

Physical computing & education services

Beginner to advanced educational platforms, teaching resources and support, makerspace tools and lab equipment, all in one convenient place.

farnell.com/education-services





Using computational thinking to address the digital skills gap

The World Economic Forum's 'Future of Jobs' report states that skills deemed important for school leavers entering the workforce are changing considerably – and 35% of skills valued in 2005 will have changed by 2020.



JONATHAN SMITH Head of Education for Farnell, Newark, element14 As creativity, critical thinking and complex problem solving become increasingly sought after by employers, educators need to rethink current curriculum content and teaching methods to better equip young people with the skills needed to address this new working economy. This reflects changes already happening in labour markets, driven by the pace of development in smart cities, artificial intelligence and the Internet of Things, which are creating new roles and jobs for current and future school leavers.

Computer scientist Jeannette Wing at Carnegie Mellon University believes computational thinking should be added to every child's analytical ability, enabling them to use concepts fundamental to computer science to formulate and solve problems, design systems and understand human behaviour. The UK Department of Education has mandated that some level of computational thinking be taught at all grades from nursery to college, exposing every schoolchild to computational concepts so it becomes second nature whatever discipline they operate in moving forward.

Computational thinking will be an essential part of addressing the growing digital skills gap that exists across the globe, and many economists, business leaders and politicians have highlighted that organizations are already transforming how they identify talent and develop their workforces. The challenge for today's educators is to help schoolchildren prepare for this new working economy, helping prevent a major skills gap in the workforce of the future.

In Finland, educators are shifting from imparting knowledge on a subject basis to teaching and

65%

of children entering primary school today will ultimately end up working in completely new job types that don't yet exist. However, traditional subject-based teaching and knowledge remains the priority in many schools.

developing skills that specifically relate to logical thinking, problem solving and computational thinking. Students are encouraged to work collaboratively, identifying problems, breaking them down into manageable chunks, and generating workable and effective solutions to apply to real-world scenarios.

But the skills gap shouldn't be seen solely in terms of the digital economy. In recent years, there has been increased focus on developing problem solving and creativity skills across the entire workforce, not just those who want to work in the technology sector.

Ironically, increased availability and acceptance of advanced technology is sometimes accused of creating a generation incapable of solving problems on their own. Ubiquitous smartphones, voice assistants and `apps for everything' make us overly reliant on these ready-made tools.

The role of physical computing

farnell.com/education-services

We are committed to supporting the development of the next generation of engineers, but this requires more than just creating a generation of coders. Physical computing forms a crucial piece of the computational thinking jigsaw, allowing interaction with systems or objects from the physical world.

Placing powerful, yet easy-to-use tools into the hands of students from very early ages opens their minds and teaches them key skills crucial not just for electronics, but for all jobs in the future - thus ensuring school-leavers are armed with digital skillsets that will be essential in the modern world.

The 'magic' of physical computing can be seen when groups of schoolchildren are tasked with solving a problem. Using platforms such as BBC micro:bit, Raspberry Pi and Arduino to make something real, often in teams, produces staggering results - not only in terms of effective learning, but also in skills development. Physical computing encourages students to develop competencies in highly creative and collaborative ways.

Students learn that not all solutions to real world problems are readily available, helping break the cycle of 'ready-made' technology. Using complex problem solving to develop something unique themselves transitions them from mere consumers of technology to creative thinkers. They interact with software and learn about physical hardware and how they can influence their environment, rather than just observing. Students can work on elements that form the basis of the IoT, connecting devices and carrying out meaningful analysis. Experience shows they become genuinely enthused when creating something with real world application.

The result of this learning is the development of computational thinking skills through the way they approach the problem they have been tasked to solve. Students must consider: what is the problem? How can it be solved? How can the solution be executed? And most importantly - what went wrong and how do I improve it? This approach takes students beyond computer science into the realm of real-world applications that could relate to

sports tech, geography, medtech, mathematics and much more.

