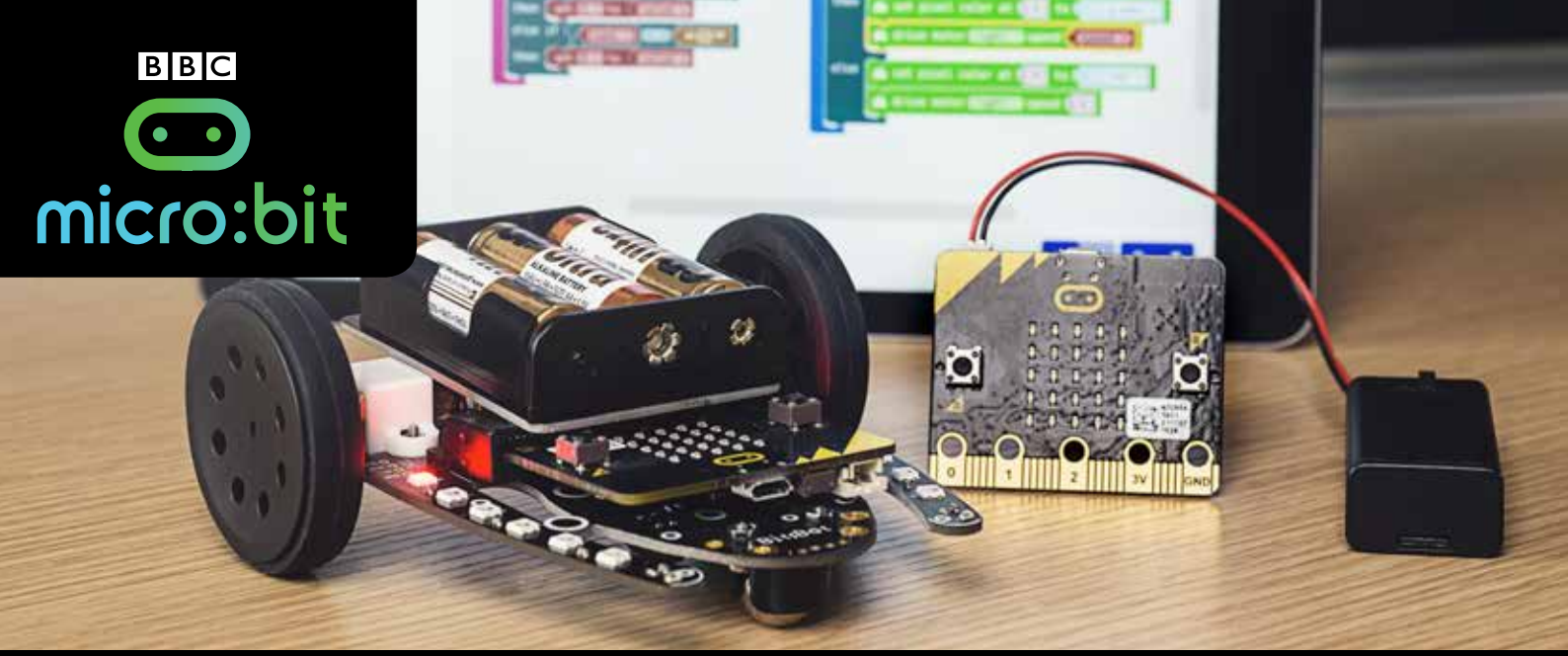
Robotics

Full range of Robotic products available at:

www.rapidonline.com

BBC micro:bit



BIT:BOT

The Bit:Bot Robot is a feature-packed little robot that is almost ready to use, requiring no soldering, no wires and nothing more than a screwdriver to complete it.
Plug your micro:bit into the connector on the robot, add three AA batteries and you are good to go.

Batteries and micro:bit sold separately

- 2x motors
- Super-smooth metal ball front caster
- 12x neopixel LEDs
- 2x line following sensors
- 2x analogue light sensors
- Sounder for making beeps wherever you go!
- Expansion connections for adding the Ultrasonic Distance Sensor

4tronix

£29.75

Order code 75-0117

Bit:Bot can be programmed using whichever micro:bit programming language you prefer. For beginners we recommend using the MakeCode block editor which has specific extensions for Bit:Bot programming **www.microbit.org/code**.

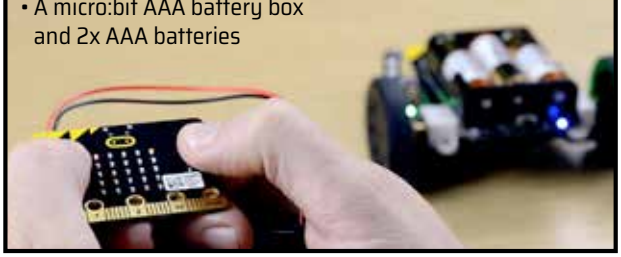
PROJECT IDEAS

Here are a couple of fun little projects to get you started with your Bit:Bot.
Visit **www.rapidonline.com/bitbot** for detailed explanations and to download sample programs

REMOTE CONTROL BIT:BOT

A neat feature of micro:bit is the ability to send messages from one micro:bit to another. A practical use for this is as a remote control – accelerometer and button data is sent from one micro:bit and received by the one on the Bit:Bot where it is used to control the motors.

For this project you will need:
- A Bit:Bot and 3x AA batteries
- 2x micro:bits
- A micro:bit AAA battery box and 2x AAA batteries

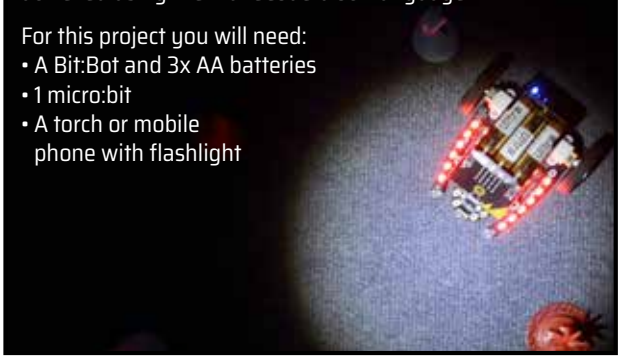


LIGHT SEEKING BIT:BOT

Bit:Bot has two light sensors on the front facing upwards. You can use these to help the robot move towards light (or go to hide in the dark!).

This project shows a some of the ways that this can be achieved using the MakeCode block language.

For this project you will need:
- A Bit:Bot and 3x AA batteries
- 1 micro:bit
- A torch or mobile phone with flashlight



micro:bit Robots

Bit:Bot Ultrasonic Distance Sensors

Two versions of the Ultrasonic Distance Sensor are available. The removable version unplugs easily from its socket to aid access to the micro:bit download port. The soldered version is more stable and robust, but you may need a right-angled USB download cable to download a program with the sensor in situ.

When fitted you just use Microsoft PXT (or MicroPython with some awkward code) to read the distance to an obstacle, then program your Bit:Bot to avoid it. Both Ping and Echo signals are on the same pin (Pin 15).

Batteries and micro:bit sold separately.

- Introduce obstacle avoidance to your Bit:Bot
- Easy to fit
- Available as fixed or removable versions

Type	Order code	1+
Socketed ultrasonic	**75-0121**	3.71
Soldered ultrasonic	**75-0119**	3.30

565004

Robo:Bit for BBC micro:bit and Accessories

If you have a **BBC micro:bit** then you should get the Robo:Bit buggy. Using the basic kit, you can learn about controlling motors and use the accelerometers or compass on the micro:bit to aid navigation and collision detection. You can also make a very cool remote control robot by using another micro:bit and the radio function.

The **Robo:Bit buggy** can be assembled very quickly using only a screwdriver. No soldering is required making it a great beginners kit and the chunky wheels and powerful motors mean it works well on any surface.

There are also available a number of optional accessories to make the Robo:Bit buggy even more versatile:

The **Ultrasonic Distance Sensor** lets the robot detect objects before it collides with them allowing you to program it to avoid them. It can also be used to create a 'follow me' program where the robot tries to stay a certain distance from the object in front of it.

The **Line Follower Sensor Pack** uses two line sensors to follow a black line and keep the buggy on track. You can write more complex programs that behave as required when you meet a T-junction or crossroads.

We all like adding blinky LEDs to our electronic creations, whether it is a robot, weather station or something that reads and displays sensor data. Now with **McRoboFace** you can add emotions to everything at the same time as adding blinkies. It also comes in grey or white.

All the 17 RGB LEDs are fully addressable and can be controlled by most processors in the field using standard 'neopixel' code. This includes Raspberry Pi, Crumble, Arduino, ESP8266, micro:bit and Codebug.

The **Robo:Bit** robotics controller is a ready-assembled robotics controller board that's ready to be used with your **BBC micro:bit**, just add battery power (3 or 4 AA is ideal, but not included) and motors of your choice to make your own DIY robot. Use a small box, ice-cream carton or similar to house everything and you can build a really affordable robot for your school, coding club or home.

Robo:Bit has been cleverly designed so that with a few hexagonal pillars and screws, you can fit the motors, battery box, front casters, line following sensors and even ultrasonic distance sensors and have a very neat and simple robot!

Robo:Bit uses the ever popular DRV8833 motor driver which allows you to use most small motors that operate in the 3 to 6V range.

Connections are provided for lots of the BBC micro:bit pins, and all have immediate 3-pin access to power (3.3V) and ground. There are three separate pins for 5V if you need the extra voltage (but don't feed back 5V to the micro:bit as it won't like it!). This is the GVS (Ground, Volts, Signal) system for sensors and servos etc.

On the left side of the board (the 'front' of the robot) is a set of 4 offset holes into which you can simply poke an HC-SR04 ultrasonic distance sensor. The offset holes and gold plating ensure a good connection, but you can also solder it in permanently for added robustness.

The Robo:Bit fixings pack contains screws, hexagonal pillars and a Pololu caster. This allows you to fit standard yellow motors (not included) and immediately get a robot working.

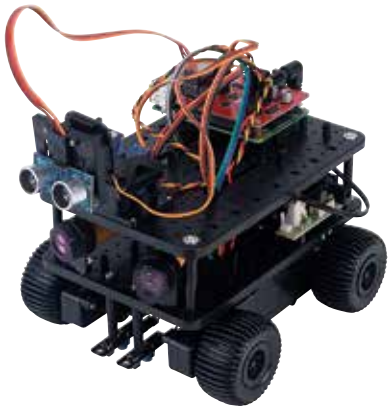
- Have fun and learn robotics at the same time
- Quick to assemble with just a screwdriver
- Chunky wheels and powerful motor
- Ideal for many projects
- Batteries and micro:bit sold separately

Type	Order code	1+
Robo:Bit Buggy	**75-0123**	22.00
Line sensor	**75-0127**	5.00
McRoboFace grey	**75-0139**	7.00
McRoboFace white	**75-0147**	7.00
Controller board	**75-0133**	10.00
Robo:bit fixings pack	**75-0136**	4.00
HC-SR04 ultrasonic distance sensor v2	**75-0146**	3.50

565005

RaspberryPi Robots

Ultimate Initio 4WD Robot Platform for Raspberry Pi with RoboHAT



The **Ultimate Initio** is a 4WD robot platform that is ideal for use with **Raspberry Pi** single board computer. The platform is a doddle to assemble and easy to use and comes with the RoboHAT robotics board and an assembled 2DOF pan-tilt servo assembly, as well as a number of other sensors that make this platform extremely flexible and perfect for a wide range of projects.

The main chassis comes pre-built, with the wheels, motors, gearboxes, battery box, wheel sensors all in place. The powerful 170-size motor is is coupled to a high-quality gearbox and there are built-in speed encoders on each side. Each wheel can be individually decoupled from the gearbox so you can run the robot in 1WD, 2WD or 3WD modes if you want.

Kit contents:
Main Initio chassis (with wheels, motors, gearboxes, battery box, wheel sensors, screws and all mountings)
RoboHAT Robotics Controller Board **75-0824**
Pan-Tilt 2DOF assembly with servos (ready assembled)
2x IR Obstacle sensors
2x IR Line sensors
1x Ultrasonic sensor
All connecting cables as required for above items
Build instructions and example code can be found on the **4tronix** website.

- Ideal for line following projects
- 6-cell battery box with switch (batteries not supplied)
- No soldering or gluing required
- Wiring already assembled
- Fixings for replacement stepper motors (not included)
- Injection moulded from tough ABS
- Includes mountings for additional boards and sensors
- Wheel size ø55 x 28mm
- Chassis size 180 x 120 x 93mm
- Height of top plate with wheels attached 110mm

Note: *Raspberry Pi not included.* **Note**: *Batteries not included.*

Type	Order code	1+
Ultimate Initio	**75-0282**	97.02

565325

Makeblock

makeblock

Arduino Compatible Ultimate Robot 10 in 1 Kit

The **Ultimate 10 in 1 robot kit from Makeblock** is the flagship of the Makeblock range with more parts, more possibilities and more fun. At the heart of the kit is the MegaPi robotics controller which is based on the popular Arduino Mega 2560 but with additional motor driver interfaces. With dedicated motor power inputs the MegaPi can drive up to 10 x servos plus 8 x DC motors or 4 x stepper motors simultaneously with a maximum output current of up to 10A. You can program it using the mBlock graphical programming tool or as you get more confident, graduate to C/C++ using the Arduino IDE. If you have a Raspberry Pi, it can function as the brains of your robot while the MegaPi handles the low level details opening up whole new area for creativity and exploration. It also supports a Bluetooth adaptor for wireless remote control from your Apple iPad (v3 or better) or Android (v4 or better) tablet.

With over 160 pieces, the Ultimate kit has plenty for you to work with including a gripper, 3 x DC motors, a phone mount, plus a wealth of beams, plates and brackets to build a large model. The major mechanical parts are made from beautiful anodised 6061 aluminium giving your robot a professional, hi-tech look as well as being very sturdy. The free Makeblock tutorial page walks you through creating the 10 x different robots, by which time you'll be a robotics expert and ready to strike out on your own. You can build a tank with a robotic arm, a mobile drinks pourer, a camera dolly, two types of 360° rotating photography platforms, a self balancing robot, a 6-legged crawler, a rolling tank, a detecting robot, and a catapult ram.

New to mBlock/Scratch? mBlock is a graphical programming system based on Scratch where you drag and drop functional blocks from a palette onto a work area to create a program. Each shape has a different function and they snap together in logical ways, some even have slots to drop in other blocks. For example, a block might order the robot to run forward at speed 50 where the direction and speed are chosen from simple drop down menus. This drag and drop interface allows quite young children to get creative with the mBot yet is capable of programming complex behaviours.

Supplied with 1 x MegaPi, 1 x MegaPi shield for RJ25, 1 x Bluetooth module, 4 x motor drivers, 3 x encoder motors, 1 x ultrasonic sensor, 1 x line follower sensor, 1 x 3-axis accelerometer and gyro sensor, 1 x RJ25 adaptor, 1 x electronic shutter release, 1 x Makeblock gripper, 1 x 360° mobile phone bracket, 1 x battery holder (for 6 x AA batteries, not supplied) plus aluminium beams, plates and brackets, plastic timing pulleys, plastic gears, tracks and wheels, cables, nuts and bolts, and other hardware and accessories.

Please note that the Raspberry Pi, Pi camera, smartphone, DSLR camera and toy props are shown for illustration purposes and are not supplied.

- 10 robots in 1 kit
- Arduino compatible robot controller
- Range of free programming tools from novice to advanced
- Free tutorial online to help get you started
- Wireless programming via Bluetooth
- Complete kit, just add batteries

Type	Order code	1+
Ultimate robot kit	**75-0695**	280.00

563845

makeblock

mBot Ranger Arduino Compatible STEM 3-in-1 Robot Kit

The **mBot Ranger 3 in 1 from Makeblock** is an intermediate robotics kit for STEM or personal use. It is based around the Me Auriga programmable module with Arduino Mega 2560 compatibility which brings with it excellent online educational and tutorial resources. The Me Auriga has a wide range of programming options from novice to expert using free Open Source tools including mBlock, a graphical Scratch-like programming tool, all the way up to C/C++ using the Arduino development tools. You will be able use the kit's range of sensors including an ultrasonic range finder, LED line follower, microphone, temperature sensor, light sensor and a 6-axis accelerometer/gyroscope. It also has a buzzer and 12 x RGB LEDs so your creation can flash and bleep messages to you.

To compliment the electronics, the Ranger kit contains all the parts you'll need (down to the last screw) to build 3 x very different robots; the tracked off-road tank, a fast trike and a fascinating self-balancing two-wheeler. The major parts are made from beautiful anodised aluminium giving your robot a professional, hi-tech look. Using the simple, step by step instructions and tools provided the kit should be ready for programming in no time. Take it for a test drive without any programming by pairing it over Bluetooth to your Apple or Android smartphone or tablet using the mBot app from the App Store or Google Play.

Programming your new gadget is where the adventure really begins. Jump into programming using the free mBlock program on your Windows or Mac PC and the supplied USB cable. Alternatively, use the Makeblock HD app on your iPad (v3 or better) or Android tablet (v4 or better) with a Bluetooth connection to read data from the sensors, control the robot and write programs using mBlock. When you start to feel more confident you can program the Arduino compatible Me Auriga using the Arduino IDE in C/C++. Choose the programming tool that best suits your abilities and preferences.

New to mBlock/Scratch? mBlock is a graphical programming system based on Scratch where you drag and drop functional blocks from a palette onto a work area to create a program. Each shape has a different function and they snap together in logical ways, some have slots to drop in other blocks. For example, a block might order the robot to run forward at speed 50 where the direction and speed are chosen from simple drop down menus. This drag and drop interface allows quite young children to get creative with the Ranger yet is capable of programming complex behaviours.

Supplied with a printed instruction sheet, printed line-follower track, the Me Auriga Arduino compatible controller, 2 x DC encoder motors, Bluetooth module, Me Line Follower module and cable, Me Ultrasonic sensor, Makeblock beams and plates, wheels and tracks, screws and nuts, screwdriver, spanner , USB cable, and battery holder (requires 6 x AA batteries, not supplied). Makeblock provide a free tutorial to help you get the most out of this great kit.

- Build 3 x different robots from one kit
- Simple to build and program
- Range of free programming tools from beginner to advanced
- Ideal for STEM applications
- Drive the mBot Ranger from your smartphone
- Complete kit, just add batteries
- Bluetooth v4.0 or better is required for PC or Mac connectivity

Type	Order code	1+
mBot Ranger	**75-0699**	124.95

563838

makeblock

mBot Arduino Compatible STEM Robot Kits with Bluetooth or 2.4GHz

The **mBot from Makeblock** is the perfect introduction to robotics for STEM or personal use. It is based around the mCore programmable module with Arduino UNO compatibility which brings with it excellent online educational and tutorial resources. The mCore has a wide range of programming options from novice to expert using free Open Source tools including mBlock, a graphical Scratch-like programming tool, all the way up to C/C++ using the Arduino development tools. You will be able use the kit's range of sensors including an ultrasonic range finder, LED line follower, and light sensor. It also has a buzzer and an RGB LED so your creation can flash and bleep messages to you. Finally, there's an infrared receiver and transmitter that you can use to control the bot using the remote control included in the kit (requires 1 x CR2025 coin cell, not supplied). The infrared can even be used to talk between mBots if you are feeling ambitious.

To compliment the electronics, the mBot kit contains all the parts you'll need to build your first bot, down to the last screw. The major parts are made from beautiful anodised aluminium giving your robot a professional, hi-tech look. Using the simple, step by step instructions and tools provided, the kit should be ready for programming in less than 20 minutes.

Programming your new gadget is where the adventure really begins. Jump into programming using the free mBlock software on your Windows or Mac PC and the supplied USB cable. When you start to feel more confident you can program the Arduino compatible mCore using the Arduino IDE in C/C++. The **Bluetooth kit** (**75-0702**) has a range of programming and control options by pairing with Apple or Android smartphones and tablets including an mBot app, Makeblock HD and mBlockly (Apple only). The **2.4GHz kit** (**75-0701**) uses a wireless virtual USB connection (like a wireless mouse) so that you can program the mBot from the other side of the room as if it was plugged directly into your computer.

Once you've mastered the challenge of building and programming your mBot and you want a new adventure it's time to try some of the cool add-ons from Makeblock. Use the **6-legged add-on kit** (**75-0705**) with parts from the mBot kit and learn about levers and linkages while building a creepy crawly beetle. Alternatively, enhance the character of your creation with the mBlock compatible **Me 8x16 Blue LED Matrix** (**75-0707**) for simple animations or text.

Perhaps you could have your mBot scan its environment by mounting its ultrasonic range finder on the **Servo Pack add-on** (**75-0704**), or give it a home-made flag to wave. The servo add-on gives you extra options for movement with your mBot.

