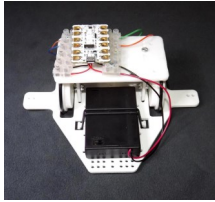# IMPORTANT NOTE FOR TUTORS

PLEASE READ IMMEDIATELY UPON OPENING TERM 3 BOX

THE 'IMAGIBOT' PROJECT

This box includes the latest version of the programmable 'IMAGIBOT' robot vehicle, along with a Powerpoint presentation on CD and Tutors' Notes on the electronics, software and programming aspects.

It is **most important** that you read the Tutors' Notes immediately, because you will need to advise your school of the requirement to download specific (free) software onto the school's PCs or laptops. The software is a special dedicated version of the Scratch 2 Programming Language.

This will need negotiations and permission for access during Club time. There are normally strict rules for loading software onto school networked computers so a request should be made for:

1.   Software to be loaded onto designated computers at the machine level.

2.   Permission granted to use the software with USB lead connected.

If permission is not granted for networked machines, many schools have portable laptops—if some of these can be loaded and made available, then programming can go ahead even if the number available is small. A minimum of one machine to 3 students would probably be acceptable, if the teacher has a machine as well.

Further information and links for downloading the software are given in the Tutors' Notes along with advice on its installation.

Please discuss these requirements with the teacher supporting your Club as soon as possible, because getting the necessary permissions and installing the software may take some time.

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Electronics, Software and Programming Aspects

Electronics HARDWARE

The Imagibot uses the Redfern Electronics 'Crumble' Computer Board
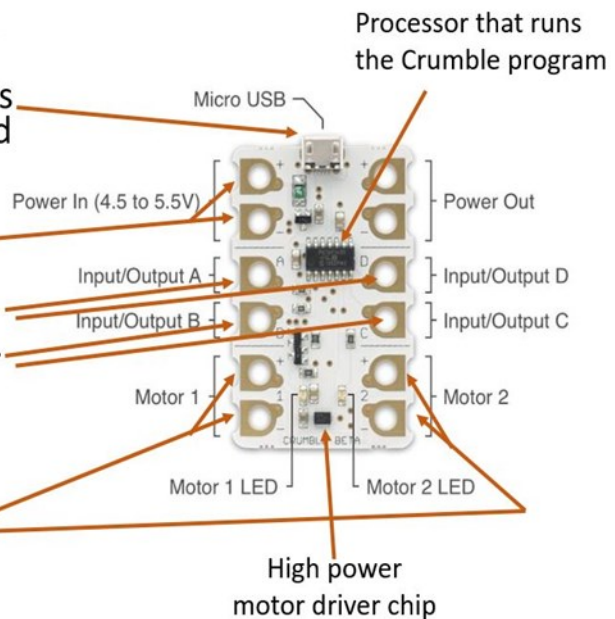

The Crumble computer board

The Crumble computer board runs a program that is downloaded from a PC through a USB cable that connects to the Micro USB socket on the board

The crumble board is powered by a 4.5 volt battery.

It has 4 connections (A,B,C &D) that can be used as inputs for switches or sensors or for outputs such as LEDs

It has 2 high power outputs that are specially for driving electric motors, and an LED for each motor

- Micro USB
- Processor that runs the Crumble program
- Power In (4.5 to 5.5V)
- Power Out
- Input/Output A
- Input/Output D
- Input/Output B
- Input/Output C
- Motor 1
- Motor 2
- Motor 1 LED
- Motor 2 LED
- High power motor driver chip

To programme the Computer Board, FREE 'Crumble' Software must be downloaded and installed on computers that Club members are going to use to program the Imagibots.

Ideally the aim should be for each Club member to have access to a school computer with the software loaded AND the computer should be able to accept and operate the USB download cable. (Standard USB2 into the computer to Micro USB on the Crumble board).

This will need negotiation and permission for access during Club time. There are normally strict rules for loading software onto school networked computers so a request should be made for:

1.   Software to be loaded onto designated computers at machine level.

2.   Permission granted to use the software with USB lead connected.

If permission is not granted for networked machines, many schools have portable laptops—if some of these can be loaded and made available, then programming can go ahead even if the number available is small. A minimum of one machine to 3 students would probably be acceptable, if the teacher has a machine as well.