Various platforms and projects are available to help develop computational thinking skills, from pre-school to post-university. Boards, coding environments, accessories and projects can be used to support learning, helping students build skills and develop understanding. Educational resources tailored with teachers and students in mind contain road maps from first steps for pre-school through to complex technical solutions for professional development.

We are involved with many roll-outs of physical computing solutions, but there is still a long way to go. As a collective we need to convince the electronics industry, governments across the globe and educators in the classroom about the benefits of applying physical computing to develop computational thinking. The tools already exist: now, we must work together to develop practical ways of providing them to students, engaging teachers and learning professionals, so students can begin to develop the necessary skills to equip them for the future.

Inspiring generations

From beginner to advanced

It is our belief that people of all ages – from young students to experienced makers, designers and developers - should not only understand how the connected world works, but have the chance to contribute to its development through coding, programming and designing projects.

With commitment to developing the technology industry by inspiring and promoting creativity, critical thinking, and complex problem solving skills, we aim to help equip young people for the future. By offering a comprehensive range of educational platforms complete with curriculum support, lesson plans, and numerous project ideas we hope to help enable the teaching of physical computing and

computational thinking in classrooms and code clubs worldwide. We also offer all the tools and accompanying accessories you'll need to kit out your schools makerspace or high tech labs, encouraging students of all ages and abilities to learn and grow.

Inspire the next generation with our educational platforms, tools, and resources, enabling them to develop their future!



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farnell.com/education-services

Beginner to advanced educational platforms, teaching resources and support, makerspace tools and lab equipment, all in one convenient place. We offer a number of services for students and educators, including convenient purchasing options, exclusive promotions and access to learning tools to support your classes and curriculum.

FEATURES AND INTERVIEWS

Discover the latest developments from across the industry, including exclusive insights from leading industry figures and trailblazers of technology in education.

TECHNICAL JOURNALS

A comprehensive series of journals, explaining the importance of core technologies, how they work, and how to use and implement them. Get face-to-face with the very latest tech challenges, innovations, solutions and applications important to design engineers in the semi-conductors industry. These quarterly journals explain the importance of core technologies, how they work, how to use them, as well as predictions relevant to their implementation.

CALCULATORS AND CONVERSION CHARTS

Whether you're trying to move from imperial measurements to metric, solve for Ohm's law, or make sure you've got the correct weight, these tools are designed to help. Our online conversion calculators and conversion tables provide the conversion ratios you need for your everyday calculations.

EXCLUSIVE BRANDS

Our brands offer a wide range of reliable products including connectors, cables, test devices, tools and much more at exceptional prices (typically 30% less). Exclusive Brands provides reliable, affordable solutions for a wide range of industries and applications. Essential Performance. Powerfully Priced.



element14.com/stem-academy

A forum where members can support STEM initiatives at all levels, creating confidence to successfully introduce a wide range of technologies into the classroom. Find a number of exclusive promotions, learning tools and resources for educators worldwide.



FEATURES

Get the latest news on significant STEM developments and initiatives from around the world. View case studies outlining others ideas and strategies used.

ROADTESTS

Trial the latest STEM kits and accessories from top suppliers by participating in our in-depth user generated road tests. Apply for your chance to receive brand new products free of charge!

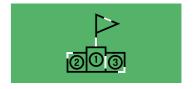


DEDICATED SPACES

From our extensive micro:bit resources to the inspirational STEM projects we're supporting, find all the content in one place with our dedicated STEM spaces.

FREE DOWNLOADS

We offer an extensive library of downloadable resources, from project guides and curriculum to posters and pamphlets for your classroom or code club, all free of charge to registered members.



COMPETITIONS

We regularly work with major suppliers to run exclusive giveaways, prize draws and design competitions to support STEM in schools and universities.