New to mBlock/Scratch? mBlock programming system based on Scratch where you drag and drop functional blocks from a palette onto a work area to create a program. Each shape has a different function and they snap together in logical ways, some even have slots to drop in other blocks. For example, a block might order the robot to run forward at speed 50 where the direction and speed are chosen from simple drop down menus. This drag and drop interface allows quite young children to get creative with the mBot yet is capable of programming complex behaviours.

Supplied with a printed instruction sheet, printed line-follower track, the mBot Arduino compatible controller, 2 x DC motors, Me Line Follower module and cable, Me Ultrasonic sensor, chassis, wheels and all screws, screwdriver, USB cable, battery holder (requires 4 x AA batteries, not supplied) and an infrared remote control (requires 1 x CR2025 coin cell, not supplied). The Bluetooth and 2.4GHz versions are supplied with their respective modules. The 2mm thick aluminium chassis is attractive and strong, but better yet it's **compatible with Lego Technic** parts. Whether you have one mBot or an army there's plenty of opportunities to problem solve and learn new skills.

- Simple to build and program
- Range of free programming tools from beginner to advanced
- Ideal for STEM applications
- Wireless programming via 2.4GHz USB link or Bluetooth
- Complete kit, just add batteries
- Dimensions 170 x 90 x 90mm assembled
- Weighs 340g

Type	Order code	1+
mBot v1.1 2.4GHz	**75-0701**	75.20
mBot v1.1 Bluetooth	**75-0702**	73.33
mBot Servo add-on	**75-0704**	24.74
mBot 6-legged add-on	**75-0705**	25.00
mBot LED matrix 8x16	**75-0707**	8.38

563837

makeblock

Robot Grippers

These grippers from **Makeblock** let your robot grab and carry objects giving you a new dimension of robot building to explore.

The **Mini-gripper** is perfect for getting a grip on lightweight objects. The gripper is made from acrylic and powered by a 9g servo to grab and carry small items such as ping-pong balls, plastic cups, Makeblock parts etc. The Me RJ25 (**75-0712**) adaptor is required to connect the Mini Gripper to the main board of any of the Makeblock robots.

The **Robot Gripper** is for getting a dealing with bigger objects than the mini-gripper can. The gripper is made from lightweight PVC and powered by an N20 screw motor which is protected by a thermal overload fuse. Suitable for the mBot (**75-0701** or **75-0702**) and mBot Ranger (**75-0699**). The Me Dual DC Motor Driver adaptor (**75-0713**) is required to connect the gripper to the mBot's main board.

- **Mini gripper:**
- Accepts items between 22 and 60mm
- Accepts items up to 60g
- Requires an Me RJ25 adaptor (**75-0712**), not supplied
- Operating voltage 5 to 12V DC
- **Robot gripper:**
- Non-slip covering for safety
- Accepts items up to 65mm
- Accepts items up to 1.5kg
- Requires an Me Dual DC Motor Driver (**75-0713**), not supplied
- Operating voltage 12V DC

Type	Order code	1+
Mini-gripper	**75-0706**	13.42
Robot gripper	**75-0703**	25.18
RJ25 adaptor	**75-0712**	2.45
Dual DC motor driver	**75-0713**	13.74

563844

makeblock

Airblock Modular & Programmable Hexacopter Drone and Accessories

The **Makeblock Airblock** is a modular and programmable aircraft that is versatile and easy-to-use, and can transform from **hexacopter drone** into a hovercraft or even a custom design, where propellers can be connected in many different ways, with the performance parameters of the individual propeller modules being individually programmable.

An innovative design combines a main module with six propeller modules, that connect to the main module via custom-engineered magnetic connectors, making any assembly quick and easy, and enabling different configurations to be achieved within moments. The main module houses an ultrasonic sensor, barometer, gyroscope and Bluetooth module, which is used to connect to the mobile app.

The aircraft/hovercraft is controlled, via Bluetooth, by a **mobile app** that is available for both iOS and Android. The graphical programming interface uses the **mBlock** graphical programming language that is based on **Scratch 2.0**. Programming is fun and easy even for beginners without prior coding experience. When operating the vehicle the user interface shows flight controls as well as dedicated special effects buttons for those aerobatic moments. Real time information is also displayed, such as altitude, signal strength, battery condition, etc.

- Propeller guards and soft materials makes Airblock safe to use
- Good impact characteristics
- Hovercraft will keep suspended when crossing land or water
- Automatic connection to mobile app
- 6x Coreless motor propeller modules
- Includes battery, charger and charging cable
- Size 230 x 222 x 53mm 150g drone mode
- Size 335 x 192 x 127mm 195g hovercraft mode
- Includes user manual
- For ages 8+

Note: *It is recommended that the flight envelope for this vehicle is 5m height and 10m distance.*

Type	Order code	1+
Airblock hexacopter	**75-0714**	138.00
16x Propeller set	**75-0726**	2.37
Spare battery	**75-0727**	19.85
Clockwise propeller	**75-0728**	9.42
Anticlockwise prop	**75-0729**	9.42
Position 1 propeller	**75-0731**	6.43

565716

Robot Chassis

Rapid

2WD & 4WD Servo Robot Platforms

The **2WD and 4WD Robot Platforms from Rapid** give you the opportunity to build a simple robot at a bargain price. They're based around an anodised aluminium chassis which is pre-cut for servos. The chassis also has a useful set of mounting holes and slots for additional hardware such as a microcontroller or sensors. These platforms are compatible with any microcontroller such as the Arduino, OrangePip, PICAXE, Genie and others, as **servos do not require additional motor drivers**.

All the parts for the platform are included in the box: 1 x anodised aluminium chassis, screws and nuts, just add your own microcontroller. The 2WD platform also includes 2 x servos, 2 x wheels with tyres, and 1 x castor. The 4WD platform also includes 4 x servos, and 4 x wheels with tyres.

- Strong, colourful aluminium chassis
- Supplied with servos
- All screws and nuts included
- Compatible with Arduino, OrangePip, PICAXE, Genie and others
- **Does not require motor drivers**

Type	Order code	1+
2WD	**70-6415**	10.66
4WD	**70-6416**	14.46

560642

Rapid

2WD & 4WD Motor Robot Platform Kits

This mini motor robot platform kit is available in 2wd or 4wd versions. The platform uses 2 or 4 DC motor gearboxes for drive, with speeds up to 100rpm and torque of 1.3kg/cm at 800mA. The robust red anodised aluminium chassis can stand up to knocks and tumbles and features additional mounting holes so that other hardware such as microcontrollers or sensors may be mounted.

The platforms are compatible with microcontrollers such as the Arduino, Orangepip, PICAXE, Genie, etc. The kit includes motors, chassis and fixings and wheels.

- Easy to assemble kit
- 60mm Diameter wheels with silicon tyres
- Wheels press-fit onto motor gearbox output shafts
- Power supply 4.5 to 6V DC
- Supplied with all fixings required

Type	Order code	1+
2WD Motor robot	**70-6417**	8.92
4WD Motor robot	**70-6418**	12.81

564035

Magician Chassis

The Magician Chassis is a quick and easy way of using your preferred microcontroller system (such as PICAXE, GENIE, Arduino) in robotics applications. The self assembly kit comes complete with two high torque motors with built-in gearboxes, wheels, rollerball front wheel and 3xAA battery holder. The cleverly perforated chassis allows you to easily mount your PCBs using PCB pillars and screws.

- Overall dimensions 175 x 125 x 75mm
- Requires some simple assembly
- 65mm diameter wheels

Type	Order code	1+
Magician Chassis	**13-1192**	18.31

518246

ARX-CH09 Robot Chassis

A self assembly kit which allows rapid prototyping of robotics projects using microcontrollers. The kit includes two motor and gear sets, wheels, rollerball rear wheel and 4x AAA battery box.

Incorporate your own choice of microcontroller such as GENIE or PICAXE and then add sensors such as microswitches or the popular SRF005 ultrasonic range finder (**78-1085**).

- 140 x 120 x 50mm
- Requires some assembly
- 40mm diameter wheels

Type	Order code	1+
Robot Chassis	**13-1196**	12.93

518248

RP-5 Robot Tank Track Chassis

The RP5 is a tank track style chassis, which is an ideal base for building mobile robots. The chassis has built-in motors and gearboxes which you can easily interface with PICAXE, GENIE, Arduino or any other microcontroller system, as well as radio control systems.

The RP5 tank track chassis is supplied ready assembled – just add your own control system and batteries!

- Dimensions: 175 x 135 x 60mm
- 2x 280 type motors
- 80:1 gear ratio
- Rubber tank tracks
- 6x AA Battery holder included

Type	Order code	1+
Tank Chassis	**13-1194**	33.38

518247

Initio 4WD Robot Platform Inc. Motors, Gearboxes and Encoders

The **Initio** is an easy to build, and easy to use 4WD robot platform designed especially for use with **Arduino** and **Raspberry Pi** single-board computers. This extremely flexible platform features powerful, built-in 170-size motors with high quality gearboxes, and speed encoders on each side. Each wheel can be individually decoupled from the gearbox, so you can run the robot as a 1WD, 2WD or 3WD.

The main chassis is already built, with all wires connected so there is no soldering or gluing required - just add your control board and screw on the top plate. The base-plate will directly mount an Arduino (UNO, Mega2560 or Leonardo) or Raspberry Pi (not supplied). There is a 6-cell battery box with switch (batteries not supplied), charging socket and motor driver and board wiring already assembled. Additionally there are fixings for stepper motors (not included) so you can replace the DC Motors with stepper motors for greater accuracy.

- Can be used for loads of projects
- Injection moulded from tough ABS
- Includes mountings for additional boards and sensors
- Wheel size ø55 x 28mm
- Chassis size 180 x 120 x 93mm
- Height of top plate with wheels attached 110mm

Note: *Raspberry Pi/Arduino not included.* **Note**: *Batteries not included.*

Type	Order code	1+
Initio 4wd robot	**75-0281**	32.00

565324

Zumo Chassis Kit

The Pololu Zuma chassis kit is an easy to assemble kit that produces a small, high performance, tracked robot platform that is less than 100mm on each side - enabling it to qualify for Mini Sumo competitions.

Included in the kit are two silicone tracks, two drive and two idler sprockets, a 1/16in acrylic mounting plate, and mounting hardware.

This chassis kit is just one of the many **Pololu** accessories carried by **Rapid**.

- Composed of sturdy black ABS
- Features a compartment for 4x AA batteries
- Sockets for two micro metal gearmotors
- Acrylic plate for mounting hardware

Note: *Motors and batteries are not included.*

Type	Order code	1+
Zumo Chassis Kit	**75-0621**	13.93

561658

SoftBank Robotics

Pepper Academic Edition Robot 3 Year Warranty

Pepper is an autonomous talking humanoid robot which can be programmed to perceive emotions and adapt its behaviour to the mood of the humans around it. Pepper can identify joy, sadness, anger or surprise and respond appropriately making interactions with humans incredibly natural and intuitive.

It has astonishing flexibility and fluidity of movement and can gesture with the speed and grace of a human while its 3 omni-directional wheels enable the robot to move around freely through 360°. Pepper has a total of 20 degrees of freedom. The robot also has a 10.1 inch touch screen which allows the integration of web pages, applications and images.

Pepper was designed to make interactions with human beings as natural and intuitive as possible and as a result the robot has been used in commercial applications all over the world.

Programming Pepper is easy using the bespoke Choregraphe* software which has been tried and tested on Pepper's smaller cousin NAO. Choregraphe* is used to build and manage the behaviours that you develop for the robot. Advanced users can also develop applications and behaviours using the Python and C++ SDKs

Academic package includes:
Pepper robot
30Ah battery
Power supply/battery charger
3-year warranty

- Height: 1.2m (4ft)
- Weight: 28kg (62lb)
- Battery: lithium-ion 30Ah (for 12 hours usage)

Academic package includes: *Pepper robot, 30Ah battery, power supply/battery charger and 3-year manufacturer's warranty. Please note – Pepper is only available to schools, colleges and universities. For commercial requirements, please contact us.*

**Mac compatibility of Choregraphe is for OS X 10.8.3 and previous. Later versions are currently not compatible.*

Technical specification

Height:	1.2m (4ft)
Weight:	28kg (62lb)
Battery:	Lithium-ion 30Ah
CPU:	ATOM Z530
Display:	LG 10.1 inch Android touch screen
Vision:	1 x ASUS Xtion SoC 3D sensor 2 x OV5640 1080p video cameras
Audio:	2 x 5W speakers 4 x microphones
Inertial unit:	3-axis gyro 3-axis accelerometer
Environment sensors:	6 x laser line generators 3 x bumper switches 2 x sonar distance sensors
Tactile sensors:	3 x head sensors 4 x hand sensors (2 in each hand)
Degrees of freedom:	Head – yaw and pitch Shoulder – pitch and roll Elbow – yaw and roll Wrist – yaw Hand – open/close Hip – roll and pitch Knee - pitch

Type	Order code	1+
Pepper robot	**70-8870**	14300.00

563399

NAO6

SoftBank Robotics NAO6 Academic Edition

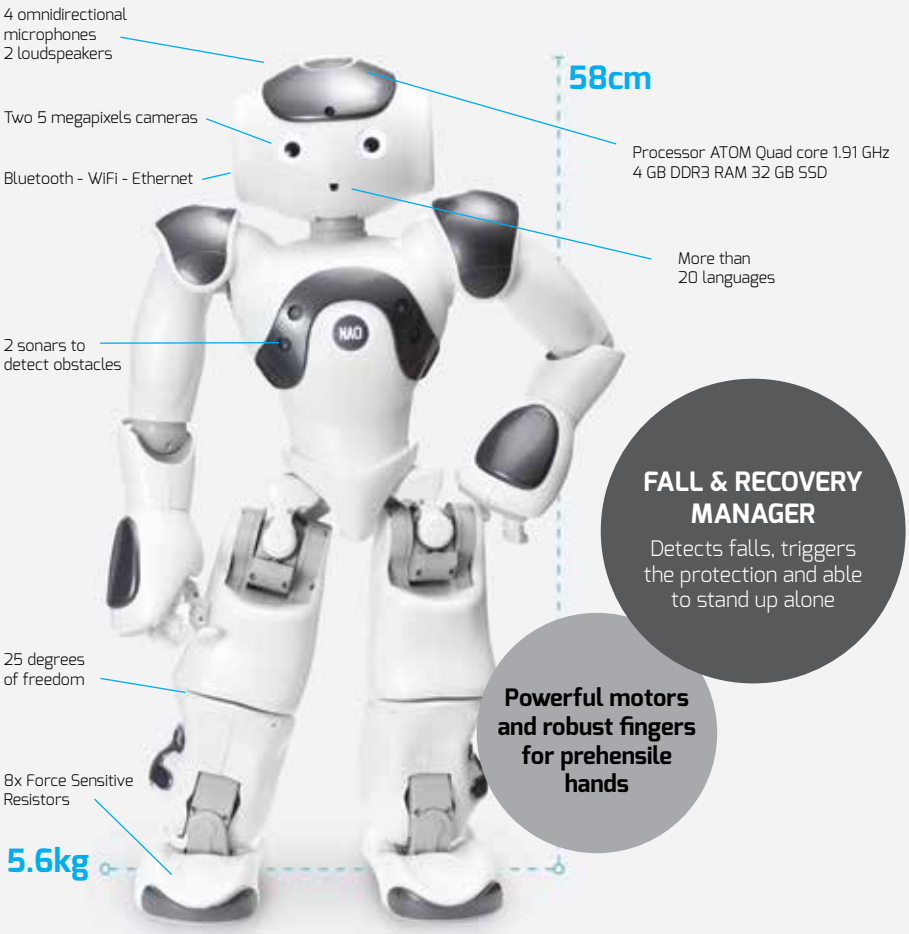
The NAO6 is the latest generation of the brilliant NAO humanoid robot family. Having continuously evolved from the 1st generation, this 6th generation model gives even more performance and greater capabilities than ever before. Improvements have been made in virtually every area as well as a host of new features such as a dual-mode camera and auto-focus.

NAO is still the most widely used humanoid robot for academic purposes worldwide. The robot creates a unique human-robot interaction experience and is a renowned teaching aid for use in areas such as robotics, systems and control and computer sciences. Use NAO to explore programming, sensors, interaction with people and the environment and much more.

The robot is capable of autonomous movement, can converse with people as well as being able to identify objects and interact with its environment. Anyone can write the programs that let NAO know what you want it to do using the graphical interface of the Choregraphe software.

Students can explore event-based, sequential or parallel programming using the configurable behaviour boxes. You can also create your own behaviours, as well as using Python to write more complex scripts.

NAO robot can be programmed by either connecting an Ethernet cable between the robot and your computer, or over a WiFi connection. The software suite is compatible with Windows, Mac and Linux.



- Robots available with either 2 year or 3 year warranty
- NAO robot stands 58cm tall and is packed full of technology
- Humanoid body with 25 degree of freedom for realistic movement
- 1-Year maintenance extension available (70-8896)

Note: Please note that these robots can only be supplied to educational establishments.

NAO6 & 2 Year Warranty

£5400.00

Order code 70-8893

NAO6 & 3 Year Warranty

£6300.00

Order code 70-8894

Transport Case

£271.95

Order code 70-8890

SoftBank Robotics

NAO Humanoid Robot Spare Rechargeable Battery and Charger

A spare or replacement rechargeable battery pack for the NAO humanoid robot.

- Spare or replacement battery pack for NAO robot
- Allows extended operation without interruption
- Replacement for a lost or damaged battery pack
- Charger available separately

Type	Order code	1+
NAO battery pack	**70-7772**	199.00
Battery charger	**70-8888**	199.00

539029

RVFM

NAO Humanoid Robot Hard Transport & Storage Case

Move and store your NAO robot safely and easily with this super-strong wheeled transport case.

- Retractable rubber-coated handle
- Two built-in wheels
- Four press-and-pull latches
- Two padlock loops
- Durable lightweight HPX® polycarbonate resin
- Water resistant
- Inner dimensions: 55.9 x 43.2 x 25.4cm (22 x 17 x 10in.)
- Outer dimensions: 62.5 x 50 x 29.7cm (24.6 x 19.7 x 11.7in.)
- Weight (empty) 7.62kg (16.8lb)

Please note: *The styrofoam packing supplied with your NAO robot at time of delivery should be retained to fit inside the case. This will then give perfect protection for your robot during transportation and storage.*

Type	Order code	1+
NAO transport case	**70-8890**	271.95

555906

Consequential Robotics

Consequential ROBOTICS

MiRo Robot

Meet **MiRo** - a welcome arrival from the gentler side of robotics. MiRo is a **social robot** with an emotional side who wants only to share your personal space, interact with you and to provide emotional engagement and entertainment.

MiRo is based on the simple premise that animals have qualities desirable in today's robots. They are robust, adaptable and good at communicating their feelings.

MiRo is a fully programmable autonomous robot ideal for researchers, teachers and healthcare professionals. MiRo has six senses, eight degrees of freedom, an innovative brain-inspired operating system and a simulation software package suited for developing companion robots.

Consequential Robotics aim to build robots that think and operate very much like animals; from their senses and decision-making processes, all the way through to their bodies and behaviours. And MiRo is particularly suited to robot-human interaction and robot-robot team interaction.

- Wide-ranging suite of sensors including stereo vision and hearing, ultrasonic ranging, light level sensors and tactile sensors
- Tail-wagging and drooping, blinking, ear-rotation and head movements are well suited for expressive communication
- Fast and stable platform works well on most smooth surfaces
- Excellent battery life (up to 6+ hours between charges depending on batteries used)
- WiFi and Bluetooth interfaces for on-board programming and/or off-board control components
- 3 robot simulator for speedy development
- Multi-processor architecture (3 stacked ARM processors) with useful suite of base behaviours ready-to-go
- Support for ROS and unique brain-based biomimetic control system
- Free software development kit and MiRo simulator software using Gazebo
- High-level control software stored on u-SD card
- Requires 4x D-cell rechargeable NiMH batteries (not included)

Please note: *Any MiRo development will require a computer running Ubuntu 16.04. Other versions of Ubuntu may not be compatible with the MiRo MDK.*

Type	Order code	1+
MiRo Robot	**70-9200**	2200.00

566385

Edison

Edison fun robotics for tomorrow's inventors

Programmable V2.0 Robot

Engage your students with Edison, the programmable robot.

Edison is a complete STEM teaching resource for coding and robotics education for students in **Key Stage 2 and 3**.

Easy-to-use with no coding experience required, Edison offers unparalleled value-for-money.

Edison has built-in sensors, lights and sound so that you can concentrate on programming.

Edison can:
Respond to light and sound
Follow lines and avoid obstacles
Read pre-set barcode programs
Communicate with other Edison robots
And so much more!

Programming Edison.

Create and run your own programs for Edison using our free browser-based or downloadable applications. The unique way that Edison transfers data to the robot using sound output means that almost any device with a standard headphone jack can be used – PC, Mac, Chromebook, iPad, Android and Raspberry Pi are all supported.

