Students can learn basic code constructs starting with flashing an LED. They can learn the principles of robotics using the on-board sensors and the motors. Then students can progress to solving system level problems like maze solving and navigation.

Maze solving is really special: using a left hand wall following algorithm it is possible to solve most mazes. But using the AllCode to first map a full maze and then work out the fastest way of going from start to finish is a real challenge for coders. Whatever you end up doing with your students there is a little bit of magic in seeing robot buggies running around mazes.

Here you can see a list for some of the learning activities that are possible with the Formula AllCode.

RoboIO	Robo-DJ	Robopop	Motor drive	Follow my line
Use on-board switches and LEDs to understand inputs, outputs and binary operation.	Use on-board loudspeaker to generate tones and play music.	Use the input mic to make the robot dance to music.	Program the robot to drive the motors with a specific speed and direction so that predetermined figures such as a triangle, a square, a circle or a spiral are made. We will have a logo-like commands in the API.	Use the on-board line sensors to follow a black line on a white background. extend the exercise with various markings on the line following mat.
See the light	**Lefty**	**Measure my drive**	**Drag race**	**Daytona race**
Use on-board light sensor to drive the buggy towards a light source.	Use the left hand wall-following technique to solve a simple maze.	Understand how wheel encoders are used to give feedback on exact distance travelled by each wheel and calibrate driving for each wheel.	Travel as fast as possible over a straight course, following a white line, then brake and stand still before hitting the end wall.	Do three laps around the maze as fast as possible, the fastest mouse wins. One second will be added for every time you hit a wall or make a 'touch'.
Naviagtion	**Tilt and turn**	**Stat panel**	**Full maze**	**Curve drawer**
Use the internal compass sensor to guide the robot along a path to buried treasure.	Develop apps in iPhone and Android that control the robot using the tilt sensor in your mobile phone/tablet, or control using a simple program on a PC (etc).	Develop apps in iPhone and Android that shows robot sensor status as it drives along a maze.	Solve an unknown maze by mapping it first and then driving the fastest courses as fast as possible.	Attach a pen to the robot and make it draw a given function (e.g. y=x2).
G forces	**Pimp my ride**	**Mobile bug**	**Remote control**	**Swarm**
Measure acceleration and wheel slip to optimise speed along a maze.	Develop a circuit board that attaches to the Formula AllCode robot using the servo outputs.	Create a spying device which drives to a location, records some speech, drives back and then plays the recorded speech back.	Use an old TV remote to make the robot move.	Use the Ir sensors to communicate between robots.

API example commands

There are two ways of programming the AllCode: firstly students can construct a program using Flowcode or MPLAB C and can download this program using USB or Bluetooth. The program will run autonomously in the robot.

Secondly students can use the AllCode as a Bluetooth connected slave to a host using a suite of commands we have provided. We call these commands the Application Programming Interface or 'API'. This means that it is easy to controlling the AllCode from computing platforms such as Android, MACOS, Windows, Raspberry Pi. The API is available in many languages (Python, App Inventor, Windows DLL, and more) and instructions on connecting major platforms to the AllCode are provided.

The table above lists some examples of the API.

Move forward 10cm. Read front distance sensor. LCDprint "Hello world"

Formula AllCode

Standard Formula AllCode

Standard Formula AllCode with USB cable for recharging/ programming.

Ordering information	
Standard Formula AllCode	RB4191

Formula AllCode deluxe kit

The deluxe kit contains a carry case, Formula AllCode, set of Maze walls, USB cable, and an activity mat.

Ordering information	
Formula AllCode deluxe kit	RB7971

Formula AllCode standard class set

The standard class set contains 5 x Formula AllCode buggies, set of Maze walls, 5 x USB cables, and activity mat.

Ordering information	
Formula AllCode standard class set	RB7240

Formula AllCode deluxe class set

The deluxe class set contains 10 x Formula AllCode buggies,| set of Maze walls, 10 x USB cables, and activity mat.

Ordering information	
Formula AllCode deluxe class set	RB7518

Formula AllCode maze walls

Desktop mounted maze wall kit that can make a 4 by 4 cell maze for problem solving and competitions.

Ordering information	
Formula AllCode maze walls	RB8962

Formula AllCode activity mat

This double sided activity mat includes a line following challenge a grid challenge as well as basic technical information on the AllCode buggy.

Ordering information	
Formula AllCode activity mat	RB8975

Formula AllCode football claw kit

The football claw add-on kit allows students to dribble and kick a ping pong ball around a football field. Great for use with mobile phones as a competition activity!

COMING SOON

Ordering information	
Formula AllCode football claw kit	RB3068