PROJECTS

We host hundreds of user generated project guides developed by teachers. From beginners' exercises to advanced design and coding challenges, find step-by-step guides for easy replication in your own classroom.

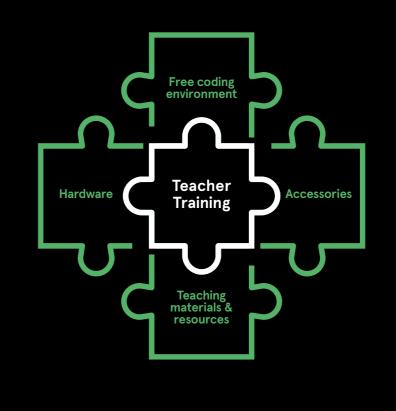
Beginner

micro:bit

FUN AND EASY

The micro:bit is a handheld, programmable micro-computer design to make learning easy and fun! With over 200 different activities and resources, micro:bit is already widely used in schools around the world. It's easy as well as accessible to learn to code with micro:bit as you can use any web browser to code in Blocks, Javascript, Python, Scratch and more with no software download required.





farnell.com/bbc-microbit



Lesson plans and curriculum materials have been made available for a wide range of subjects including Design Technology, Physics, Art, Music classes and more, and include anything from easy experiments to creative coding challenges. With features like LEDs, buttons, sensors, and wireless communication micro:bit is a versatile and engaging tool for all ages.





There are over **4 million** micro:bits currently being used within Education all around the world.

Inclusive

70% more girls said they

would choose Computing as

a school subject after using

the micro:bit.



Interesting

86% of students said the BBC micro:bit made Computer Science more interesting to them.



Impactful

85% of teachers agree it has made ICT/Computer Science more enjoyable for their students.



micro:bit **BBC** micro:bit 1 micro:bit and a

Quick Start Guide.

AGE 11+

ORDER CODE 2728764



micro:bit go **BBC** micro:bit 1 micro:bit, a USB cable, battery holder,

2 AAA batteries, and a Quick Start Guide. ORDER CODE 2728765

AGE 11+



micro:bit club **BBC** micro:bit AGE 11+

10 micro:bits, 10 USB cables, 10 battery holders, 20 AAA batteries and 10 Quick Start Guides.

ORDER CODE 2728766



micro:bit bulk box **BBC micro:bit** AGE 11+

300 micro:bits and 300 Quick Start Guides.

ORDER CODE 2728767

HARDWARE micro:bit

ACCESSORIES

To help develop skills and advance to next level.

FREE CODING ENVIRONMENT

- 1. Microsoft make:code: block & Java script
- 2. Scratch: block & Python.

TEACHING MATERIALS & RESOURCES Free to access without registration.

TEACHER TRAINING

The Micro:bit Foundation have a number of partners who they work with nationally to provide teacher support via training. Visit the micro:bit Community at microbit.org/community-local



Accessible

90% of students said working with the BBC micro:bit has shown them that anyone can code.

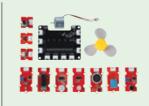


Confident

50% of teachers who've used the micro:bit say they now feel more confident as a teacher.

micro:bit accessories

We have a growing portfolio of accessories designed to enhance and support learning with micro:bit. From add-ons for projects to advancement through curriculum, these accessories provide even more functionality to your micro:bit. With free lesson plans and project support available, these accessories help to inspire students to easily progress through beginner to advanced levels.



mi:node element14

A development kit for micro:bit that includes 10 different sensor modules.

ORDER CODE 2821832



BOSON Starter Kit DFRobot Includes micro:bit expansion board, 8 sensor and actuator modules with cables. Lego compatible.

ORDER CODE 2945679

> micro:bit compatible

Beginner / Intermediate

Kitronik

ENGAGE AND INSPIRE

Kitronik aim to inspire and engage people of all abilities to further their knowledge of Electronics, Coding and Design by offering a well designed, well manufactured, innovative product range with free resources. They create high guality micro:bit accessories, electronic products, and resources for education and makers.

farnell.com/microbit-accessories



Battery Holder element14 2×AAA battery holder for micro:bit.