Edison can be programmed using EdWare, a graphical drag-and-drop language or EdPy which is based on the popular Python text-based language.

Works with LEGO bricks.

LEGO bricks can be connected to the top, bottom and sides of Edison as well as to the wheels allowing you to build your own designs on the base robot. You can even use LEGO bricks to connect two or more Edison robots together!

- Complete STEM teaching resource
- Fun both for beginners and experts
- Easy-to-use with no coding experience required
- Unparalleled value-for-money
- Suitable for connection to LEGO bricks

Each Edison is supplied with an EdComm download cable for use with PC, Mac, Chromebook, iPad, Android or Raspberry Pi.

4x AAA batteries are required (not included).

Type	Order code	1+	10+	20+
Edison	**70-6555**	34.99	28.99	27.49

565246

LEGO education

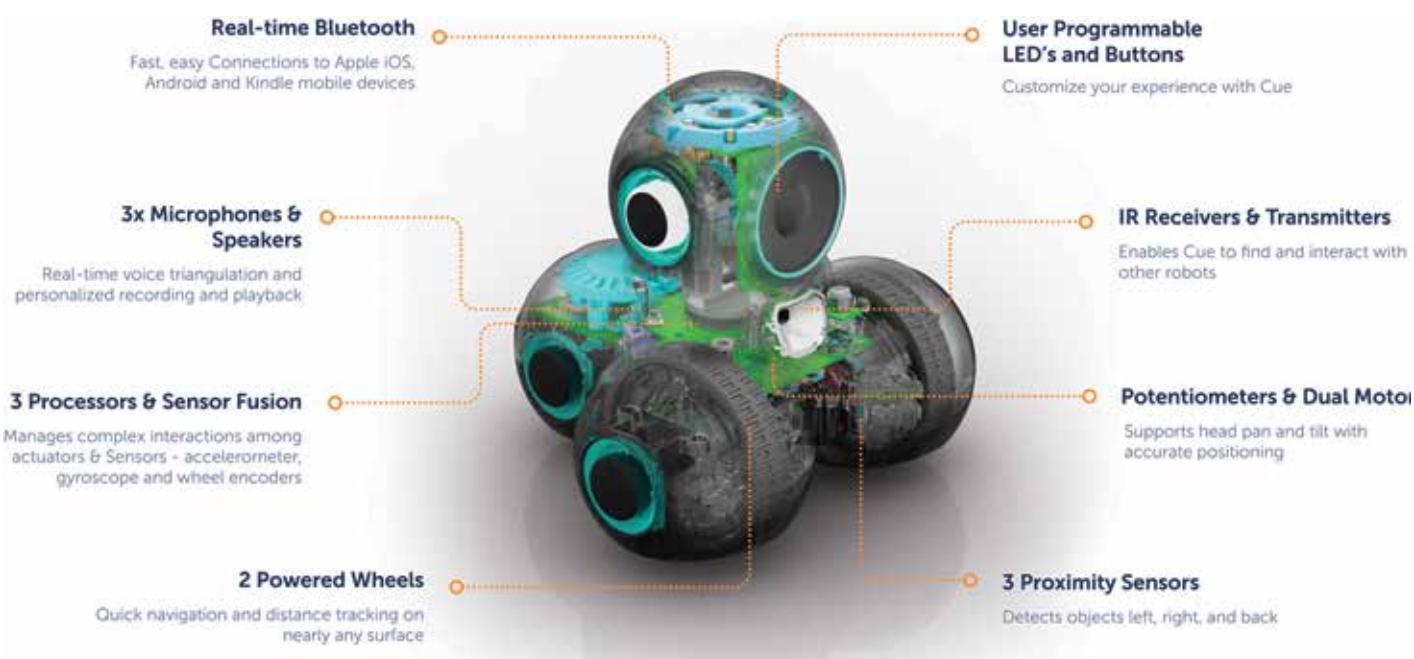
Lego® Kits

See page 74

cue™

Cue is a programmable robot who is closely related to Dash. Visually, Cue looks really similar to its brother, but the biggest difference is how Cue is programmed. Whilst Dash is ideal for learning coding at Key Stage 1 and 2, Cue is better suited to Key Stage 3

CUE
£141.99
Order code 70-1108



Cue and the curriculum

Here are a few ways in which Cue can help deliver the computing programmes of study at KS3:

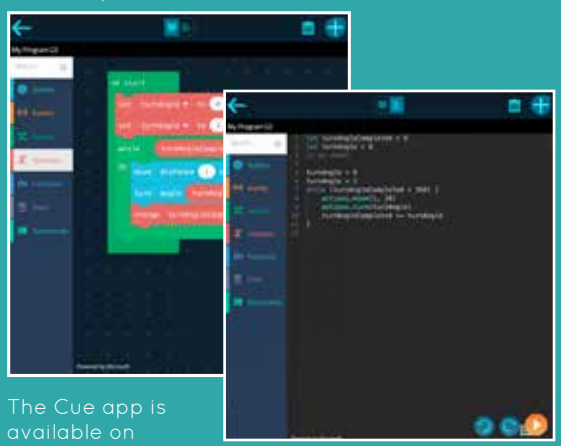
- Design, use and evaluate computational abstractions that model the state and behaviour of real-world problems and physical systems – **use Cue to simulate autonomous navigation, social robots, human-robot interaction**
- Understand several key algorithms that reflect computational thinking [for example, ones for sorting and searching]; use logical reasoning to compare the utility of alternative algorithms for the same problem – **collect and filter data from sensors to remove errors, create an algorithm to solve a maze, create an algorithm to draw a specific shape using the sketch kit**
- Use two or more programming languages, at least one of which is textual, to solve a variety of computational problems; make appropriate use of data structures [for example, lists, tables or arrays]; design and develop modular programs that use procedures or functions – **Cue app allows you to use both blocks and text (JavaScript) to create programs. In both, students can create functions, variables and use events**
- Understand simple Boolean logic [for example, AND, OR and NOT]and some of its uses in circuits and programming; understand how numbers can be represented in binary, and be able to carry out simple operations on binary numbers [for example, binary addition, and conversion between binary and decimal] – **all standard Boolean logic can be implemented in the Cue app using both block and JavaScript coding**

Accessorise and customise!

Because the shell of Cue is identical to that of Dash, it is compatible with all the same accessories including the Building Brick Connectors and the Sketch Kit. (70-1110 & 70-1105)

Programming

Cue is programmed using an app using Microsoft's MakeCode platform. It's the same thing that the micro:bit programming language is built on which means it is tried and tested in an education environment. Like it's micro:bit counterpart, the Cue app allows you to code in a graphical block language or using a text-based JavaScript environment.



The Cue app is available on Windows 10, iOS & Android devices.

Dash and Dot are the coolest, cutest robots for the classroom

Dash and Dot are the coolest, cutest robots around and they are on a mission to help teach KS1 and KS2 aged children. Both robots are feature-packed and can be programmed with Android, iOS or Kindle devices. They come ready-assembled and require almost no set up. They even have built-in rechargeable batteries so getting going couldn't be easier.

Why use Dash and Dot in your primary school?

Dash, Dot and the apps that support them have been specifically designed for use in primary education. We appreciate that one of the biggest concerns with any school investing in Ed Tech products is cost, so if you are going to invest in hardware for use in your classrooms you need to be sure that you are going to get value for money. The best way to do this is to make a device that delivers learning outcomes across the school for children of all ages.

So who are Dash and Dot anyway?

Dash is a ready-assembled robot that requires almost no set up and it even has a built-in rechargeable battery so getting going couldn't be easier. But whilst it is easy to use and set up, Dash is a really smart robot that is packed with features and sensors - it can drive around, move its head, detect objects around it, identify which direction a sound is coming from, record and playback sounds and communicate with Dot robots.

Dot is Dash's companion and is the brains without the brawn! Whilst Dot doesn't have wheels to make it move, it has loads of cool sensors and can interact with Dash as well as being used as a stand-alone device. Dot can hear sound, light up any colour you like, know when and how it is being moved and communicate with Dash.

You can build structures using LEGO parts on both Dash and Dot by using the Building Brick Adaptors which are included with all Dash robots or available separately.

Dash and Dot in the Curriculum

The most obvious curriculum use for a programmable robot is computing - after all, these little robots are masters at teaching coding. But there is so much more Dash and Dot can help with from maths, design technology, science, art and music.

Here are a few examples from the UK National Curriculum Programmes of Study documents:

COMPUTING

- Use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs - **using the Wonder or Blockly apps**
- Creating and debugging simple programs - **using the Wonder or Blockly apps**
- Logical reasoning - **using any of the apps**
- Sequencing - **using the Wonder, Blockly or Path apps**

Use the Challenge Card Set to help you teach all the fundamentals of coding, including sequences, loops, events, conditionals, functions and variables. Each durable laminated card gives the child a different task to complete and the Learn to Code Curriculum Guide helps teachers to understand the solutions to each task.

MATHS

There are so many mathematical concepts that can be taught using coding and robotics including estimating, rounding, measuring, adding, subtracting and more. Here are a few examples:

- Compare, describe and solve practical problems for: lengths and heights [for example, long/short, longer/shorter, tall/short, double/half] - **when programming the robot to move, children can describe changes to their programs in terms such as "I need to make it go twice as far" or "I need it to turn half as much"**
- Describe position, direction and movement, including whole, half, quarter and three-quarter turns - **vital for programming a robot to navigate around a course**
- Identify, represent and estimate numbers using different representations, including the number line - **Estimate distances, speed, angles etc.**
- Estimate the answer to a calculation and use inverse operations to check answers - **using variables and addition or subtraction within your programs**
- Understand and draw geometric shapes - **using the Sketch Kit**

ART AND DESIGN

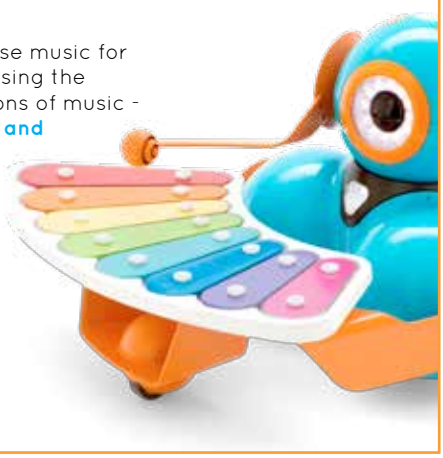
- To use a range of materials creatively to design and make products - **make all kinds of add-ons for the robots from costumes and accessories to areas for the robots to play**
- Create drawings using the Sketch Kit

SCIENCE

- Compare how things move on different surfaces - **how does Dash drive on smooth, rough, loose surface etc**
- Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary - **how does Dash perform at different speeds? What effect does carrying loads of different weights make?**
- Recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect - **the Launcher is a great example of this!**

MUSIC

- Improvise and compose music for a range of purposes using the inter-related dimensions of music - **By using the Xylo app and Xylophone add on, children can combine music with learning algorithms and patterns**



The Dash and Dot apps

Dash and Dot apps are available on iOS, Android and Kindle. Download them for free via your devices app store. Please note that Go! is not available on Kindle.

Go!
(All ages)

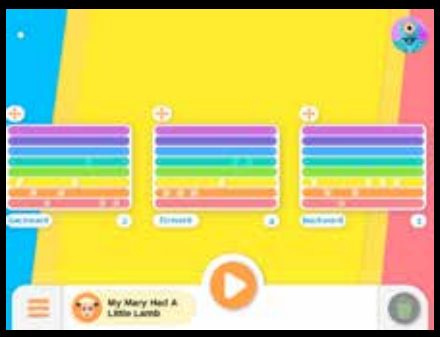
This app is for your youngest kids from reception class upwards and acts as a remote control for Dash.

- Drive the robot around using the on-screen joystick (top speed can be limited using the slider)
- Move the head to make Dash look around
- Create patterns by controlling which of Dash's 12 LED eye segments are illuminated.
- Independently change the colour of the ear and chest LEDs and experiment with different ways of making them flash
- Get Dash to play a number of pre-recorded sounds
- Record your voice into the microphone on the tablet device and play it back through Dash as a way of making Dash talk

What is Go! good for?

- Developing a child's fine motor skills
- Spatial awareness
- Acting out stories and characters
- Understanding sound and light

Xylo
(All ages)



Xylo is designed to be used specifically with the Dash Xylophone accessory. This accessory is available separately or is included as part of the Wonder Pack. Xylo introduces children to both programming and music by allowing them to create visual sequences of notes which Dash can then play on the Xylophone.

What is Xylo good for?

- Algorithm design
- Command sequences and control flow
- Loops

Path
(Key Stage 1 & 2)

Path allows you to draw a route for Dash to follow. When you press the head of the on-screen Dash, the real-life Dash will follow the path you have drawn. You can drop various icons along the way, so that the robot plays a sound or does an action at certain points along the route.

There are various "challenges" within the software such as a racetrack and farmyard but perhaps the most powerful part is the free space which allows children to explore distances, estimating, sequencing and more.

What is Path good for?

- Spatial awareness – try to estimate a route around some obstacles on the floor
- Basic algorithm design
- Sequences
- Control flow
- Sensors and events
- Problem solving

Dash
£129.99
Order code 70-1100

Battery, power and connectivity

Playtime	Up to 5 hours
Standby time	Up to 30 days
Battery type	Built-in rechargeable lithium ion
Charging	Via Micro USB connector - can be connected to a computer or USB power adaptor
Connectivity	Bluetooth Smart 4/LE

Movement

Max speed	1 m/s
Head tilt	25° up/10° down
Head rotation	120° left/120° right

wonder workshop

Wonder
(Later Key Stage 1 & 2)

Wonder is an introduction to coding which lets children discover sequences and algorithms using a very visual interface. Connect the commands together with lines much like you would with a flow chart and use inputs from sensors to control the program flow.

For children that are completely new to coding, Wonder can be easier to understand than the more traditional Blockly language.

What is it good for?

- Ideal for children who are new to coding
- Algorithm design
- Command sequences
- Control flow
- Loops
- Sensors and events

Blockly
(Budding Key Stage 1 & 2)

Blockly is the full programming app for Dash and Dot – it's ideal for teaching coding and can be used in conjunction with the accessories like the launcher and the pen add on to create exciting tasks

It can also be used with the Challenge Card Set and the Learn to Code Curriculum Guide teacher book which sets mini-challenges for students to solve and give the teachers solutions explanations.

What is it good for?

- Perfect introduction to block programming (coding)
- Algorithm design
- Command sequences
- Control flow
- Conditionals (Booleans, if/then/else)
- Loops
- Sensors and events
- Variables

Lights, sensors and media

Microphones	3
Speaker	1
Eye lights	12 white LED segments
Ear lights	RGB LEDs (can light up any colour)
Spotlights	RGB LED in chest (can light up any colour)
Tailights	Red LEDs
Transmitters	4 infrared LEDs
Receivers	2 infrared
Distance sensors	3 (with 300mm range)
Buttons	4

Dot
£49.99
Order code 70-1101

wonder workshop

Lights, sensors and media

Microphones	1
Speaker	1
Eye lights	12 RGB LED segments (can light up any colour)
Ear lights	RGB LEDs (can light up any colour)
Transmitters	4 infrared LEDs
Receivers	2 infrared
Accelerometer	Detects when and how Dot is being moved
Buttons	4

ozobot

THE SMALL BUT MIGHTY LOW COST ROBOT!

Here at Rapid we know a thing or two about educational robots and the Ozobot really grabbed our attention because of how easy it is to use. We'd go as far as to say it is the easiest to program that we have ever seen.

One of the biggest barriers with robots can often be related to software rather than hardware – is it compatible with your machines? Do I need drivers? Do I need to involve IT support? What about if I want to use a tablet? Ozobot removes all that pain. As long as you have an internet connection and a web browser, just about any device will work. PC, Mac, tablet, phone, interactive whiteboard…

This is because of the unique way that you download programs to Ozobot. Just hold the robot against the screen and the program is transferred optically.

So what can Ozobot do?

Essentially, Ozobot is a programmable line-tracking robot although this simple description doesn't do it enough justice. It has two motors, one on each side that allow it to move forwards, backwards and turn. There is a multicolour LED inside which can be made to light up any colour you like – it's a great way for Ozobot to let you know what it is doing. Finally, it has a bank of colour sensors on the bottom which can be used to track lines and detect colours on the surface below the robot.

Ozobot pens

The Ozobot felt tip pens can be used to draw your own maps, mazes and challenges on standard paper for your Ozobot programs to solve. You might find that your standard red, blue, green and black feltips work just fine. If not, the official Ozobot pens are perfect.

Order Code	Description	Price
70-8200	Ozobot 2.0 Bit Robot - Crystal White	£32.99
70-8201	Ozobot 2.0 Bit Robot - Titanium Black	£32.99
70-8202	Pack of 4 pens for Ozobot	£4.10

Ozo Blockly

OzoBlockly is a graphical programming language based on Blockly which is used by a wide range of educational coding tools. What makes Ozoblockly different is the five progressive programming modes that it offers.

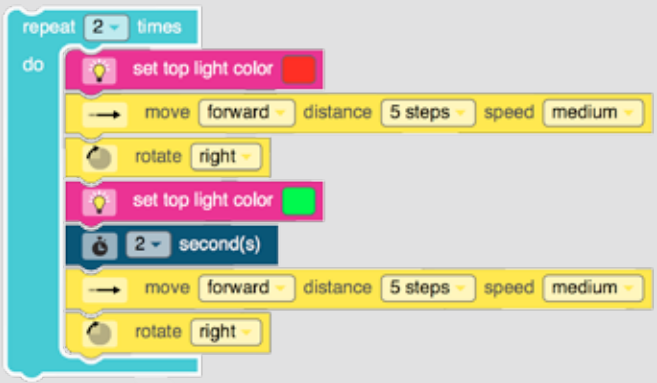
Whichever skill level you are using, Ozoblockly has a built-in help file and plenty of challenges to keep your students busy. Simply colour-print the challenge "maps" on A4 paper and follow the task instructions.

1 Pre-Reader

Suitable even for reception age children, Pre-Reader is the most basic mode in OzoBlockly. It has clear picture-based blocks that are large and easy to assemble.

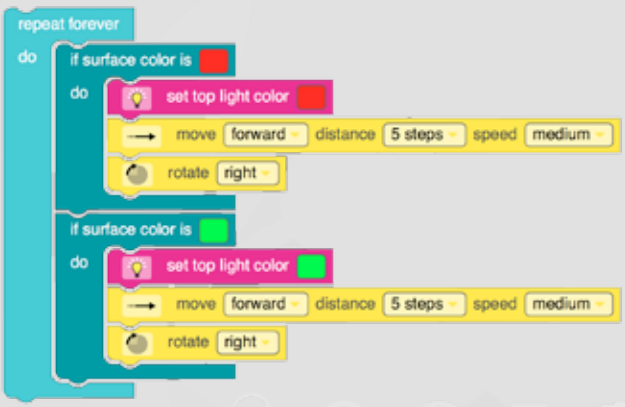
2 Beginner

Beginner mode extends from Pre-Reader with the introduction of simple loops. Blocks are now described with text titles as well as pictures.



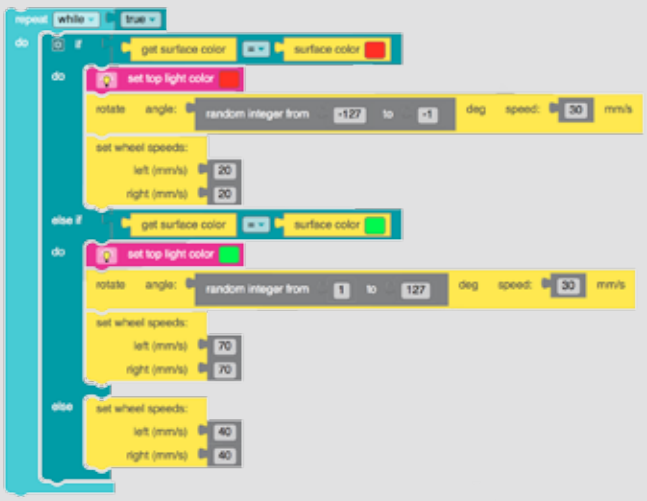
3 Intermediate

Control Ozobot's ability to follow lines using the line navigation category. Intermediate mode also introduces some simple if/else logic blocks.



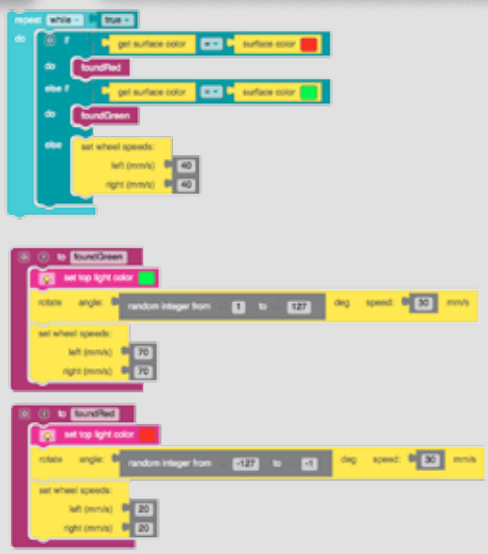
4 Advanced

Advanced mode significantly expands Ozobot's programmability with the introduction of repeat, while and for loops, more logic, integers, variables and functions.



