1. Crumble

The **Crumble** is a very cheap control board designed to enable young children to design, make and program digital creations.

Up to two motors can be attached and programmed along with other **outputs** such as LED lights, Buzzers and stepper motors (0-90 degree turns).

The Crumble can also accept a variety of **inputs** such as buttons, sliders, dials, distance sensors, PIR sensors, touch sensors etc.
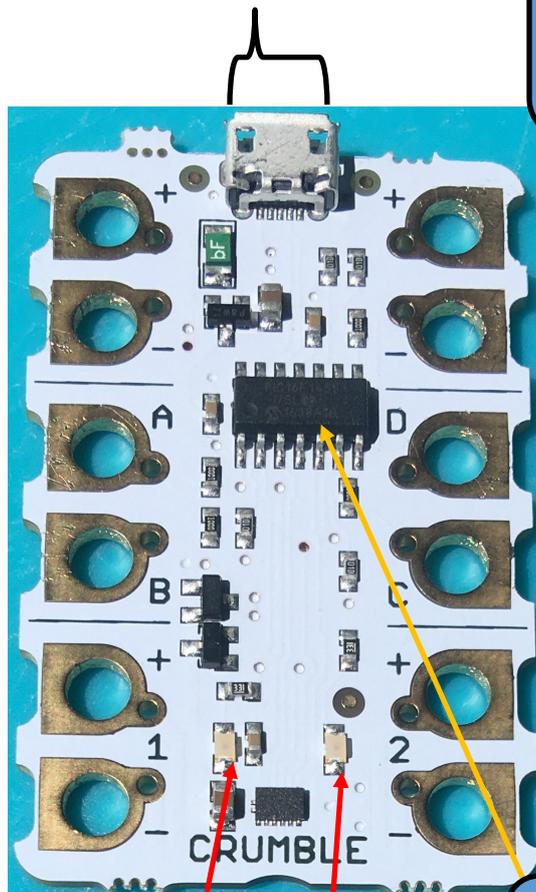
The Crumble is limited to four inputs and or outputs excluding the two motors which use their own dedicated output connections.

Crumble Classic

Connected to a battery pack and Sparkle programmable light

Output –Something that comes out of a digital device

Input –Something that goes into a digital device

The USB cable plugs into the Crumble here. When it is connected to a PC, Mac or Linux computer, programs can be sent to the control chip via this connection

This Crumble version is referred to in this guide as Crumble Classic to distinguish between it and the Crumble Playground
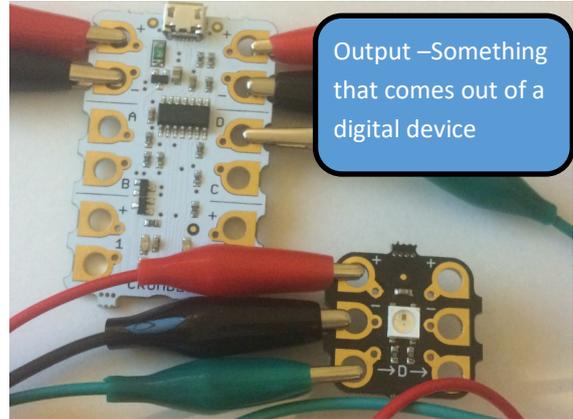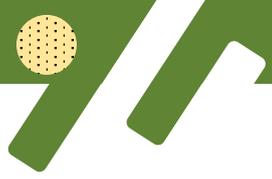
Power is provided to the crumble board through these connections. Both Redfern Electronics and 4Tronix provide a 3xAA battery holder with a on/off switch. A standard 3xAA battery pack can be used although the on/off switch is very useful

Four inputs or outputs can be connected to A, B, C or D

These connections control **Motor 1**, the DC motor wires can be swapped to reverse the motor or reversed using the Crumble Software. It accepts 3-6v DC motors.

Some inputs and outputs need their own power. They get this through these connections

D can be used as a standard input or output connector or to connect up to 32 programmable lights in a daisy chain

These connections control **Motor 2**, the DC motor wires can be swapped to reverse the motor or reversed using the Crumble Software. It accepts 3-6v DC motors.

Red lights show when motors 1 or 2 are activated

The black chip stores the program once it has been sent to the Crumble from the Crumble software (Green arrow)

Crumble Equipment and Software Stockists UK

Name	Notes	Contact Details
Redfern Electronics	Redfern Electronics created the Crumble and the Crumble software and sells Crumble Accessories	**Web** https://redfernelectronics.co.uk/ **Software Download** (Free) https://redfernelectronics.co.uk/crumble-software/ **Twitter** @RedfernElec
4Tronix	Makes the Crumble Playground and an extensive range of Crumble accessories	**Web** https://4tronix.co.uk/store/ **Twitter** @4Tronix_uk

Both Redfern Electronics and 4Tronix have been helpful over many years with the authors questions and misconceptions and they are both examples of great British enterprise that seeks to make a difference in education.

Please note that the author cannot list every available Crumble accessory as the list is continuously growing.