ORDER CODE 2845434



6" USB B to Micro B cable element14 Programming/Power cable for micro:bit.

ORDER CODE 2845435





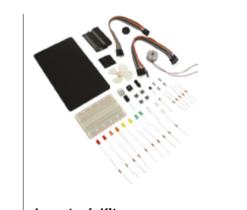
InventThings Adapter inventThings

Connect inventThings sensor boards to a micro:bit and start programming in Python. ORDER CODE 2846905



Right Angle Edge Connector element14

Right angled edge connector for micro:bit ORDER CODE 2845436



farnell.com/kitronik

Kitroni

Inventor's Kit Kitronik

The Kitronik Inventor's Kit is a great way to get started with programming and hardware interaction with micro:bit. This Inventor's Kit contains everything you need to complete 10 experiments including using LEDs, motors, LDRs and capacitors. Includes an easy to follow tutorial book.

ORDER CODE 2563847



MeArm Robot Arm Kit Kitronik

AGE 10+

This is the blue version MeArm and is an easy-to-build robot arm kit that's designed to get children (and adults!) learning about technology, engineering and programming. It's been expertly designed to be easy to build and use. Code with the Microsoft MakeCode Blocks & Javascript editor, as well as microPython.

ORDER CODE 3021730

element14

Everything you need for your first wearables project. Including



MBIT-WEARIT

a battery case and wrist strap.

ORDER CODE 2832540



micro:bit **Expansion Board** DFRobot Enables compatibility with DFRobot Boson and Gravity modularized electronic blocks.

ORDER CODE 2946133



Battery Enclosure Multicomp

A case designed to house the micro:bit Go via clip-in grooves. No screws required.

ORDER CODE 2728769

10

Click Adapter

Mikroelectronika

micro:bit Click board adapter

with 2 mikroBUS sockets.

ORDER CODE 2931435



> micro:bit compatible

High quality products and resources for education and makers. Kitronik specialize in electronic project kits and a considerable range of exciting micro:bit accessories.

AGE 11+



:MOVE mini Buggy Kit

Kitronik

AGE 11+

The :MOVE mini buggy kit controlled by the micro:bit provides a fun introduction to robotics. It is a 2 wheeled robot that is suitable for autonomous operation, remote control projects using a Bluetooth application or by being controlled using a second micro:bit as a controller via the micro:bit's radio functionality.

Kitronik accessories

To help you get the most from your micro:bit Kitronik have created a vast range of accessories and add-ons, including an extensive list of learning resources. A number of robotic applications for micro:bit have been developed and Kitronik still have more in development. Illuminate your micro:bit, game with it, connect it, wear it and take it out and about with you on the go.

farnell.com/kitronik-accessories



Line Following Add-On Kitronik Add line following to the :MOVE mini. order code 3021763



Bulldozer Add-On Kitronik Lift and carry things with this :MOVE mini add-on. ORDER CODE 3021760

> micro:bit compatible



Prong Soil Moisture Sensor Kitronik Monitor moisture present in soil with two conductive tines.

ORDER CODE 3021724

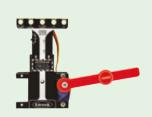
KLIP HALO Kitronik Breaks out GPIO pins to crocodile clip connection points. JST power connector.

ORDER CODE 3021714

farnell.com/kitronik-accessories



LAMP:bit Kitronik White LED street light model with phototransistor. ORDER CODE 3021718



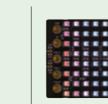
ACCESS:bit Kitronik Access barrier model with 2 servo motors and buzzer. ORDER CODE 3021719



STOP:bit Kitronik Red/yellow/green LED traffic light. ORDER CODE 3021717



Mi:power Board Kitronik 3V CR2032 battery adapter for micro:bit boards. ORDER CODE 3021748



ZIP Tile Kitronik 64 full colour ZIP LEDs. Includes 3 expansion ports. ORDER CODE 3021726



ZIP Halo Kitronik 24 individually addressable full colour LEDs. ORDER CODE 3107549



Motor Drive Board Kitronik

Motor driver board for micro:bit designed to drive 2 motors.