5 Master

Take full control over Ozobot in Master mode with the addition of lists and arrays



Upload your programs to Ozobot by simply holding it against the screen of your device.

- ✔ Tablets
- ✔ Laptops
- ✔ Desktops
- ✔ Interactive whiteboards
- ✔ Smart phones

VEX IQ

VEX IQ is a programmable robotics platform designed to transform STEM learning for young students and their teachers. IQ is ideally suited to students from Key Stage 2 and 3 (ages 8 - 14) but can also be used well beyond Key Stage 3. The intuitive, tool-less platform allows students to have robots up and running in no time, whilst also allowing for complex designs as the student's skills grow.

VEX IQ is ideal for use in the classroom and can also be used in the VEX IQ Challenge.

STARTER KITS

Everything you need in one box

VEX IQ starter kits do more than just get you started. They contain everything you need to build a programmable robot including batteries, chargers, cables and a stackable storage bin to keep it all in. They are available in three variants to suit classroom or competition use.

Each of the starter kits include:

4x Smart Motors

1x Robot Brain

1x Rechargeable robot battery

1x Battery charger

2x Bumper switches

Structural and mechanical parts to build any of the Hero Bots

All connecting cables

Stackable storage bin

Unlimited access to free programming software

SUPER KIT

Also includes:
- Controller and battery
- Colour Sensor
- Gyro
- 2x Touch LEDs
- Distance Sensor

✔ **Best for VEX IQ Challenge**

£269.99

Order code 70-7891

STARTER KIT WITH SENSOR

Also includes:
- Colour Sensor
- Gyro
- 2x Touch LEDs
- Distance Sensor

✔ **Suitable for classroom use**

£219.99

Order code 70-7892

STARTER KIT WITH CONTROLLER

Also includes:
- Controller and battery

✔ **Suitable for VEX IQ Challenge or classroom use**

£219.99

Order code 70-7893

HELPING YOU MAKE IT

Designing your own robot from scratch can be a daunting task. To get you started, VEX have supplied several build instructions for robots known as the Hero Bots, all of which can be constructed using the parts supplied in any of the VEX IQ Starter Kits. Some of the builds are best suited to classroom use and others are for competition.

Each year, a new set of instructions will be added to help teams that are new to the VEX IQ Challenge build a basic competition robot. As they become more experienced, students can then improve that robot or design their own from scratch.

Clawbot IQ

The original VEX IQ robot, Clawbot IQ was optimised for the Highrise VEX IQ Challenge game and is still an excellent robot for classroom activities using the VEX IQ Cube sets.

Stretch

A good starting point for the Ringmaster game, Stretch features a parallel motion linkage lift which is a staple concept of robot design. It also introduces the concept of using elastic as a spring for mechanical advantage.

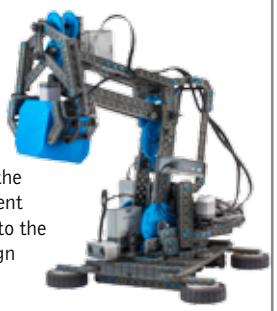
Flex

Based on Stretch, Flex has been modified to handle the Hub objects used in the Next Level VEX IQ Challenge game. Like Stretch, it has a parallel motion linkage lift with elastic assistance.

Ike

A cute robot with moving arms and bending waist which allows it to pick up objects from the ground.

Armbot IQ

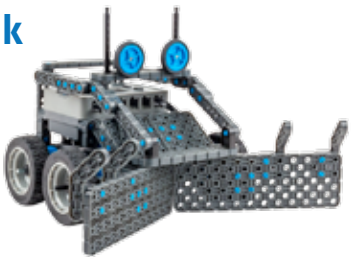


Armbot IQ is the only robot that is not mobile. That is because it is using all four motors from the kit to provide movement (degrees of freedom) to the lifting arm. This design is excellent for experimenting with creating autonomous programs for collecting and sorting objects.

Linq

Using a 4-bar parallel motion lift with a large load bay, Linq offers excellent learning opportunities as students try to improve the mechanism to lift heavier weights.

Slick



A simple bulldozer-inspired design that leaves plenty of parts for students to add their own additional features. Perhaps raise and lower the plough or increase the power to be able to shunt heavier objects.

V-Rex

What's that coming over the hill? It's V-Rex, a two-legged walking robot that uses clever linkages to move both legs and arms with just one motor.

Allie

This alligator has no bite – can you improve the design to re-purpose some of it's 4 motors to maintain the walking motion, but move the head and mouth independently?

Download FREE build instructions from **www.rapidonline.com/vexiq**

PROGRAMMING VEX IQ

MODKIT VEX

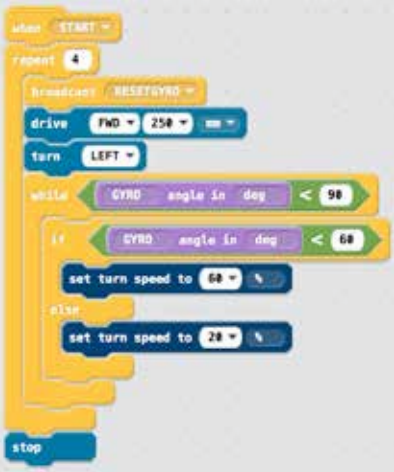
FREE

Modkit

Modkit is a graphical program that will be recognisable to these that have used Scratch before. It uses the same shapes and colours blocks and works in the same "event driven" way.

Modkit helps younger students get to grips with the basics of programming robots in a familiar environment whilst still being able to create some complex autonomous robots as their skills progress.

Available on PC, Mac and ipad



ROBOT C

FREE

ROBOT C

ROBOTC offers three different tiers of programming complexity within the same piece of software. Students can start with the graphical interface before moving on to "natural" language – a simplified version of C text-based coding. Finally, a full C interface allows experienced programmers to access the full range of functionality of VEX IQ.

Robot MESH STUDIO

FREE

RobotMesh Studio

Like ROBOTC, Robot Mesh Studio offers three tiers of programming. Starting off with simple flowcharts, students can the move on to the Blockly graphical interface and finally use a Python text language for maximum functionality.

For FREE software, contact **education@rapidonline.com**

VEX IQ CHALLENGE

The VEX IQ Challenge is a STEM competition for KS2 and KS3 students to test their robot design and programming skills. In the VEX IQ Challenge, students build a robot to solve an engineering challenge that is presented in the form of a game and will need to create fully autonomous robots as well as be able use the controller to manually operate them. Each year, teams will need to build a new robot to compete in a different challenge.

To find out more about the VEX IQ Challenge, visit **www.rapidonline.com/vexiq**

Challenge Team Bundle

The VEX IQ Challenge Team Bundle is the ultimate kit for starting a VEX IQ Team.

While the VEX IQ Super Kit contains enough parts to build your first competition robot, this Challenge Team Bundle allows you to take your designs to the ultimate level by combining a VEX IQ Super Kit, **70-7902** with an additional Competition Add-On Kit, **70-7940** and a Foundation Add-On Kit, **70-7903**.

This takes it from 850 parts to a massive 2850 parts while offering a significant saving over buying the kits separately and includes 6 motors which is the maximum allowed per robot in the competition.

£399.99

Order code 70-7953

VEX IQ Challenge Field

These field perimeter and tiles are exactly the same as the ones used in the VEX IQ Challenge and are excellent for practicing or running your own events.

- Official IQ Challenge perimeter and tiles
- Snap-together construction allows for assembly in minutes and easy storage/transport

£174.99

Order code 70-7935

VEX IQ Challenge Next Level Full Field and Game Elements Kit

This kit contains all the field elements and game objects needed to build a complete Next Level field - required for the VEX IQ Challenge game for the 2018-19 season.

Game elements for the 2019/20 season will be available from April 2019.

£79.99

Order code 70-6068

VEX IQ Classroom Bundles

These **VEX IQ Classroom Bundles** are designed to support classroom learning by providing enough equipment to support groups of 10, 20 or 30 students working in groups of two.

Each pair will have a **VEX IQ Super Kit, 70-7902,** containing a VEX IQ Brain, Controller, 4 motors, 7 sensors and 850 structural parts as well as all batteries, chargers and download cables. Each kit is supplied in a stackable storage bin for easy storage at the end of each lesson.

The kits can be used in conjunction with the **VEX IQ Curriculum** which can be downloaded free from **www.rapidonline.com/VEXIQ**

All kits are supplied with Highrise Cubes for use in your own classroom competitions. The 30 student bundle also includes a full VEX IQ Challenge field which can be built or packed away in minutes.

- Use the free graphical Modkit software to program your robots
- Classroom Curriculum available to download
- Kits can also be used to enter the national VEX IQ Challenge
- All kits include batteries, chargers and storage boxes for every robot

Technical specification

Order code	Description	No. of students	Super kits	Highrise cubes	IQ challenge field
70-7950	VEX IQ group bundle	10	5	18	No
70-7951	VEX IQ small class bundle	20	10	36	No
70-7952	VEX IQ classroom bundle	30	15	36	Yes

Type	Order code	1+
Group bundle - 5 kits + 18 cubes	**70-7950**	1349.99
Small class bundle - 10 kits + 36 cubes	**70-7951**	2699.99
Classroom bundle - 15 kits + 36 cubes + field	**70-7952**	3999.99

548357

VEX IQ Accessories

Robot Brain

The VEX IQ Robot Brain is the heart of the VEX IQ system.

- 12x identical Smart ports - connect any device to any port, sensors or motors
- Backlit LCD for simple operation
- Built in programs make robot building faster
- Programmable with Modkit for VEX or ROBOTC

Type	Order code	1+
IQ Robot Brain	**70-7904**	89.99

530019

Controller

Pair the VEX IQ Controller with a Robot Brain and gain remote control of your robot.

- 4x Joystick axis
- 8x Buttons
- Battery sold separately, order code **70-7909**
- 2.4GHz radio module sold separately, order code **70-7910**

Type	Order code	1+
IQ Controller	**70-7908**	29.99

530013

2.4 GHz Data Radio

The VEX IQ system 2.4 GHz radio is used to wirelessly drive your VEX IQ Robot using the Controller. 2 radio modules are required - 1 for the Brain and 1 for the Controller.

- 2.4GHz Radio modules which allow you to remotely control your VEX IQ Robots
- 1x radio module included
- Controller not included

Type	Order code	1+
2.4 GHz Radio	**70-7910**	7.99

530041

Smart Radio

The Smart Radio expands the potential of the VEX IQ Robot Brain and Controller by enabling wireless communication with smartphones, tablets and computers using Bluetooth 4.0+ connections. This allows for wireless programming of robots, interaction with robots using smartphones or tablets running Bluetooth 4.0 or higher, and other advanced features.

Supported mobile devices include Android 4.4, iPhone 4s, 3rd generation iPad, 1st generation iPad Mini, or any newer versions of the above. Compatible with VEX IQ Robot Brain, VEX IQ Controller, smartphones, tablets, computers, or other devices using the Bluetooth 4.0 (or higher) protocol.

The Smart Radio takes the VEX IQ Robot Brain to the next level of wireless capabilities, enabling wireless programming, wireless debugging and wireless datalogging.

- Can be used in place of existing 900 MHz and 2.4 GHz wireless radios
- Supports multiple connections (e.g. Robot Brain + Controller + Tablet)
- Unleashes advanced Robot Brain wireless capabilities

Type	Order code	1+
Smart radio	**70-7947**	9.99

554730

Long Smart Cable Pack

A pack of 8x long smart cables for VEX IQ Smart Motors and Sensors.

- 2x 800mm Smart Cable
- 2x 1.0m Smart Cable
- 1x 1.2m Smart Cable
- 1x 1.4m Smart Cable
- 1x 1.6m Smart Cable
- 1x 2.0m Smart Cable

Type	Order code	1+
Cable pack	**70-7946**	16.99

554729

Robot Battery

Replacement battery for the VEX IQ Robot Brain

- Nickel Metal Hydride technology
- 7.2V
- 2000mAh

Type	Order code	1+
Robot Battery	**70-7905**	14.99

530023

Competition Add-On Kit

The VEX IQ Competition Add-On Kit is the best VEX IQ expansion bundle for competitive teams. It complements the Super Kit with the advanced motion components needed to give your team a competitive edge.

- Omni-directional wheels allow for more complex drive systems
- Chain and sprocket kit helps you to create more elaborate mechanisms
- Over 2.4m (8 feet) of tank tread and chain
- Includes 2 motors and 12 wheels
- See Technical Specification for full list of contents
- **VEX part no. 228-3600**

Competition add-on kit contains the following:

Chain & Sprocket Kit
8x 8 tooth sprockets
8x 16 tooth sprockets
4x 24 tooth sprockets
4x 32 tooth sprockets
4x 40 tooth sprockets

Tank Tread & Intake Kit
200x tread/attachment links
4x 24 tooth sprockets
40x traction links
20x short intake flaps
20x medium intake flaps
20x long intake flaps

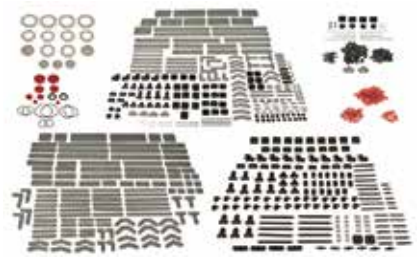
Wheel Kit
6x small wheel hubs
4x large wheel hubs
4x 100mm travel rubber tyres
4x 160mm travel rubber tyres
4x 200mm travel rubber tyres
4x 250mm travel rubber tyres

Additional Wheels & Motors
2x 200mm travel omni-directional wheels
2x smart motors

Type	Order code	1+
Competition add-on	**70-7940**	79.99

546301

Foundation Add-On Kit



The ideal kit for expanding your VEX IQ parts collection. More parts allow for bigger and more complex creations with additional robot mechanisms.

- Contains over 850 VEX IQ components
- Structural and motion components included
- Includes Storage Bin and Tray

Type	Order code	1+
Structure Kit	**70-7903**	74.99

530014

Competition Fields and Spares

These field perimeter and tiles are exactly the same as the ones used in the VEX IQ Challenge.

- Official IQ Challenge perimeter and tiles
- Snap-together construction allows for assembly in minutes and easy storage/ transport
- Available as full fields or half fields for use in smaller spaces

Type	Order code	1+
Full Field	**70-7935**	174.99
Half Field	**70-7936**	89.99
Spare field tile	**70-8180**	7.99
Spare perimeter wall	**70-8181**	4.99
Spare corner wall	**70-8182**	4.99

530020

Smart Motor

The Smart Motor does more than just make your wheels spin or arm move. The built in processor, quadrature encoder and current monitor allow for advanced control and feedback through the Robot Brain.

- Command speed, direction, time, revolutions and degrees
- Mounts directly to VEX IQ structural components
- Command motors up to 3,000 times/second
- Encoder resolution is 0.375 degrees
- Supports event programming to simplify software

Type	Order code	1+
Smart Motor	**70-7911**	14.99

530022

Need a product urgently?

We can offer a next day, before noon, delivery service

01206 751166

Smart Motor Mount Pack

These plastic motor support caps slide onto the back of the **VEX IQ Smart Motor**. Use the single motor support cap's second set of mounting holes to attach motors in new ways, or use the dual motor support mount to attach two Smart Motors back-to-back.

- Supplied with 2x single and 2x dual caps

Type	Order code	1+
Motor mounting caps	**70-7948**	3.99

554731

200mm Travel (62mm dia.) Omni Directional Wheels Pack of 2

These Omni-Directional wheels roll forward like normal wheels but slide sideways with almost no friction (no skidding during turns). Use these wheels to make your robot turn smoothly or build a holonomic drive train.

- Diameter approx. 62mm
- Travel: 200mm (distance covered in 1 revolution)
- Omni-Directional Wheels roll sideways with very little friction
- Minimize skidding during turns
- Made from ABS plastic
- Rollers are soft rubber-coated ABS

Type	Order code	1+
Omni Wheel Pk 2	**70-7926**	7.99

530018

Chain & Sprocket Add-on Kit

Use chains and sprockets for additional reductions and to drive mechanisms.

- 200x Chain Links
- 8x 8-Tooth Sprockets
- 8x 16-Tooth Sprockets
- 4x 24-Tooth Sprockets
- 4x 32-Tooth Sprockets
- 4x 40-Tooth Sprockets

Type	Order code	1+
Chain & Sprocket Kit	**70-7921**	15.99

530016

Gear Kit

This kit contains VEX IQ Gears, rack gears, worm gears and linear slides.

- 10x 12-Tooth Gears
- 10x 36-Tooth Gears
- 6x 60-Tooth Gears
- 4x 36-Tooth Crown Gears
- 8x Rack Gears
- 4x Linear Slider
- 2x Worm Gears
- 6x Worm Gear Brackets

Type	Order code	1+
Gear Kit	**70-7924**	12.99

530015

Tank Tread & Intake Kits

Use these kits to create intake mechanisms to collect and release objects or tank tread drive trains to allow your robot to tackle the roughest terrains.

- Pack of 200 Tread/Attachment Links
- Pack of 4 24-Tooth Sprockets
- Pack of 40 Traction Link
- Pack of 20 Short Intake Flaps
- Pack of 20 Medium Intake Flaps
- Pack of 20 Long Intake Flaps

Colour	Order code	1+
Black	**70-8122**	24.99
Green	**70-8128**	24.99
Orange	**70-8120**	24.99
Pink	**70-8130**	24.99
Purple	**70-8124**	24.99
Red	**70-8118**	24.99
Yellow	**70-8126**	24.99

554556

Long Shaft Add-On Pack

This add-on kit contains 14 'long length' shafts enabling you to construct even larger VEX IQ robots. The shafts allow you to transfer motion over long distances with ease.

- Material: Zinc-plated steel
- **VEX IQ type 228-4420**

Technical specification

Quantity	Type	VEX IQ type	Length (mm)
2	9x pitch	228-2500-260	112.5
2	10x pitch	228-2500-261	125.2
2	11x pitch	228-2500-262	137.9
2	12x pitch	228-2500-263	150.6
1	14x pitch	228-2500-264	176.0
1	16x pitch	228-2500-265	201.4
1	18x pitch	228-2500-266	226.8
1	20x pitch	228-2500-267	252.2
1	22x pitch	228-2500-268	277.6
1	24x pitch	228-2500-269	303.0

Type	Order code	1+
Long shaft pack	**70-7949**	7.99

563701

VEX ROBOTICS

VEX Robotics kits help to inspire students to become the problem-solving heroes of tomorrow. The VEX EDR system harnesses the excitement of building robots to immerse students in STEM concepts as well as familiarising them with using basic tools.

VEX EDR robots are constructed using steel or aluminium structural parts which are assembled using nuts and bolts. The mechanical parts such as gears and sprockets are manufactured from engineering-grade plastics such as acetal and nylon.

V5 is the latest generation control system for the highly popular VEX EDR robotics platform.

V5 Brain

At the heart of any VEX robot project is the V5 Robot Brain. Run programs, get real-time feedback and troubleshoot your robot directly via the colour touch-screen. The 21 Smart Ports automatically detect the type of connected device and handle motors and sensors interchangeably for maximum flexibility. Legacy VEX EDR Sensors and Motors are also supported through eight 3-Wire ports.

- 4.25" full colour touch-screen
- Dashboards provide real-time diagnostics
- 21x Smart Ports
- Eight 3-Wire ports for analogue and digital sensors
- Download programs wirelessly
- Programmable with free VEX Coding Studio software or third-party tools such as PROS and Robot Mesh Studio.

£164.99

Order code 70-8186

VEX V5 Wireless Controller

The controller has two analogue joysticks and twelve buttons, arranged in the familiar game controller-style design. An internal rechargeable battery ensures enough charge to get you through multiple class sessions or a full day of competition.

Instant real-time feedback from the Robot Brain is provided via a monochrome LCD screen allowing programmers to send data and text to the screen for debugging and driver information.

- LCD Screen for real-time information
- Start and stop programs from the controller
- Programmable haptic feedback
- Competition practice mode - sync up with other robots and run practice matches
- Built-in VEXnet 3.0 radio and Bluetooth
- Integrated rechargeable battery

£84.99

Order code 70-8187

VEX V5 Vision Sensor

Improve your robot's autonomous capabilities by detecting the colour, location and size of objects using the V5 Vision Sensor.
Recognises up to 7 different colours and many tens of objects simultaneously.