The software has 3 versions: Windows (minimum XP SP3—Win 7 or 8 or 8.1 or 10); ALSO Apple MAC OS (10.6) (64 bit minimum). DOWNLOAD FORM LINK BELOW:

http://redfernelectronics.co.uk/crumble-software/

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The software loads a directory in which the .exe programming software is loaded and to which files can saved. It will be convenient if the Programme Shortcut could be placed on the Desktop but this is NOT essential. When the software has loaded it will designate a USB port. The software installation can be tested by connecting up the USB lead and writing and downloading a programme which flashes the motor LEDs. This DOES NOT NEED the external 4.5 battery pack or the motors connected. If the Crumble download has been successful, the loading information box will show 'programming successful' and the two motor LEDs will come on.

If the programming is unsuccessful, the message will be 'ERROR: Crumble not found' . If this happens try changing the computer USB connection—closing the Crumble programme and reloading.

Bear in mind that some networked desktop computers take a LONG time to load this programme and designate a USB port—up to a minute. Laptops normally load it in 10 seconds. If loading is OK, ALWAYS use the same USB connection point on the computer.

Electronics SOFTWARE

The Crumble uses a special dedicated version of the Scratch 2 Programming Language. Information link below:

http://wiki.scratch.mit.edu/wiki/Scratch_2.0

The Scratch language as written by the students is converted into the Microcontroller 'machine code' by the 'Crumble Software' for the actions commanded. The loaded program is located in NON VOLATILE memory so removal of the Microcontroller power DOES NOT lose the code.

To clear the memory and make the chip DO NOTHING make a program that ONLY contains the Program Start command, download this to the Crumble Board.

A ten-page dedicated 'Crumble Software' description leaflet is downloadable from link below:

http://redfernelectronics.co.uk/?ddownload=1679/

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PROGRAMING ASPECTS

For an 'open two motor Imagibot movement program, after the '**Program Start'** command has been entered the sequence should follow the pattern:

ACTION COMMAND—WAIT ACTION—ACTION COMMAND—WAIT, ETC

For the Imagibot it is a good idea to ALWAYS begin with **MOTOR 1 STOP , MOTOR 2 STOP, WAIT 4**

Simple Forward Run

Forward Run with Right Hand Turn, Looking from the BACK
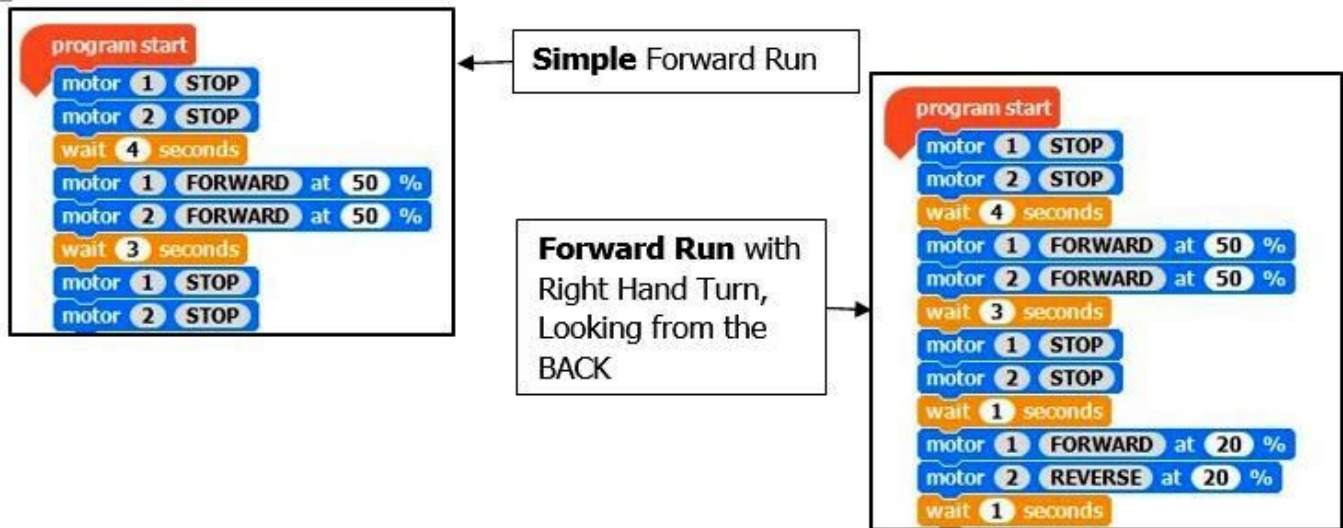
Note the timing and speed may need to be adjusted depending on vehicle set up and wheel assembly friction.

Run with 2 turns

Right Hand

Left Hand

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