ORDER CODE 2563846



16 Servo Driver Board Kitronik

A comprehensive driver board capable of driving up to 16 servo motors simultaneously.

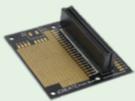
ORDER CODE 3021755



All-In-One Robotics Board Kitronik

Enables micro:bit to drive 4 motors (or 2 stepper motors) and 8 servos.

ORDER CODE 3021716



Create Proto Board Kitronik

Create prototype circuits using surface mount and/or conventional components.

ORDER CODE 3021721



Servo:Lite Kitronik

Allows 2 servos to be driven simultaneously with 5 addressable LEDs.

ORDER CODE 3021757



Klimate Board Kitronik

Development board with environmental sensors and RTC.

ORDER CODE 3021722





Edge Connector: Assembled

Kitronik

Breakout board to connect additional circuits and hardware to GPIO pins.

ORDER CODE 2563845



:GAME ZIP 64 Kitronik

Handheld gaming. 64 (8×8) individually addressable full colour ZIP LED, screen.

ORDER CODE 3021715

> micro:bit compatible



:KLEF Piano Kitronik Capacitive piano keys with an integrated speaker.

ORDER CODE 3021720



Prototyping System Kitronik Gives access to the pins on the bottom of the micro:bit ORDER CODE 2563850



Mi:pro Protective Case Kitronik

Orange protective casing with battery holder for micro:bit boards.

ORDER CODE 3021746



Noodle Cable Kitronik

1m flat white anti-tangle USB-A to Micro-B Noodle Cable for micro:bit

Beginner / Intermediate

BinaryBots

FUN AND ENGAGING

Children love to make things. Combining a real robot with coding fires up a child's imagination, inspires dreams and builds confidence. Full curriculum and lesson plans are available for all BinaryBots kits, including comprehensive lesson plans mapped to the UK National Curriculum for Computing and STEM (KS2 & KS3) for schools.



Beginner

SAM Labs

INTERACTIVE AND FUN

SAM Labs seamlessly connects software and hardware with lesson plans that cover a wide variety of subjects, making learning about coding accessible, experimental, interactive and fun. With Bluetooth connectivity, each block can connect to the others via the app to do something different. By using logical reasoning to write algorithms, incorporating variables, input and outputs, students will learn to control and simulate physical systems, bringing computational thinking to life.

farnell.com/binarybots

BINARYBOTS

AGE 8+

AGE 11

Build your very own robot in a few simple steps. Each kit comes as a flat-packed robot with glossy stickers, easy to follow farnell.com/sam-labs



Make the most of your lessons with tools and support from SAM Labs, including curriculum-aligned lesson plans, visual flow-based apps and wireless electronic blocks

Planet Hex

BinaryBots

Affordable 'Cardboard2Code' robot kits that work with micro:bit. Includes an instruction book, speaker, temperature, motion, and light sensors with attaching Croc Clip Wires.

Planet Totem BinaryBots

Build your very own robust robot and bring it to life. Working with micro:bit the powerful sensor board allows response according to real world actions with its capacitive touch sensor strips and vibramotor for haptic feedback.



Meet DIMM order code 2886646

Totem Spider

ORDER CODE 2886648



instructions and extra sensors.

Binary's UFO ORDER CODE 2886647



Totem Crab order code 2886649



Totem Tortoise order code 2886650



A lesson kit perfect for student

teaching materials, a flow-based

groups. Includes a variety of

coding app and a significant

number of wireless electronic

blocks and accessories. Use

Space app to build classroom

projects and complete lesson

curriculum. For 9-10 students.