- Tracks up to seven individual colours at once
- Analyze objects for advanced tracking and path planning
- Built-in Wi-Fi for live viewing from web browser
- Also compatible with VEX IQ

£55.99

Order code 70-8198

V5 Smart Motor

This V5 Smart Motor is an extremely powerful unit that puts an integrated encoder and a motor controller into one compact package. You can customise speed and torque performance with interchangeable gear cartridges which allow for 100, 200 or 600rpm shaft output speed.

- Built-in encoder tracks a robot's rotational position and velocity
- Current and temperature feedback
- Compatible with high-strength (1/4") and standard (1/8") VEX EDR shafts
- Supplied with 200rpm (green) gear cartridge

£29.99

Order code 70-8185

Programming

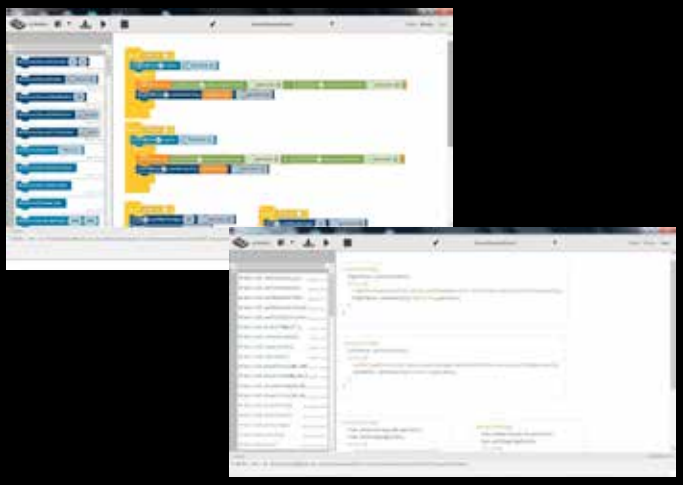
VEX Coding Studio is a free coding environment for VEX V5. VCS contains multiple languages and coding styles proving a low barrier to entry and a high ceiling for advanced programmers.

Students can start programming using Modkit blocks, smoothly move to text-based programming and eventually on to advanced object-oriented concepts using C++.

The Modkit interface will be familiar to anyone that has used Scratch in the past. Simply drag and drop the blocks together to create a program using fundamental programming structures such as loops, variables, Boolean logic and more.

Modkit also allows programmers to see their code in text, assisting the transition from blocks to a full text-based programming language.

VEX C++ steps into the shoes of ROBOTC which is commonly used by programmers of the VEX Cortex or VEX IQ systems. It's a text-based language using C++ structures and which allows students to include other standard C++ libraries in their programs.

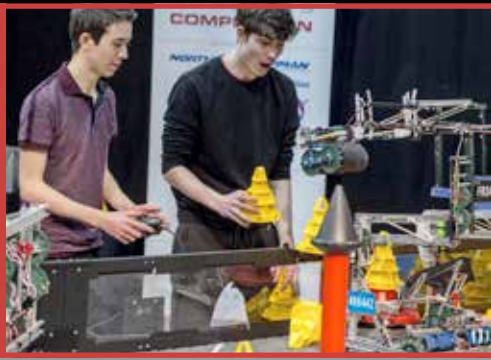


VEX Robotics Competition

VEX Competitions bring STEM skills to life by tasking teams of students with designing and building a robot to play against other teams in a game-based engineering challenge. Classroom STEM concepts are put to the test as students learn lifelong skills in teamwork, leadership, communications, and more. Tournaments are held year-round at a regional level and culminate at the VEX Robotics UK National Championship each year.

The specific challenge that the teams need to undertake changes each year which means students can continue to develop their skills year after year.

To learn more about the VEX Robotics Competition, visit **www.rapidonline.com/VEX**



Classroom Starter Kits

The Classroom Starter Kit is a good introduction to V5 based around the V5 Clawbot robot. The Classroom Super Kit contains a wide range of mechanical parts and different types of wheels which allows students to experiment with lots of different designs and mechanisms.

	Classroom Super Kit	Classroom Starter Kit
	70-8195	70-8194
	£924.99	£459.99
V5 Brain, Controller, Radio Module	✔	✔
Li-ion Robot Battery and Charger	✔	✔
V5 Smart Motors	6	4
Bumper Switches	4	2
Potentiometer	2	✘
Distance sensor	1	✘
Steel structural parts	31	9
Omni-wheels	8	2
Mecanum wheels	4	✘
Other wheels	12	2
High strength gears and sprockets	35	2
Additional motion pack	✔	✘
Tools and accessories	✔	✔

Competition Starter Kits

Designed specifically for use in the VEX Robotics Competition, these Competition Starter Kits contain aluminium structural parts and high strength mechanical parts for the rigours of competitive robotics.

	Competition Super Kit	Competition Starter Kit
	70-8197	70-8196
	£1199.99	£699.99
V5 Brain, Controller, Radio Module	✔	✔
Li-ion Robot Battery and Charger	✔	✔
V5 Smart Motors	8	4
Additional 36:1 motor gear cartridge	2	✘
Bumper Switches	4	2
Vision Sensor	✔	✘
Aluminium structural parts	52	27
Omni-wheels	4	2
Other wheels	4	6
High strength gears and sprockets	102	30
Tank tread, intake kit and high strength chain	✔	✔
Tools and accessories	✔	✔
Storage bin and tray	✔	✔

VEX V5 System Bundle

The V5 system bundle contains: V5 robot brain; V5 controller with integrated battery; V5 robot battery, charger and cable; V5 radio; V5 smart cables; USB cable.

£359.99

Order code 70-8183

For more V5 products see www.rapidonline.com/vex

LEGO®

Early Simple Machines

The Duplo Early Machines Set is ideal for introducing youngsters to mechanical principles such as gears, levers, pulleys, wheels and axles, as well as investigating energy, buoyancy and balance.

- The set includes inspirational inbox cards for building eight different models such as the Measuring Car and the Spinning Top
- Exclusive for this set is a plastic punch-out sheet with eyes, sails, scales and wings
- Number of pieces: 102
- Suitable for **Foundation** and **Key Stage 1** (ages 4 to 7)

Type	Order code	1+
Duplo Simple Machines	**70-1312**	98.75

079522

education

WeDo 2.0 Core Set and Accessories

This **280-piece** set from the **LEGO Education WeDo 2.0** range is based upon the latest science standards and was created to enhance students' curiosity and science skills. The set is delivered in an easily portable storage bin along with sorting trays, labels, a Smarthub, a medium motor, tilt sensor, and enough building elements to occupy two students.

The accompanying desktop and tablet-supported software provides an easy-to-use programming environment and includes the **WeDo 2.0 Curriculum Pack**, which covers life, physical, earth, and space sciences, as well as engineering.

The accompanying eLearning program helps teachers to become confident users of the WeDo 2.0 Core Set.

- Provides investigating, modelling and designing solutions
- Engages students in science by making it real and relevant
- Encourages basic programming, collaboration and presentation skills
- Available on both desktop and tablet devices
- Integrated documentation tool to document projects: pictures, screen shots, videos, and written text
- Inbuilt assessment
- Supplied with sturdy storage bin and sorting tray for easy classroom management

Smarthub, medium motor, sensors and other accessories also available separately.

Type	Order code	1+
Core set	**70-6536**	123.70
Smarthub 2 I/O	**70-6537**	41.23
Rechargeable battery	**70-6538**	34.90
Transformer	**70-6539**	20.62
Medium motor	**70-6540**	15.45
Tilt sensor	**70-6542**	15.45
Replacement pack	**70-6543**	4.07

564920

education

WeDo Power Functions M-Motor

A motor for operating action models built with the WeDo Construction Set, **70-6500**.

- Connects to the WeDo USB Hub, **70-6508**
- **LEGO type 8883**

Type	Order code	1+
WeDo Motor	**70-6510**	7.30

082535

education

Pneumatics Add-on Set

This Pneumatics add-on set for the 9632/9686 Simple & powered machines set, **70-6053**, provides five principle models and four real-life pneumatics models.

- Provides a safe introduction to pneumatics
- Includes full-colour building instructions, pumps, tubes, cylinders, valves, air tank and manometer
- Build and explore pneumatics through real-life LEGO models
- Investigate power systems and components
- Explore kinetic and potential energy
- Allows children to work as technical investigators
- Manometer measures pressure in both psi and bar
- Buddy Building concept allows students to build the models in teams
- Brick Type LEGO Technic
- Piece count 31
- Meets Science & Technology curriculum goals
- Suitable for **Key Stages 3 & 4** (ages 11 to 16)
- **LEGO type 9641**

Type	Order code	1+
Pneumatics add-on	**70-6054**	47.77

082377

education

Renewable Energy Add-on Set

An exciting add-on set for use with the LEGOsimple and powered machines set, 9686 , order code **70-6053**.

It allows students to learn all about renewable energy sources and is compatible with both the Machines and Mechanisms portfolio and LEGO MINDSTORMS Education. The set features a solar panel, turbine blades, a motor/generator, LED lights, an extension wire and the unique LEGO Energy Meter. The set includes full-colour building instructions for six real-life LEGO models. Connected with the MINDSTORMS NXT brick, the Energy Meter works as a sensor, making it ideal to use with the MINDSTORMS Data Logging software.

- Gives students a highly relevant insight into different Renewable Energy sources, e.g. solar, wind, hydro and hand generated power
- The product is compatible with both Simple and Powered Machines and MINDSTORMS
- Includes building instructions for 6 different models to build with the Simple and Powered machines set
- Free activities and building instructions to build with MINDSTORMS on www.MINDSTORMSeducation.com Includes Energy Meter that allows students to store and use the generated energy
- The Energy Meter also gives you the opportunity to datalog in the MINDSTORMS datalogging software
- Key Learning Points:
- Building and exploring renewable energy through real-life LEGO models
- Exploring energy supply, transfer, accumulation, conversion and consumption
- Engaging students in engineering and design
- Piece count 12
- Recommended for ages 8+

Building instructions for machines and mechanisms, and activities for MINDSTORMS can be downloaded free of charge from LEGOeducation.com.

Type	Order code	1+
Renewable energy set	**70-6055**	82.78

500033

education

Simple & Powered Machines Set

The core brick set in the range of machines & mechanisms solutions, this set includes full-colour building instruction booklets for 10 principle models and 18 main models. Combine with curricular-relevant activity packs and add-on sets to carry out a broad range of activities within design technology, science and mathematics.

- Building and exploring real life machines and mechanisms
- Investigating powered machines with the motor
- Using plastic sheets for calibration and capturing wind
- Exploring gearing mechanisms with the assorted gear wheels incl. differential
- Piece count 396
- Age 8+
- Brick Type LEGO Technic
- Storage tray: 425 x 309 x 156mm
- **LEGO type 9686**

Type	Order code	1+
Simple/powered machines	**70-6053**	103.00

082424

fable

Set your Fable robots free with Fable Spin

Like all the other Fable modules, Spin has magnetic connectors to allow you to integrate it with all existing Fable parts. Armed with precision encoders for precise movement, distance sensors for obstacle avoidance, light level sensors, colour sensors and IR communication, Spin gives your Fable robot the power to navigate its environment with ease.

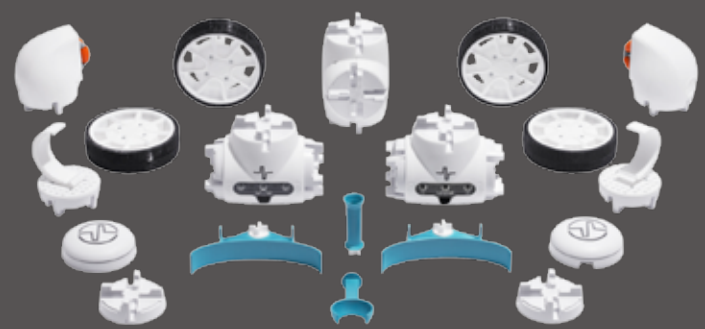
Simply click the wheels or any other Fable part onto the magnetic connectors to add precise 360-degree rotational movement to your Fable robots.

Key features

- 2x 360-degree continuous rotation connectors
- 2x static connectors
- RGB colour sensor
- Ambient light sensor
- Distance sensor
- Infrared communication capability
- Wireless Bluetooth downloading
- Integrated rechargeable battery

Spin is programmed using the same graphical and Python interfaces that are used with standard Fable robots.

Set	Go	Play	Class
Order code	00-0410	00-0411	00-0412
Price	£449.00	£880.00	£4,200.00
Spin Module	1	2	10
Bluetooth Hub	1	2	10
Wheels	2	4	20
3XY Module		1	5
Castor Wheel	1	2	10
3D Print Connector	1	2	10
Accessory Adaptor	1	2	10
Smartphone Holder	1	2	10
Plough	1	2	10
Fork		1	5
Ball Stand		1	5
Charger	1	2	10
Charging Station			2
Storage Box	1	2	10



fable

Learning with Fable

Fable is a modular robotics construction set that can be used across STEM subjects and it helps students gain the skills they will need in the 21st century.

Fable Sets To Match All Needs

Fable Sets are available in different sizes so you can be sure that everyone has the opportunity to explore and let their imagination run wild!

✔ Ideal for pupils aged 8 to 18

Type	Joint module	Entry set	Standard set	Medium set	Large set	Class set
Joint module	1	1	2	4	5	10
Dongle	-	1	2	4	5	10
Lego® connector module	-	1	2	4	5	10
4XY Construction module	-	1	2	4	5	10
Connector for 3D-printed parts	-	1	2	4	5	10
Laser pointer	-	1	2	4	5	10
Box with base stand	-	1	2	4	5	10
Smart phone holder	-	-	1	2	3	5
USB charger	-	1	2	-	-	-
Desk charging station	-	-	-	1	1	2
Group size	-	3	2 to 6	4 to 12	5 to 15	10 to 30
Order code	00-0408	00-0404	00-0403	00-0402	00-0401	00-0400
	£324.99	£435.00	£869.00	£1738.00	£2173.00	£4169.00

1. Joint Modules

As well as providing movement, the joint modules also contain an integrated battery and Bluetooth communication which makes each joint a completely independent but fully functioning part of the robot.

Each joint has two high quality servos which provide 2 degrees of freedom.

- Integrated battery
- 2 degrees of freedom (DoF)
- Magnetic connections
- 6 Bluetooth channels
- Rugged and robust

2. Bluetooth Dongle

Connects via USB to a PC or Mac and allows you to communicate with one or more Joint Modules via Bluetooth.

- 6 Bluetooth channels
- USB connection
- PC and Mac compatible

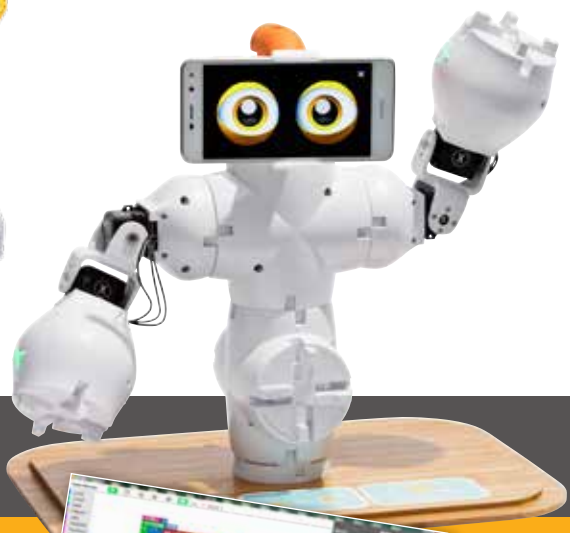
3. 4XY Construction Module

These passive construction modules have 4 magnetic couplings which allow you to connect multiple Joints, Construction Modules and Extension Modules together.

- 4 Magnetic connections
- Rugged and robust

4. Extension Modules

These modules allow you to interface Fable with LEGO®, a Smartphone or to create your own 3D printed parts.



The Programming Interface

Using the Fable Bluetooth dongle, students can program their robots wirelessly from both PC or Mac.
The interface has 3 different levels of complexity which can be used depending on the student's programming skill.

Level 1 – Simple Blockly

Graphical interface with a basic command set using simple programming structures such as repeat loops and if/else statements.

Level 2 – Full Blockly

The same familiar Blockly interface but with an increased command set containing more complex loops, logic and mathematical functions as well as data manipulation such as variables and lists. Students will also be able to access a wider range of sensor data and use advanced colour and movement recognition features.

Level 3 – Python

Access all the standard features of the Python programming language and use the Fable API to create the most complex Fable programs in a text-based programming environment.

Use a standard webcam for sensing objects, movement and colour.

With some robotics platforms, advanced sensors such as motion sensing or colour and object sensing can be expensive. With Fable, all you need is a standard webcam connected to your computer!

This makes it easy to write programs to detect movement, sort by colour or accurately calculate the position of an object.

Fable Spares and Extras

3D Adaptor Module 3D Connector

£5.30
Order code 00-0409

Joint Module

£324.99
Order code 00-0408

4XY Construction Module

£35.99
Order code 00-0407

Phone 3D Module Including Phone Holder

£45.00
Order code 00-0406

3D Printed Extras Set of 4-pieces

£119.99
Order code 00-0405

Robot Arms

DOBOT
Magician Robotic Arm

Meet **Dobot Magician** - the desktop robotic arm with incredible **accuracy** and repeatability. Dobot is **versatile** – it can be controlled via a PC, remote control, gesture control or programmed to operate as a standalone unit.

Dobot Magician's control software is called DobotStudio. It has a wealth of integrated features including Teach and Playback mode (no coding required!), graphical programming via Blockly and text programming. Dobot can also be controlled via a Leap Motion gesture control unit, remote joystick and via Bluetooth or WiFi.

Because Dobot's movements are so accurate, it is an excellent way to learn about control, automation and how industrial robots work without the need for large machinery.

Dobot comes at just a fraction of the size and cost of its industrial equivalent making it **ideal for the classroom** environment. Dobot also offers a large amount of flexibility through its Extended Input and Output (EIO) ports which allow users to connect their own sensors, motors, servos or additional microcontrollers.

- Number of axes 4
- Maximum payload 500g
- Maximum reach 320mm
- Position accuracy 0.2mm
- Robot power supply 12V/7A
- DC Power adaptor (included) 100 to 240V AC, 50/60Hz
- Power consumption 60W maximum
- Weight 3.4kg
- Base footprint 158 x 158mm
- Made from aluminium alloy and ABS

Supplied with everything you need to use Dobot: *Dobot Magician robot arm; power supply; 3 different end effectors - claw, suction cup and pen; USB cable; WiFi module; bluetooth module; joystick remote control; DobotStudio software.*

Type	Order code	1+
Robotic arm	**70-0480**	1100.00

564463

DOBOT

Curriculum guide available

Contact: **education@rapidonline.com**

DOBOT
Dobot Sliding Rail Kit

An extra metre brings you endless possibilities!

As Dobot Magician's official accessory, the sliding rail kit expands its functional area to a whole new extent. With interchangeable tool heads and graphical programming environment, you'll design complicated workflows like a pro.

From organizing objects, to writing a long letter, this simple accessory will make industry 4.0 approachable like never before. The rail is made from a single piece of steel using high precision CNC milling. And it runs like silk.

The sliding rail is supplied with wire set, tool kit, attachments and assembly instructions.

Specifications
- Max. payload: 5kg
- Effective travel distance: 1000mm
- Maximum speed: 150mm/s
- Maximum acceleration: 150mm/s²
- Repeat positioning accuracy: 0.01mm
- Absolute positioning accuracy: 0.25mm
- Dimensions (L x W x H): 132 x 120 x 55mm
- Weight: 4.7kg

Dobot not included.

Type	Order code	1+
Sliding rail kit	**70-0481**	825.00

565241

DOBOT
Dobot Conveyor Belt Kit

The simplest mini production line ever.

The conveyor kit for the Dobot Magician gives you a complete production line simulation. The kit consists of a conveyor belt with adjustable speed, a distance sensor and a colour sensor. Combined with the powerful and programmable Dobot Magician, these are the ideal essentials for you to create a highly effective simulated production line, or even apply it to an actual factory scenario.

The conveyor belt is supplied complete with 40 wooden cubes, a demonstration positioning board and user manual.

Conveyor belt
- Max. payload: 500g
- Effective delivering distance: 600mm
- Maximum speed: 120mm/s
- Maximum acceleration: 1100mm/s²
- Dimensions: 700 x 215 x 60mm
- Weight: 4.2kg

Distance measuring sensor unit
- Measurable range: 20 to 150mm
- Signal: analog output
- Input: 4.5 to 5.5V

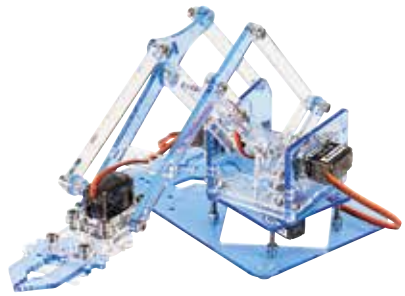
Colour recognising sensor unit
- Input: 3 to 5V
- Detectable: non-glowing object
- White LED embedded, on/off controllable

Dobot not included.

Type	Order code	1+
Conveyor belt kit	**70-0482**	299.00

565242

MeArm
Robotic Arm Kits



The **MeArm Robotic Arm kits** are great gadgets whether you're looking for either a beginner or experienced project. It is simple to assemble the numbered parts using the detailed instructions, the supplied hex key and a small screwdriver. The MeArm is supplied in two versions, Maker and Deluxe. Once built, you use a microcontroller (MCU) to drive the servos using low-current PWM signals directly from the MCU so there's no separate controller board. The team at MeArm wants to get you off to a flying start so they've provided a free resources page with build guides and software.

The **Maker kit** contains the laser-cut acrylic parts, 4 x servos, nuts and screws, and a hex key so that you can add your own microcontroller such as an Arduino, OrangePip, PICAXE or Genie board.

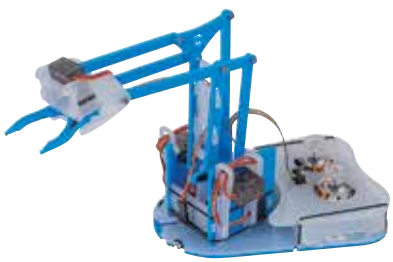
The **Deluxe kit** is a complete kit, containing the laser-cut acrylic parts, servos and the hex key just like the Maker kit. In addition, it contains the Brain Board, joystick controller and battery holder. Once assembled, add batteries and you are ready to drive the MeArm using the joysticks.

- Self-assembly kit in Nuka Cola Blue
- Maker version – add your own microcontroller
- Deluxe Version – complete with Arduino compatible microcontroller and joystick

Type	Order code	1+
Maker kit	**75-0040**	26.98
Deluxe kit	**75-0041**	62.90

560644

Mime Industries
Pi Raspberry Pi Robot Arm in Blue



The **MeArm Pi** is a brilliant new robot arm for all ages, that is easy to make and control, and can be built by anyone. The arm is powered and controlled with a Raspberry Pi (not included) and will teach you about technology, engineering and programming.

The MeArm has been deliberately designed so it is easy to build and use, it is recommended for 11+ age range but is so well designed that even younger engineers should have

no problems. The only tool required is a Hex key, and it's included in the box.

The 'heart' of the arm is the Raspberry Pi, a low cost computer that has been developed to make learning about computing accessible and fun. The MeArm can be controlled directly via the neat on-board joysticks, or you can try your hand at learning to code, making the arm move using one of the many programming languages that the Raspberry Pi runs. All the software is free and is suitable for all skill levels from absolute beginner to experienced programmer.

You'll find it simple to start programming and using the MeArm as soon as it's built. You can choose which way you program the MeArm, on-board programming and in-browser programming. The icing on the cake for the MeArm is that it can all be controlled straight from your web browser, so you don't need to have a monitor, keyboard or mouse.

Here's what you get in the box:
Arm structure parts
Socket head screws for easy assembling
Hex key so you don't need your own tools
4x Metal gear servos
Raspberry Pi HAT with two on-board joysticks

What else you'll need:

If you don't already have one, we can supply you with the phenomenal Raspberry Pi 3 (**75-0650**)

- Build the future with MeArm and Raspberry Pi
- 100% Open source in both hardware and software
- Joysticks for live control
- Simple on-board or in-browser programming
- The MeArm comes in blue

Type	Order code	1+
MeArm Pi robot arm	**75-0725**	38.00

565031

RVFM

Robotic Arm and Optional USB PC Interface

This Robot Arm helps you get to grips, literally, with the basics of robotic technology. Following the detailed instructions, you can build your own wire-controlled Robot Arm, and control its movements via the remote control box. Alternatively, you can operate the Robot Arm from your PC by installing the optional USB Interface Kit (sold separately). The robot has 5 motors and 5 joints and features base rotation, elbow and wrist motion and a gripping function. A built-in searchlight means you can even operate the Robot Arm in the dark.

- Educational kit includes all necessary parts (except tools)
- Supplied complete with wired hand controller
- Add the optional USB interface and software (sold separately) to control your robotic arm from your PC
- No soldering required
- Maximum lift 100g
- Dimensions 37.5 x 16.1 x 23cm
- Weight 658g
- Requires 4x D batteries (not supplied)
- Optional USB Interface Kit is compatible with Windows Vista, Windows® XP and Windows® 7

Not suitable for children under 5 due to inclusion of small parts

Type	Order code	1+
Robotic arm	**06-9349**	25.28
USB interface	**06-9350**	14.94

518239

Accelerometers & Compass Sensors

TruSens

HC-SR504 Ultrasonic Ranging Module

The HC-SR504 is a non-contact ultrasonic ranging module with a 20 to 4000mm range. The module includes ultrasonic transmitter, receiver, and control circuit - all on a compact circuit board.

- Easy to use
- Ranging accuracy up to 3mm
- Compact dimensions

Technical specification

Voltage	5V DC
Current	15mA
Frequency	40Hz
Range	20 to 4000mm
Measurement angle	15°
Trigger input signal	10µs TTL pulse
Echo output signal	Input TTL lever signal + range in proportion
Dimensions	45 x 20 x 15mm

Type	Order code	1+	10+	50+
HC-SR504	**74-1109**	2.10	1.99	1.84

565684

seeed studio

Grove Motion Sensor, Control and Actuator Modules

The **Grove Motion Sensor Modules from Seeed Studio** give you a range of options to monitor motion and position in your next project. The range includes accelerometers, gyroscopes, and compasses as well as distance, motion and proximity sensors. There's even a GPS receiver which is compatible with any microcontroller with a spare serial port (Arduino, Raspberry Pi etc.). If your next project needs to keep track of where it is and where it's going then take a look at the **Grove** add-on modules.

Type	Order code	1+
Accelerometer	**75-0439**	7.13
Accelerometer (±1.5g)	**75-0458**	7.50
Accelerometer (±16g)	**75-0454**	7.43
Collision sensor	**75-0473**	6.32
Digital gyro	**75-0450**	12.96
Electromagnet	**75-0470**	8.49
GPS receiver	**75-0435**	21.23
I2C Motor Driver	**75-0432**	10.69
IR distance sensor	**75-0468**	4.43
PIR Motion Sensor	**75-0433**	6.77
Reflective sensor	**75-0465**	3.84
Ultrasonic ranger	**75-0427**	11.28
Vibration motor	**75-0466**	2.18

560346

ROBOT ELECTRONICS

Sharp Infrared Distance Sensors

These infrared distance sensors are ideal for use in robotics projects because of their ease of use. The sensors give an analogue output which has a 2V variation between the maximum and minimum distances meaning they can be interfaced with just about any microcontroller.

Two versions are available and should be selected based on the distance that you wish to measure.

- Easy to use
- 5V supply required
- Analogue output
- 3-way JST connector - a suitable connecting cable with 30cm leads is available separately (**70-6412**)

Type	Order code	1+
4-30cm Optical sensor	**70-6407**	8.65
10-80cm Optical sens.	**70-6408**	9.30

554062

adafruit

Triple-Axis Accelerometer Breakout Boards

The **Adafruit Triple-Axis Accelerometers** offer adjustable sensitivity and a choice of either I2C or SPI bus connectivity. Select from ±2, 4, 8 or 16g sensitivity; ±2g gives a higher resolution for slow movements while ±16g is best for high speed tracking. They can be configured to detect various events, such as a single tap or free-fall.

Supplied as a fully assembled and tested accelerometer boards plus a strip of 0.1in. pitch header pins for you to solder on as required. Adafruit provide a free tutorials to help get you started, please refer to the individual product pages for details.

- 3-axis accelerometers with adjustable full scale
- Detect free-fall events etc.
- I2C or SPI connectivity
- Breadboard friendly

Type	Order code	1+
ADXL345	**73-5332**	14.88
LIS3DH	**73-5283**	5.89

563257

Line Follower Sensors

VISHAY

Optical Switch Phototransistor Output

These **reflective sensors** from **Vishay** contain an infrared emitter and phototransistor in a leaded plastic package designed to exclude visible light. The specification and feature set of these optical sensors makes them ideal for line tracking and following and also suitable for applications such as **position sensor** for shaft encoder, detection of reflective materials, limit switch for mechanical motion, etc.

- Available in standard and long lead versions
- Peak operating distance 2.5mm
- Operating range 0.2 to 15mm
- Typical output current 1mA
- Daylight blocking filter
- Emitter wavelength 950nm
- Dimensions 10.2 x 5.8 x 7mm
- Package includes 2x mounting clips

Type	Order code	1+
Optical switch	**60-8260**	0.562
Optcl swtch long legs	**60-8261**	0.569

559424

Gyro Sensors

L3GD20 Triple-Axis Gyro Breakout Board

The **Adafruit L3GD20 3-axis Gyro Breakout Board** has an adjustable full scale of ±250, ±500 or ±2000 degrees per second. It's simple to interface to a microcontroller with both I2C and SPI connectivity. Then add 3.3 to 5V logic and power compatibility and you have a very useful and versatile little board.

Supplied as a fully assembled and tested gyro board plus a strip of 0.1in. header pins for you to solder on as required. Adafruit provide **a free library** as an example to help get you started.

- ±250 to ±2000 degree per second full scale (42 to 333rpm)
- On-chip temperature sensor
- 3.3 to 5V logic and power compatible
- I2C and SPI connectivity
- Dimensions 30.7 x 19.1 x 3mm (1.2 x 0.75 x 0.12in.)
- Adafruit part no.: 1032

Type	Order code	1+
Gyro breakout board	**73-5397**	10.39

563269

GPS Modules

Grove Motion Sensor, Control and Actuator Modules

The **Grove Motion Sensor Modules from Seeed Studio** give you a range of options to monitor motion and position in your next project. The range includes accelerometers, gyroscopes, and compasses as well as distance, motion and proximity sensors. There's even a GPS receiver which is compatible with any microcontroller with a spare serial port (Arduino, Raspberry Pi etc.). If your next project needs to keep track of where it is and where it's going then take a look at the **Grove** add-on modules.

Type	Order code	1+
Accelerometer	**75-0439**	7.13
Accelerometer (±1.5g)	**75-0458**	7.50
Accelerometer (±16g)	**75-0454**	7.43
Collision sensor	**75-0473**	6.32
Digital gyro	**75-0450**	12.96
Electromagnet	**75-0470**	8.49
GPS receiver	**75-0435**	21.23
I2C Motor Driver	**75-0432**	10.69
IR distance sensor	**75-0468**	4.43
PIR Motion Sensor	**75-0433**	6.77
Reflective sensor	**75-0465**	3.84
Ultrasonic ranger	**75-0427**	11.28
Vibration motor	**75-0466**	2.18

560346

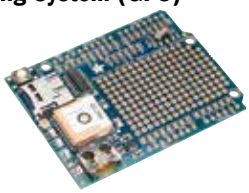
Grove - Physical Sensor Modules

The **Physical Sensor modules from Seeed Studio** provides a range of specialist sensors to microcontrollers and computers such as the Arduino, Raspberry Pi etc.. The range includes gas and alcohol sensors, plus fingerprint, vibration, and touch sensors. There's even a module to measure galvanic skin response from any microcontroller with a spare analog port.

Type	Order code	1+
Fingerprint sensor	**75-0446**	35.00
Galvanic skin sensor	**75-0453**	7.54
Gas sensor CO	**75-0462**	5.32
Gas sensor LPG	**75-0467**	8.90
Magnetic switch	**75-0469**	2.28
Piezo sensor	**75-0449**	4.87
Sound sensor	**75-0448**	3.74
Sound sensor	**75-0460**	4.47
Touch sensor	**75-0452**	10.74
Temperature sensor	**75-0459**	8.90

560372

Global Positioning System (GPS) Shields



With these **Arduino Global Positioning System (GPS) Shields** your Arduino will always know where it is.

Type	Order code	1+
Adafruit GPS	**73-4738**	60.80

559647

Ultimate GPS Breakout Board MTK3339 Chipset 66 Channel Version 3

A **GPS** breakout board designed around the **MTK3339** chipset. This high quality GPS module can track up to 22 satellites on 66 channels and also features a built-in antenna and -165dB tracking, high sensitivity receiver. Location update rate is up to 10 per second and power usage is only 20mA during navigation.

The module has a built in data-logging capability that can log time, date, longitude, latitude, and height is logged every 15 seconds and only when there is a fix. The internal FLASH can store about 16 hours of data. When a bigger antenna is required, any 3V active GPS antenna can be connected via the uFL connector. The module will automatically detect the active antenna and switch over.

Includes one fully assembled and tested module, header for breadboarding, CR1220 coin cell holder (coin cell not included).

- Onboard ultra-low dropout 3.3V regulator
- 5V Friendly design and only 20mA current draw
- Breadboard friendly + two mounting holes
- ENABLE pin to turn off module using any microcontroller pin or switch
- Footprint for optional coin cell to keep RTC running and allow warm starts
- Fix status LED

Technical specification

Satellites	22 tracking, 66 searching
Patch Antenna Size	15 x 15 x 4mm
Update rate	1 to 10Hz
Position Accuracy	<3m
Velocity Accuracy	0.1m/s
Warm/cold start	34s
Acquisition sensitivity	-145 dBm
Tracking sensitivity	-165 dBm
Maximum Velocity	515m/s
Vin range	3.0 to 5.5V DC
MTK3339 Operating current	25mA tracking, 20 mA current draw during navigation
Output	NMEA 0183, 9600 baud default DGPS/WAAS/EGNOS supported FCC E911 compliance and AGPS support (Offline mode : EPO valid up to 14 days) Up to 210 PRN channels Jammer detection and reduction Multi-path detection and compensation

Type	Order code	1+
GPS Breakout board	**75-0496**	33.01

559280

Grove Motion Sensor, Control and Actuator Modules

The **Grove Motion Sensor Modules from Seeed Studio** give you a range of options to monitor motion and position in your next project. The range includes accelerometers, gyroscopes, and compasses as well as distance, motion and proximity sensors. There's even a GPS receiver which is compatible with any microcontroller with a spare serial port (Arduino, Raspberry Pi etc.). If your next project needs to keep track of where it is and where it's going then take a look at the **Grove** add-on modules.

Type	Order code	1+
Accelerometer	**75-0439**	7.13
Accelerometer (±1.5g)	**75-0458**	7.50
Accelerometer (±16g)	**75-0454**	7.43
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PIR Motion Sensor	**75-0433**	6.77
Reflective sensor	**75-0465**	3.84
Ultrasonic ranger	**75-0427**	11.28
Vibration motor	**75-0466**	2.18

560346

Ultimate GPS HAT for Raspberry Pi A+, B+ or 2

The Ultimate GPS HAT has a built-in Real Time Clock (RTC) and a GPS module, adding precision time and location to a Raspberry Pi Model A+, B+, or Pi 2. The module has an internal patch antenna that works quite well when used outdoors. A u.FL connector enables connection to an external antenna. Additional features include status LEDs, PPS output on fix, and it is possible to obtain 7 years timekeeping by using a CR1220 backup battery (not supplied).

- Fully assembled GPS and PCB + 2 x 20 GPIO header
- Sensitivity -165 dBm
- 10Hz Updates
- 66 Channels

- Only 20mA current draw
- Break-outs for all the Raspberry Pi's extra pins
- Plenty of prototyping area for adding LEDs, sensors, etc.
- Requires a 12mm coin battery (e.g.CR1220)

Type	Order code	1+
GPS HAT	**75-0504**	31.48

559287

Sensor Robots

CIC
Line Tracking Mouse Kit

A sound-activated robot mouse that can follow a black line on a white background.

- A sharp sound, such as a handclap, sets the mouse tracking a line, using three photointerrupters as its eyes
- Self assembly kit includes:
- A programmed IC
- 2 sets of geared motors
- Suitable for **Key Stages 2, 3 & 4** (ages 7 to 16)

Requires 4x AA batteries (not included).

Type	Order code	1+
Line tracking mouse	**13-1035**	14.61

060686

CIC
Line Tracking Robot

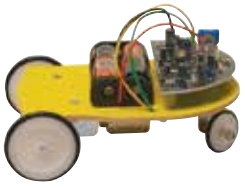
The Line Tracking Robot will help keep you on the right track if you are interested in basic robotics. Follow the detailed instructions and you can assemble a robot that will follow the route you have designed for him. The Line Tracking Robot has 2 photo interruptors as eyes which can distinguish black from white using infrared rays. Create a route using black tape or a marker pen and the robot will follow it.

- Easy to assemble as no soldering is necessary
- All parts supplied (excluding tools)
- Suitable for Key Stages 3, 4 and 5
- Finished robot height 10.5 cm
- 2 x AA batteries required (not supplied)

Type	Order code	1+
Line Tracking Robot	**06-9348**	14.38

518244

CIC
Sound Reversing Car Kit



A small robot car that responds to sound.

- Using a microphone as a sound detector, the car reverses and turns when it 'hears' a sharp sound such as a handclap or the sound generated by hitting an obstacle

Requires 2x AA batteries (not included).

Type	Order code	1+
Sound reversing car	**13-1030**	9.42

060685

CIC
Follow-Me Robot

You can build your own faithful friend with the Follow Me Sound-Detecting Robot. This little chap responds to clapping sounds. With 4 built-in microphones, he detects the source of the sound and will turn and move towards it with a flash of his eyes and a beep. If he doesn't hear a signal for 2 minutes he will go into sleeping mode.

- Educational kit suitable for Key Stages 3, 4 and 5
- Kit includes all necessary parts (except tools)
- Full assembly instructions provided
- No soldering required
- Robot effective within 1 metre of sound source
- Finished robot heights 15cm
- Requires 4 x AAA batteries (not supplied)

Not suitable for children under 5 due to presence of small parts.

Type	Order code	1+
Follow-Me Robot	**06-9347**	21.02

518243

CIC
Escape Robot Kit

The Escape robot kit enables you to build a robot that never fails to find its way out of a maze. The Escape robot makes use of three infrared emitting diodes and one infrared receiving module to send and receive signals to detect obstacles. It contains an in-built microprocessor which enables it to think and process information about its environment.

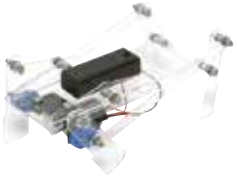
- Soldering required
- Suitable for **Key Stages 2, 3 & 4** (ages 7 to 16)

Requires 4x AAA batteries (not included).

Type	Order code	1+
Escape robot	**13-1090**	12.36

070721

RVFM
Four-Legged Walking Robot



Enjoy building this four-legged robot.

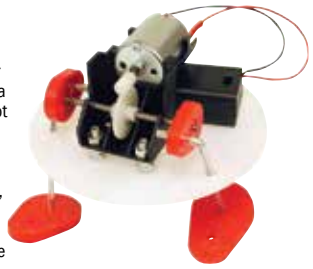
- Can be used for demonstrations, as a guide for self-designed robots, or as a basis for developing more complex mechanisms
- All parts are supplied, including laser-cut components and motorised gearbox
- Suitable for **Key Stages 2 & 3** (ages 7 to 14)

Requires 1x AA battery (not included).

Type	Order code	1+
Four legged robot	**13-0886**	8.52

010549

RVFM
Robot Duck



This pack contains all of the basic components for the creation of a two-legged robot duck. However, it does not include all of the instructions, allowing your pupils to conduct creative investigation.

- Suitable for **Key Stages 2 & 3** (ages 7 to 14)

Requires 1x AA battery (not included).

Type	Order code	1+
Two legged robot duck	**13-0884**	4.55

010548

TEP

Jitterbugs

Create a fantastic motorised jitterbug, which jumps and moves, by utilising a spinning off-centre mass (see **06-0698**, for off-centre mass wheels).

- The bug's battery and motor are hung underneath, so that a graphic image can be glued to the top plate
- This great value product, comes complete with all components, instructions, plus a choice of 3 graphic images
- Suitable for **Key Stages 2 & 3** (ages 7 to 14)

Requires 1x AA battery (not included).

Type	Order code	1+
Jitterbug	**13-0790**	1.77

066880

Wooden Robotic Kits

CIC
Automech Kit

A motorised racing car kit based around pre-punched wooden parts and a modular gearbox kit.

- No soldering required
- Pulley operation
- Tools required: modelling knife, screwdriver and long nose pliers
- Supplied complete with, switch, battery holder and all parts needed
- Suitable for **Key Stage 2+** (ages 7 and above)

Requires 2x AA cells (not included).

Type	Order code	1+	5+	10+	20+
Automech	**13-0998**	8.68	8.01	7.44	6.77

066808

TECHNOKIT

Stunt Buggy

Build this motorised **Stunt Buggy** from **Technokit** and you will be amazed at how it zips along and even performs wheelies! This super-cool electric buggy is easy to construct with no glue or mess – just fit together the interlocking printed thick card pieces, add the electrical and mechanical components and it's ready to go. Either construct so the printed sections are on the outside, or build your buggy inside out and paint or decorate your own design. The **Stunt Buggy** is the perfect inexpensive gift for boys (and tomboys) aged from 8 to 108!

Set includes:
- Printed panels
- Axles
- Pulleys
- Pulley insert
- Electric motor
- Motor mount
- Foam wheels
- Drive band
- Battery box
- Decal sheet
- Instruction manual

Requires 2x AA batteries (not included).

Type	Order code	1+
Stunt buggy	**13-1504**	7.27

079568

TECHNOKIT

Dragster Kit

With this kit you can build a super-cool, fast dragster that will amaze your friends - not just with its speed but also with its good looks! Easy to construct with no glue or mess - just push together the interlocking printed thick card pieces, add the electrical and mechanical components and then have fun playing with your **Dragster** or keep it as a desk trophy. You can either construct it so the printed sections are on the outside, or build your **Dragster** inside-out and paint or decorate your own design The dragster makes a perfect and inexpensive gift for boys and girls aged 8 to 108. An exciting technology project designed to stimulate a practical knowledge technology while having fun.

Contents:
- Printed panels
- Axles
- Pulleys
- Pulley insert
- Electric motor
- Motor mount
- Foam wheels
- Drive band
- Battery box
- Decal sheet
- Colour instructions
- Size when built 255 x 145 x 90mm

Requires 2 x AA batteries.

Type	Order code	1+
Dragster	**06-8632**	7.27

517622

Servos

FEETECH

SCS15 Smart Control Digital Servo with Metal Gears and Brackets

The **SCServo** is a multipurpose UART BUS **robot** servo designed for use with Arduino. The unit can work in both servo mode and wheel mode. The servo mode can be wired together in robots to control limbs and set them at specific angles. The wheel mode is intended for wheel-type operations. The SCServo can give feedback on the values of position, temperature, load, speed and input voltage, as well as having the ability to set parameters such as speed of rotation, max. output torque, operating voltage limit, operating temperature limit, etc.

To connect to Arduino The TTLinker control board is required (available separately as **37-1333**). The TTLinker is a signal conversion board. Arduino needs to convert its UART signals to the half duplex type and through TTLinker connect to SCServo. The TTLinker also has more interfaces to make provision for more sensors.

- Supplied with metal gears and brackets
- A 70mm wheel with tyre is also available (**37-1334**)
- SCServo is easily controlled by Arduino
- The SCServo has a unique ID number to identify on BUS network
- Operating voltage range 6 to 8.4V
- 73 rpm Max. operating speed at 8.4V

Technical specification

Dimensions	40 x 20 x 40.5mm
Weight	56g
Gear type	Metal 275:1
Bus interface	TTL Level Multi Drop
Position sensor and resolution	Potentiometer(215°/1024)
Operating angle	200° (Servo Mode)
Control system	Bus Packet Communication
ID	254 ID (0 to 253)
Communication speed	38400bps 1 Mbps
Motor type	Carbon
Bearing type	2BB
Operating voltage	6 to 8.4V
Stall torque(kg.cm)	15 @ 6V, 16.5 @ 7.4V, 17 @ 8.4V
Stall current	1.5A @ 7.4V
Operating speed (rpm)	55 @ 6V, 65 @ 7.4V, 73 @ 8.4V
Connector (wire length)	3P&5264 (15cm)

Type	Order code	1+	5+	10+
SCS15 Servo	**37-1332**	21.33	19.69	19.06
TTLinker board	**37-1333**	2.83		
70mm Wheel and tyre	**37-1334**	1.36		
3-Pin servo cable	**37-1337**	0.507		

559635

FEETECH

FS90R Analog Micro Servo Continuous Rotation

The **FS90R** is an analog micro servo that is capable of continuous rotation clockwise or anti-clockwise, as opposed to moving to a set position. The servo is ideal for the beginning roboticist and is perfect for use with the Motor Shield for **Arduino**. The servo can be controlled using any servo code, hardware or library and to control with an Arduino, just connect the orange control wire to pin 9 or 10 and use the Servo library included with the Arduino IDE.

Also available is a wheel (**37-1338**) that can be attached directly to the servo. The servo and wheel are also available as a package (**37-1336**).

- Good for making simple moving robots
- Small dimensions means servo can fit in confined spaces
- Lightweight
- Operating voltage 4.8 to 6V
- A 3-pin 10cm cable is available for connecting servos

Technical specification

Dimensions	23.2 x 12.5 x 22mm
Weight	9g
Operating speed	110 rpm @ 4.8V, 130 rpm @ 6V
Stall torque	1.3kg.cm @ 4.8V, 1.5kg.cm @ 6V
Operating voltage	4.8 to 6V
Direction	CCW
Operating angle	Continuous rotation
Required pulse	900 to 2100µs
Connector wire length	20cm

Type	Order code	1+
FS90R 360∞ Servo	**37-1335**	4.45
Servo and wheel	**37-1336**	5.57
Wheel for servo	**37-1338**	1.36

559636

FEETECH

FS90 Mini Servo 120° Operating Speed 0.12sec/60°

The **FS90** is an analog micro servo that has 120∞ of rotation. The servo is ideal for the beginning roboticist and is perfect for use with the Motor Shield for **Arduino**. The servo can be controlled using any servo code, hardware or library and to control with an Arduino, just connect the orange control wire to pin 9 or 10 and use the Servo library included with the Arduino IDE.

- Good for making simple moving robots
- Small dimensions means servo can fit in confined spaces
- Lightweight
- Operating voltage 4.8 to 6V
- A 3-pin 10cm cable is available for connecting servos (**37-1337**)

Technical specification

Dimensions	23.2 x 12.5 x 22mm
Weight	9g
Operating speed	0.12sec/60° (4.8V) 0.10sec/60° (6V)
Stall torque	1.3kg.cm (4.8V) 1.5kg.cm (6V)
Operating voltage	4.8 to 6V
Control system	Analog
Direction	CCW
Operating angle	120°

Type	Order code	1+	25+
FS90 Servo	**37-1339**	2.88	2.59

560555

RVFM

Tower Pro SG90 Mini Servo

The Tower Pro SG90 Mini Servo is a low-cost, well specified servo ideal for use in radio-controlled models and for interfacing with microcontroller systems like Arduino, Raspberry Pi, PICAXE, etc.

- Size: 23 x 12.2 x 29mm
- Low-cost, high quality
- Supplied complete with control horns and mounting screws
- **Tower Pro type SG90**

Technical specification

Dimensions	23 x 12.2 x 29mm
Operating voltage	4.8V
Stall torque	1.8kg/cm (4.8V)
Operating speed	0.1s / 60° (4.8V)
Dead band width	10µs
Temperature range	0 to 55°C
Weight	9g

Type	Order code	1+	25+	50+
Mini servo	**37-1330**	2.99	2.74	2.48

530144

MODELCRAFT

BMS-410C Plastic Gear JR Standard Servo Analogue Servo

The Modelcraft BMS-410C Standard Servo is not only economical, but ideal for many applications in **Radio Control** modelling owing to its **standard dimensions**. It is also compatible with microcontroller systems such as PICAXE, Arduino and Raspberry Pi.

- Standard dimensions
- Includes control horn and screw
- **Modelcraft type BMS-410C**

Technical specification

Manufacturer part No.	**BMS-410C**
Servo type	Standard servo
Connector system	JR
Gears	Plastic
Servo technology	Analogue servo
Servo time 6V/7.4V	0.15sec/60°
Servo time at 4.8 V	0.17sec/60°
Servo time at 6 V	0.15sec/60°
Servo torque at 4.8 V	35Ncm
Servo torque at 6/7.4 V	44Ncm
Servo torque at 6 V	44Ncm
Stroke time at 4.8 V	0.17sec/60°/0.15sec/60°
Length	40.5mm
Width	20mm
Weight	38g

Type	Order code	1+
Plastic gear servo	**49-9395**	5.33

534062

MODELCRAFT

Servo Mount Kit

Modelcraft mounting kit for servos with a hole distance of 10mm in the bracket.

- Servo width maximum 20mm
- Servo height maximum 30mm up to bracket

Type	Order code	1+
Servo Mount	**51-2295**	4.01

524206

MODELCRAFT

ES-07 JR Micro Servo

The Modelcraft ES-07 JR micro servo should be a must for any serious model maker, either as a spare servo for your model or as part of the basic equipment of a hobbyist workshop.

- Product includes servo and servo horn

Technical specification

Connector system	JR
Dimensions	(L x W x H) 19.7 x 8.2 x 24mm
Gear material	Plastic
Intended use (modelling)	Spare part
Manufacturer part no.	ES-07 JR
Servo technology	Analogue servo
Servo type	Micro servo
Stroke time at 4.8V	0.09s / 60°
Torque at 4.8V	5Ncm
Type of bearing	Plain bearing
Weight	4.4g

Type	Order code	1+
Micro Servo	**51-2307**	9.92

524218

MODELCRAFT

Servo Tape 230 x 65 x 2mm

Double-sided adhesive foam tape to attach servos, receivers, gyro systems and other radio control components.

- Good adhesion
- Size 230 x 65 x 2mm
- Supplied in **packs of 2**

Type	Order code	1+
Servo Tape	**51-2318**	1.99

524229

MODELCRAFT

Micro Servo MC1811

Affordable micro servo from Modelcraft, suitable for use as a replacement servo for ARF models or as part of the standard equipment for the hobby workshop.

- Mounting material included

Technical specification

Connector system	JR
Dimensions	(L x W x H) 23 x 11.5 x 24.5mm
Gear material	Plastic
Manufacturer part no.	MC1811
Servo technology	Analogue servo
Servo time 6V/7.4V	0.08s (60°)
Servo torque 6 V/7.4 V	18
Servo type	Micro servo
Stroke time at 4.8V	0.10s (60°)/0,08 s (60°)
Torque at 4.8V	15 / 18Ncm
Type of bearing	Plain bearing

Type	Order code	1+
Micro Servo	**51-2338**	6.01

524249

MODELCRAFT

Standard Servo RS2 MG/BB with Ball Bearings and Metal Gears

The Modelcraft RS2 Servo is ideal for numerous applications in the modelling field, such as radio controlled models like cars, airplanes and robots.

- Metallic drive

Technical specification

Connector system	JR
Dimensions	(L x W x H) 41 x 20 x 42mm
Gear material	Metal
Manufacturer part no.	RS2 MG/BB
Servo technology	Analogue servo
Servo time 6V / 7.4V	0.17s (60°)
Servo torque 6 V / 7.4 V	35
Servo type	Standard servo
Stroke time at 4.8 V	0.19s (60°) / 0.17s (60°)
Torque at 4.8V	31/35 Ncm
Type of bearing	Ball bearing
Weight	49g

Type	Order code	1+
Standard Servo	**51-1617**	12.98

523705

Motors & Gearboxes

seeed studio

Mini Vibration Motor 3V 2.0mm Circular

The **Mini Vibration Motor from Seeed Studio** operates from 3V DC and vibrates constantly when energised. The motor is not sensitive to the polarity of the voltage applied.

- ø 10 x 2mm

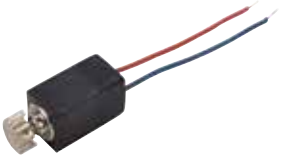
Type	Order code	1+
Vibration motor	**75-0416**	0.911

560351

seeed studio

Mini Vibration Motor 3V Rectangular

The **Mini Vibration Motor from Seeed Studio** operates from 3V DC and vibrates constantly when energised. The motor is not sensitive to the polarity of the voltage applied.



- Operating Voltage: 2.2 to 3.6V DC
- Rated Voltage: 3.0V DC
- Rated Speed: 12,000 90mA max
- Stall Current: 120mA max
- Starting Voltage: 2.0V DC max
- Mechanical Noise: 50db(A) max
- Weight: 2g approx.
- Dimension: 12 x 4.6 x 4.6mm

Type	Order code	1+
Vibration motor	**75-0417**	1.93

560352

TruMotion

3V, 13100 RPM DC Motor

A low-cost miniature DC motor with many applications including models, robotics and educational demonstration equipment.

- Operating voltage 1.5 to 4.5V DC
- Two flat sides make the motor ideal for mounting on a PCB
- Rotates counter-clockwise when viewed from shaft end
- Solder tag termination

Technical specification

Rated voltage	3V DC
No load current	0.34A max.
No load speed	16,400rpm ± 15%
Rated load	8.0 g.cm
Rated load current	1.07A max.
Rated load speed	13,100rpm ± 12%
Length excluding shaft	25mm
Diameter	20mm
Width across flats	15.1mm
Shaft length	9.4mm
Shaft diameter	2mm
Weight	17g approx.

		MOQ 2		
Type	Order code	2+	25+	100+
3V, 13,100 rpm	**37-0140**	0.588	0.461	0.346

061539

TruMotion

Miniature Motor 3V 5240rpm

A low-cost miniature motor offering a higher stall torque.

- Ideal for models, robotics, etc.
- Operating voltage 1.5 to 4.5V DC
- Rotates clockwise when viewed from shaft end
- Solder tag termination

Technical specification

Rated voltage	3V DC
No load current	0.13A max.
No load speed	6700rpm ±15%
Rated load	10.0 g.cm
Rated load current	0.45A max.
Rated load speed	5240rpm ±12%
Length excluding shaft	26.9mm
Diameter	23.8mm
Shaft length	8.6mm
Shaft diameter	2mm
Weight	28g approx.

Type	Order code	1+	25+	100+
3V, 5240 rpm motor	**37-0142**	0.85	0.63	0.578

061541

TruMotion

Miniature Motor 3V 8000rpm

A high torque miniature DC motor for higher power requirements.

- Operating voltage 1.5 to 6.0V DC
- Rotates clockwise when viewed from shaft end
- Solder tag termination

Technical specification

Rated voltage	3V DC
No load current	0.23A max.
No load speed	9000rpm ±15%
Rated load	10.0 g.cm
Rated load current	0.63A max.
Rated load speed	8000rpm ±12%
Length excluding shaft	30.5mm
Diameter	24.2mm
Shaft length	12mm
Shaft diameter	2mm
Weight	42g approx.

Type	Order code	1+	25+	100+
3V, 8000 rpm motor	**37-0144**	0.819	0.651	0.556

061542

RVFM

Solar Motor Worm Drive Gear Box

A worm drive gearbox in an aluminium housing powered by a solar motor.

- Shaft length 125mm approx.

Type	Order code	1+
Worm drive gearbox	**06-1592**	5.30

553715

RVFM

Self Adhesive Motor Mount

A push fit motor mount to suit our range of miniature motors.

- Base has self adhesive surface for easy mounting of the motor as required
- Colour may vary
- Supplied in **packs of 10**

Type	Order code	1+
Motor mount	**37-0360**	1.94

064468

RVFM

Motor Clip 21mm Diameter

Suitable for holding a motor to a flat surface.

- Ideal for use with motors with a diameter of 21mm

	MOQ 3	
Type	Order code	3+
21mm Motor clip	**06-6054**	0.321

079036

RVFM

Motor Clip

Suitable for holding a motor.

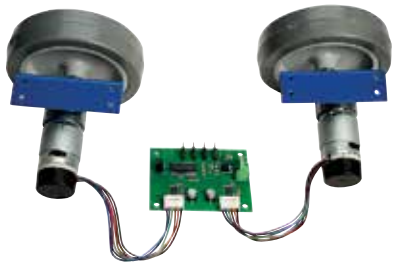
- Heat in hot water to soften for easier fitting
- Ideal for use with motors with a diameter of 21 and 23.8mm
- Paper packaging may be required with 21mm motors

	MOQ 10	
Type	Order code	10+
21/23.8mm dia. Motors	**06-6052**	0.107

078968

ROBOT ELECTRONICS

RD02 Robot Drive System



The RD02 is a complete drive system that is ready to integrate into your robot. The package includes two EMG30 motors and mounting brackets, two 100mm wheels and an MDS25 Dual H-Bridge Driver.

The on-board 5V regulator allows you to power your microcontroller or other electronics up to 300mA from the same 12V batteries that power your robot.

Kit includes:2x EMG30 motor and gearbox with integrated encoders1x MDS25 Dual H-Bridge Driver2x 100mm wheels2x motor mounting brackets

- Requires 12V battery power supply
- Easily interfaced with PICAXE, Arduino etc.
- Suitable for robots up to 5kg

Type	Order code	1+
Robot drive system	**70-6403**	99.00

554058

ROBOT ELECTRONICS

EMG30 Motor with Gearbox and Integrated Encoder

The EMG30 is a 12V motor and 30:1 reduction gearbox in a single unit giving a 1.5 to 200rpm output speed. It also has a built-in hall-effect motor encoder which gives precise control.

- Terminated with a 6-way JST connector for easy connection
- Mounting bracket available separately (**70-6406**)
- Can be controlled via I2C using the MD25 driver

Technical specification

Rated voltage	12V
Rated torque	1.5kg/cm
Rated speed	170rpm
Rated current	530mA
No load speed	516
No load current	150mA
Stall current	2.5A
Rated output	4.22W
Encoder counts per o/p shaft turn	360

Type	Order code	1+
EMG30 Motor	**70-6404**	25.65

554056

ROBOT ELECTRONICS

EMG30 Aluminium Mounting Bracket

Aluminium mounting bracket designed for the EMG30 motor.

- Robust construction
- 74 x 25 x 45mm

Type	Order code	1+
Mounting bracket	**70-6406**	2.84

554077

ROBOT ELECTRONICS

100mm Diameter Robot Wheel

This 100mm diameter wheel is fitted with a 5mm hub and retaining grub screw, which means it can be easily fitted to a motor that has a 5mm shaft with a flat.

- Ideal for use with the EMG30 motor
- Rubber tyre
- 5mm Hub with retaining grub screw
- Supplied singly

Type	Order code	1+
100mm Robot wheel	**70-6411**	8.39

554059

ROBOT ELECTRONICS

MDS25 Dual H-Bridge Driver

Designed to work with the EMG30 motors, the MDS25 can drive two motors and is controlled by serial or I2C making it compatible with most microcontroller platforms.

The board has two modes of operation which allow direct individual control of each motor or the ability to send a speed and turn command when using two motors. An onboard 5V regulator allows you to use the 12V batteries that will power your robot to also power your microcontroller or other electronics.

- 2x 6-way JST connectors for easy interface with EMG30 motors
- Can be controlled via serial or I2C connection
- Compatible with a wide range of microcontrollers including Arduino and PICAXE
- Returns 360 counts per revolution when used with the EMG30
- Up to 2.8A per motor
- On-board 5V 300mA regulator for powering your microcontroller

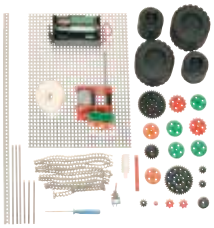
Type	Order code	1+
Dual H-bridge driver	**70-6405**	36.63

554057

MFA / COMO DRILLS

Geared Motor Accessory Kit

A kit containing a useful selection of mechanical parts, ideal for the construction of motorised models, robots, buggies, technology projects, etc.



- Motorised gearbox
- Wheels
- Hardware
- Gears
- Rack and pinion
- Perforated metal sheet and strips
- Axles/shafts
- Nuts
- Bolts and washers
- Chain and sprockets
- Worm drive
- Toggle switch
- Size D 1.5V zinc-chloride battery and battery box

Type	Order code	1+	5+
Geared motor kit	**37-1100**	24.79	24.11

064471

RVFM

Submarine Motor

A submarine motor encased in a plastic housing with a rubber sucker for attachment.

- Motor pulls apart to insert battery
- Twisting the battery starts the motor
- Dimensions 120mm(L) approx.

Requires 1x AA battery (not included).

Type	Order code	1+
Submarine motor	**06-6050**	2.09

078967

RVFM

Clearbox Motor

Specially designed for use in schools, this clearbox motor has a virtually unbreakable polycarbonate gearcase and tough nylon gears.

- Motor will run between 1.5V and 6V DC
- Clear polycarbonate housing provides mounting for both the motor and gears
- Interchangeable gears give a range of speeds and motor torques
- Full instructions for calculating gear ratios etc., are included
- Output shaft is 4mm diameter and is suitable for Meccano and Fischertechnik wheels, gears and pulleys to be fitted directly
- Shaft extends 24mm from front, 54mm from rear

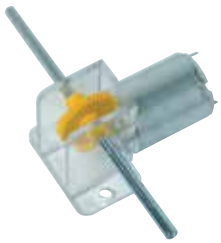
Type	Order code	1+
Clearbox motor	**37-0161**	7.95

300340

RVFM

Economy Gearbox and Motor

An economy gearbox with clear casing.



- Complete with 3V motor
- Helps pupils to understand the mechanics and movement of gears and motors
- Reduction ratio 40:1
- Output shaft diameter 4mm

Type	Order code	1+
Economy gearbox	**37-0165**	3.38

010556

CIC 2-in-1 Gearbox

A gearbox kit which contains:

- Electric motor (3-6V)
- 2 sets of gears giving either a 60:1 or 288:1 reduction (approx. 200 or 42rpm)
- Gearbox chassis and shafts

Type	Order code	1+
2-in-1 Gearbox	**13-1020**	3.30

064472

Rapid

Buggy Accessory Kit

A great chance for you to buy a bumper pack of model accessories, whilst also making a super saving.

- 2x caterpiller tracks
- 100x card axle supports
- 100x gears in assorted sizes and colours
- 100x wheels in assorted colours
- 20x 3V motors
- 20x S/A motor mounts
- Supplied in an educational storage tray with lid
- **Supplied as a pack**

Type	Order code	1+
Model accessory kit	**13-0162**	35.29

070728

RVFM

1.8° Step Angle Stepper Motor

A 12V bi-directional 4-phase unipolar permanent magnet stepper motor. Applying the correct electrical pulse sequence to the windings of the motor results in a 1.8° step angle rotation of the spindle (200 steps per revolution).

- Number of steps and speed are determined by frequency of input signal applied
- Suitable for many control applications where a medium torque motor is required
- 5mm shaft diameter

Technical specification

Step angle	1.8°
Holding torque	830gf/cm (8.14Ncm) min.
Phase (coil) resistance	75Ω/phase ±10%
Current per coil	160mA
Nominal voltage	12V
Output shaft	5mm dia.

Type	Order code	1+
Stepper motor	**37-0506**	17.41

067728

Stepper Motor Control/ Driver L293D

Only

£3.71

Order code 82-0192

www.rapidonline.com

RVFM

Mini Hybrid Stepper Motor Size 11

A high torque stepper motor suitable for heavy duty applications. By applying the correct electrical pulse sequence to the windings of the motor results in a 1.8° step angle rotation of the spindle.

- Number of steps and speed are determined by the frequency of the input signal applied
- Lightweight
- Compact size
- Low inertia
- High accuracy
- 6 leads for greater control
- 5mm shaft diameter

Technical specification

Step angle	1.8°
Holding torque	7N-cm
No. of leads	6
Phase current	0.95A
Phase resistance	3.4Ω
Phase inductance	1.6mH
Rotor inertia	12g-cm²
Detent torque	50g-cm
Insulation class	B
Step accuracy	Angular deviation is ±5% of one step
Weight	140g

Type	Order code	1+
Stepper motor size 11	**37-0508**	24.01

073209

RVFM

Mini Hybrid Stepper Motor Size 14

A high torque stepper motor suitable for heavy duty applications. By applying the correct electrical pulse sequence to the windings of the motor results in a 1.8° step angle rotation of the spindle

- Number of steps and speed are determined by the frequency of the input signal applied
- Low noise
- Low inertia
- High accuracy
- 6 leads for greater control
- 5mm shaft diameter
- Unipolar voltage 8V

Technical specification

Step angle	1.8°
Holding torque	8N-cm
No. of leads	6
Phase current	0.76A
Phase resistance	10.5Ω
Phase inductance	4.8mH
Rotor inertia	12g-cm²
Detent torque	100g-cm
Insulation class	B
Step accuracy	Angular deviation is ±5% of one step
Weight	150g

Type	Order code	1+
Stepper motor size 14	**37-0509**	24.01

073211

RVFM

2 Phase Bipolar Stepper Motor 12V

A 2 phase bi-polar stepper motor with a 7.5° step angle rotation of the spindle.

- Number of steps and speed are determined by the frequency of the input signal applied
- 3mm shaft diameter

Technical specification

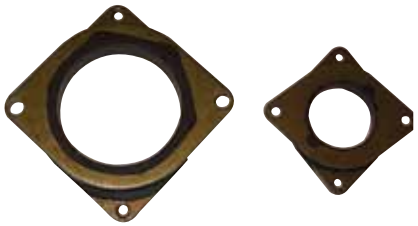
Step angle	7.5° full step
No. of phases	2
Rated voltage	12V DC
Rated current	0.48A/phase
Insulation class	E
Ambient temperature	–10°C to +50°C
Coil temperature	115°C
Operating humidity	20% to 90% RH (no condensation)
Life span	>3000 hours min.
Shaft diameter	3mm
Weight	125g

Type	Order code	1+
Stepper motor	**37-0507**	9.73

073192

RVFM

Stepper Motor Mounting Damper



Stepper motors are affected by resonance. The resonance can become so severe that the stepper will stall and lose position; stalling can also damage the stepper. Resonance is caused by parts vibrating in concert with each other. It can be lessened by fitting a stepper damper.

In addition to the improved settling time system resonances are suppressed as well as vibrations and motor noise greatly reduced.

- Metallic mounting plate with rubber inserts
- Available for stepper motor sizes 16/17
- Significantly reduce audible noise and resonance traditionally transmitted during operation

Type	Order code	1+
Damper size 16 and 17	**37-0519**	4.59

119485

AmpFlow

E30-150 77mm (3in.) 24V Motors and Gearboxes

Ampflow E30-150 motors are designed to give the best possible performance at the lowest possible price.

Using ferrite magnets and with a nominal voltage of 24V, these motors have a peak power of 1.0hp making them ideal for heavy-duty robotics, motorised vehicles and automation applications.

A 9-tooth sprocket and key suitable for the motor shaft is available separately, please see order code **37-0289**.

The motors are available with or without an 8.3:1 reduction chain-drive gearbox.

- Motor diameter: 79mm
- Motor length: 102mm
- Peak power: 0.75kW (1.0hp)
- Motor RPM 5600

Type	Order code	1+
Motor	**37-0311**	62.98
Motor with gearbox	**37-0315**	208.93

565848

AmpFlow

A28-150 77mm (3in.) 24V Motors and Gearboxes

Ampflow A28-150 motors are designed to give the best possible performance at the lowest possible price.

Using neodymium magnets and with a nominal voltage of 24V, these motors have a peak power of 3.0hp making them ideal for heavy-duty robotics, motorised vehicles and automation applications.

A 9-tooth sprocket and key suitable for the motor shaft is available separately, please see order code **37-0289**.

The motors are available with or without an 8.3:1 reduction chain-drive gearbox.

- Motor diameter: 77mm
- Motor length: 102mm
- Peak power: 2.2kW (3.0hp)
- Motor RPM 6100

Type	Order code	1+
Motor	**37-0312**	266.68
Motor and gearbox	**37-0316**	414.73

565849

AmpFlow

A28-150-F 77mm (3in.) Diameter High Performance Motors and Gearboxes

The Ampflow A28-150-F series are designed to give the highest possible performance from brushed DC motors.

Using rare-earth neodymium magnets and with a nominal voltage of 24 (or 48V), these motors have a peak power of 3.0hp (4.6hp for 48V model) making them ideal for high performance, heavy-duty robotics, motorised vehicles and automation applications. They are fitted with a fan and are drilled with vent holes to allow flow-through cooling which allows longer duty cycles and even higher power outputs.

A 9-tooth sprocket and key suitable for the motor shaft is available separately, please see order code **37-0289**.

The motors are available in 24V and 48V ratings with or without **an 8.3:1 reduction chain-drive gearbox.**

Replacement brushes, order code **37-0285**, are available separately.

Technical specification

AmpFlow type	Type	Voltage	Order code
A28-150-F24	Motor	24V	**37-0313**
A28-150-F24-G	Motor and gearbox	24V	**37-0317**
A28-150-F48	Motor	48V	**37-0314**
A28-150-F48-G	Motor and gearbox	48V	**37-0318**
A28-Brushes	Replacement brushes	-	**37-0285**

Type		Order code	1+
Motor	24V	**37-0313**	292.93
Motor and gearbox	24V	**37-0317**	430.63
Motor	48V	**37-0314**	292.93
Motor and gearbox	48V	**37-0318**	430.63

565850

Sprocket and Key for 79mm (3in.) Diameter Motors

These sprockets have a 12.7mm (½in.) bore to fit Ampflow E30 and A28 motors and are supplied with a suitable key.

The sprockets have 9 teeth and work with #35 roller chain.

Type	Order code	1+
Sprocket and key	**37-0289**	12.59

565229

E30-400 79mm Diameter (3in.) 24V Motors and Gearboxes

Ampflow E30-400 motors are designed to give the best possible performance at the lowest possible price.

Using ferrite magnets and with a nominal voltage of 24V, these motors have a peak power of 2.1hp making them ideal for heavy-duty robotics, motorised vehicles and automation applications.

A 9-tooth sprocket and key suitable for the motor shaft is available separately, please see order code **37-0289**.

The motors are available with or without an 8.3:1 reduction chain-drive gearbox.

- Motor diameter: 79mm
- Motor length: 147mm
- Peak power: 1.58kW (2.1hp)
- Motor RPM 5700

Type	Order code	1+
Motor	**37-0281**	94.48
Motor with gearbox	**37-0288**	271.93

565226

A28-400-F 77mm (3in.) Diameter High Performance Motors and Gearboxes

The Ampflow A28-400-F series are designed to give the highest possible performance from brushed DC motors.

Using rare-earth neodymium magnets and with a nominal voltage of 24 (or 48V), these motors have a peak power of 4.3hp (9.1hp for 48V model) making them ideal for high performance, heavy-duty robotics, motorised vehicles and automation applications. They are fitted with a fan and are drilled with vent holes to allow flow-through cooling which allows longer duty cycles and even higher power outputs.

A 9-tooth sprocket and key suitable for the motor shaft is available separately, please see order code **37-0289.**

The motors are available in 24V and 48V ratings with or without **an 8.3:1 reduction chain-drive gearbox.**

Replacement brushes, order code **37-0285**, are available separately.

Type		Order code	1+
Motor	24V	**37-0282**	397.95
Motor and gearbox	24V	**37-0283**	539.99
Motor	48V	**37-0284**	397.93
Motor and gearbox	48V	**37-0291**	566.95

565227

A40-300 102mm (4in.) Diameter High Performance Motors

The A40-300 is Ampflow's larger 102mm (4in.) offering that gives more power than the 79mm (3in.) ferrite magnet motors. Rated at 24V and producing a peak power of 3.8hp, these motors are ideal for heavy-duty robotics, motorised vehicle and automation applications.

The motors are mounted using flanges with 8.65mm (0.34in.) holes.

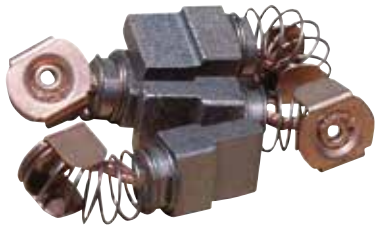
Replacement brushes are available separately.

- Diameter 101mm (4in.)
- Length 176mm (6.9 in.)
- Peak Power 2.8kW (3.8)
- Stall torque 27Nm (3840oz.-in.)
- Efficiency 84%
- Nominal voltage 24V
- RPM 4000
- Shaft diameter 15.9mm (5/8in.)
- Shaft length: 44.45mm (1.75in.)
- Key-way: 4.76mm (3/16in.)
- Magnet type: ferrite
- No-load current: 3.5A
- Resistance: 0.05Ω
- Weight: 5.4kg (11.9lb)
- **Ampflow type A40-300**

Type	Order code	1+
Motor	**37-0286**	330.73

565228

Replacement Brushes and Brush Caps for Ampflow Motors



Replacement brush sets and brush caps for Ampflow A40-300 and A28-400 motors.

- Replacement caps fit both A40-300 and A28-400 motors

Type	Order code	1+
Brushes for A28-400	**37-0285**	40.95
Brushes for A40-300	**37-0287**	40.95
Brush caps (4)	**37-0293**	14.69

565786

High-Traction Drive Wheels with Keyed Hubs

These wheels are from the Colson Performa range, which has long been a favourite of combat robot builders.

The non-marking thermoplastic elastomer tread is permanently bonded to a ribbed polyolefin wheel core which is fitted with a 19.05mm (¾in.) aluminium hub with a 6.35mm (¼in.) key-way. Each wheel comes with a 6.35mm (¼in.) key and two steel discs for holding the wheel in place on the end of a 19.05mm (¾in.) shaft.

- Wheel diameter 152mm (6in.)
- Shaft diameter 19.05mm (¾in.)
- Ideal for direct fitting to AmpFlow gear-motors **37-0283**, **37-0288** & **37-0291**

Type	Order code	1+
150mm keyed wheel	**37-0389**	25.19
200mm keyed wheel	**37-0290**	32.54
250mm keyed wheel	**37-0292**	36.74

565692

Victor BB 300A PWM Motor Speed Controller

The VEX Victor BB has been designed from the ground up for combat robotics use, but also has numerous other applications where a high continuous current rating is required. The fan-less design is based on over 15 years of combat robot experience with VEX's main objective being to produce the best performing, most durable and lightweight speed controller possible.

The speed controller can be quickly switched from brake to coast mode and can also be connected to a PC via USB to set advanced features such as current limiting, throttle response and battery eliminator circuits.

The VEX Victor BBis the ideal speed controller for use with the Ampflow range of high power motors.

- **Specification:**
- Supply voltage: up to 50V (12C)
- Input signal: PWM
- Maximum current: 300A continuous
- Dimensions: 77 x 77 x 39mm
- Weight: 550g
- Cable: 8 AWG extra-flexible

Type	Order code	1+
VEX 300A controller	**70-6435**	449.99

565240

Motor Accessories

adafruit

TB6612 1.2A DC/Stepper/Solenoid Motor Driver Breakout Board

The **Adafruit Solenoid/ Stepper Motor Driver Breakout Board** is a versatile high current driver able to control 2 x bidirectional DC motors, 1 x stepper motor or 2 x solenoids. It uses a TB6612 dual H-bridge chip that can supply 1.2A, which isn't that high in real terms but it's a huge current compared to the recommended 20mA output from an Arduino GPIO pin for example. The chip has built-in flyback diodes to prevent damage due to inductive kick-back and Adafruit have added reverse polarity protection on the motor power input as well. The H-bridges are disabled at power-up to prevent twitching when power is applied. All the logic inputs are 3.3 to 5V compatible so you can run the driver board from an Arduino or Raspberry Pi, while the motor power has a separate input from 4.5 to 13.5V DC. There's a separate PWM input on each H-bridge so that you can control the motor speed.

Supplied as an fully assembled and tested board plus a strip of 0.1in. header pins for you to solder on as required. Adafruit supply a free tutorial to get you started. An ideal board for those times when you just want to get something working quickly.

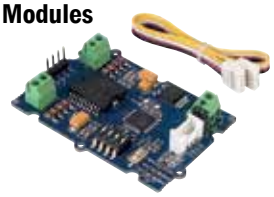
- Dual H-bridge breakout board
- Flyback diodes and reverse motor power protected
- Motors disabled on power up
- 2 x bidirectional DC motors, 1 x stepper motor, 2 x solenoids
- Up to 1.2A drive current per motor
- 3.3 to 5V logic and power compatible
- Separate motor power from 4.5 to 13.5V DC
- Adafruit part no.: 2448

Type	Order code	1+
Breakout board	**73-5310**	4.65

563235

seeed studio

Grove Motion Sensor, Control and Actuator Modules



The **Grove Motion Sensor Modules from Seeed Studio** give you a range of options to monitor motion and position in your next project. The range includes accelerometers, gyroscopes, and compasses as well as distance, motion and proximity sensors. There's even a GPS receiver which is compatible with any microcontroller with a spare serial port (Arduino, Raspberry Pi etc.). If your next project needs to keep track of where it is and where it's going then take a look at the **Grove** add-on modules.

Type	Order code	1+
Accelerometer	**75-0439**	7.13
Accelerometer (±1.5g)	**75-0458**	7.50
Accelerometer (±16g)	**75-0454**	7.43
Collision sensor	**75-0473**	6.32
Digital gyro	**75-0450**	12.96
Electromagnet	**75-0470**	8.49
GPS receiver	**75-0435**	21.23
I2C Motor Driver	**75-0432**	10.69
IR distance sensor	**75-0468**	4.43
PIR Motion Sensor	**75-0433**	6.77
Reflective sensor	**75-0465**	3.84
Ultrasonic ranger	**75-0427**	11.28
Vibration motor	**75-0466**	2.18

560346

adafruit

2305 Haptic Motor Controller (DRV2605L)

The **Adafruit DRV2605L Haptic Motor Controller** adds effects to haptic motor control giving you freedom to choose more interesting or informative vibrations. The DRV2605L chip has a library of 123 effects such as click, double click, ramp, and hum, including various intensities; it's a very smart chip. To make your project easier, Adafruit supply a tutorial and code library for Arduino. This should be simple to convert to any microcontroller. The board uses I2C so connecting to it is quick and simple and with Adafruit's library you should be up and running in no time. It is specified to work with Linear Resonance Actuator (LRA) and Eccentric Rotating Mass (ERM) type motors, though Adafruit have only tested it with ERM motors.

Supplied as a fully assembled board plus 1 x 5-pin header for you to solder on if your project needs it.

Haptic or vibration motors are available separately.

- Make haptic feedback motors more interesting and informative
- Have different effects for different conditions rather than a single buzz
- Works with 3 to 5V power and logic

Type	Order code	1+
Haptic motor driver	**75-0568**	7.11

561285

ST Stepper Motor Control/Driver

The L293D is a monolithic integrated, high voltage, high current, 4-channel driver.

- L293E is a quad push-pull driver capable of delivering output currents up to 1A per channel
- L297 generates four phase drive signals for two phase bipolar and four phase unipolar stepper motors in microcomputer controlled applications

Technical specification

Device	Function	Package	Order code
L293D	Accepts DTL/TTL logic levels, will drive inductive loads, DC and stepper motors, switching power transistors.	DIL-16	**82-0192**
L293E	TTL compatible control, inhibit input on each pair of drivers, external connections for sensing resistors.	DIL-20	**82-0194**
L297	Motor can be driven in half-step, normal and wave drive modes, on-chip PWM chopper circuits permit switch-mode control of the current in the windings. Requires only clock, direction and mode input signals.	DIL-20	**82-0198**

Type	Order code	1+	10+	25+	100+
L293D	**82-0192**	3.71	2.58	2.24	1.73
L293E	**82-0194**	2.75	2.26	2.22	
L297	**82-0198**	6.40	5.40	5.05	

034479

adafruit

815 Servo/PWM Driver 16 Channel 12-bit

The **Adafruit PCA9635 PWM/ servo driver breakout board** will drive 16-channels with 12-bit PWM (Pulse Width Modulation) at up to 1.6kHz. This versatile board can drive servos or LEDs or anything else that needs PWM with output voltages up to 6V. Uses a miserly 2 x I2C pins on the microcontroller, and the I2C address selection means you can have up to 62 of these boards for a total of 992 channels! Adafruit supplies a software library you can download and a tutorial to get you started.

Supplied as a fully assembled board plus 4 sets of 3 x 4 male straight headers, a 2-pin terminal block, and 1 x 6 0.1in. header pins for breadboarding. The microcontroller, servos and LEDs are available separately.

Available either as a breakout board or as an Arduino shield.

- Drive 16 x servos or 16 x LEDs with 12-bit PWM up to 1.6kHz
- 5V compliant, compatible with 3.3V Arduino
- Drive outputs up to 6V, ie LEDs with 3.4V Vf
- I2C driver with built-in clock reduces microcontroller overhead
- Terminal block for power with reverse polarity protection

Type	Order code	1+
Servo / PWM driver	**75-0565**	14.30

561282

RVFM

Soft-link Tubing

Soft silicone polymer tubing which can be used as a flexible coupling in many low-torque applications, such as flexible drive shafts, universal joints, linking push/pull rods, etc. Its unusual softness and strength allows for an amount of compliance in otherwise rigid drive systems.

- Ideal for modelling and robotics applications where high torque and accuracy are not of paramount importance
- Bore dia. approx. 2.5mm
- Supplied in **lengths of 1m**

Type	Order code	1+
1m Soft-link tube	**37-1275**	1.46

064484

TruMotion

Plastic Pulleys

A range of plastic pulleys ideal for use with our range of miniature motors.

- Rigid black plastic with deep V-grooves
- All sizes include motor spindle stand-offs
- Excellent for robots, mechanical constructions, science experiments as well as functional tasks
- 10mm pulley will interference fit on to a 2mm shaft
- Other pulleys will interference fit on to a 3.2mm shaft

MOQ 10 - In Multiples of 10

Type	Order code	10+
10mm dia.	**37-0342**	0.13

MOQ 5

Type	Order code	5+
20mm dia.	**37-0344**	0.21
30mm dia.	**37-0346**	0.23

MOQ 4

Type	Order code	4+
40mm dia.	**37-0348**	0.29

071522

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