SAM Blocks and the SAM

plans aligning with your

ORDER CODE Please Call

AGE 4+

STEAM Kit:

Team Size

SAM Labs

AGE 4+

STEAM Kit: Classroom Size SAM Labs

Lesson kit for the full class. With teaching materials, a flow-based coding app and an abundance of wireless electronic blocks and accessories, it's everything you need to bring STEAM learning into classrooms. Use SAM Blocks and the SAM Space app to build projects and complete lesson plans. For 30 students.

ORDER CODE Please Call

14



> micro:bit compatible



STEAM Kit: Alpha Size SAM Labs

AGE 7+

An introductory STEAM lesson kit comprised of a variety of teaching materials, a flow-based coding app and a number of wireless electronic blocks and accessories. Use the SAM Blocks and the SAM Space app to build classroom projects with your students and complete lesson plans. For 2-3 Students.

ORDER CODE Please Call



Maker Kit

SAM Labs



Includes teaching material, flow-based app, and exclusive blocks not found in other kits. Bring a world of coding and creating to your classroom. With a variety of hardware and software, this kit's made for the classroom and provides everything you need to unleash your students' creativity. For 4-6 Students.

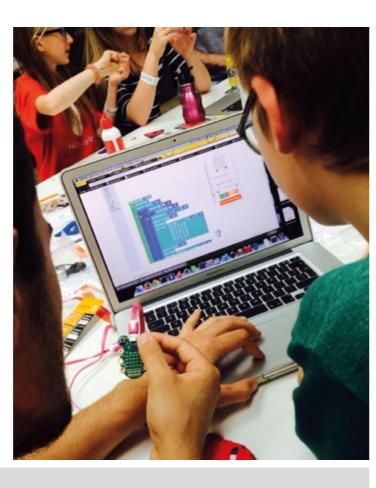
ORDER CODE Please Call

Beginner

CodeBug

FUN, PROGRAMMABLE, WEARABLE

CodeBug is a little device that you can wear and learn to program. It was designed to introduce simple programming and electronic concepts to anyone, at any age. Learn how to code in three simple steps: create, download, transfer. Program CodeBug easily by using the online interface, which features colourful drag and drop blocks, an in-browser emulator, and engaging community features.



Beginner / Intermediate

Wonder Workshop

SPARK CREATIVITY

By putting the power of play into the hands of students, Dash and Cue encourage skill development and the building of self-confidence in all abilities from beginners to advanced learners. These robots are charged and ready to go straight out of the box, responding to voice, navigating objects, dancing and singing.

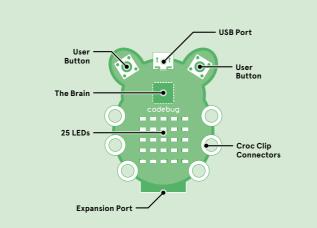


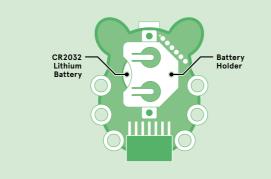
farnell.com/wonder-workshop

farnell.com/codebug



Learn and develop computational thinking skills with CodeBug's free online activities, courses and curriculum.







vonder

workshop

AWARDS 2019 WINNER





Dash

Wonder Workshop

Wonder Workshop's standards-based lessons encourage active learning through creative problem-solving tasks that have real-world application. Seven progressive apps introduce students to a variety of ways to code and control DASH as they work through the in-app demos, challenges, and puzzles. Advance through the 72 challenge cards complementary to the Learn to Code Curriculum.

ORDER CODE 2947810



CodeBug

CodeBug

So simple, you can create your first program in under a minute! It has 25 LED lights in a 5×5 grid, 2 push buttons, and 6 touch sensitive `legs' that can be used as inputs or outputs for you to interact with. Get started with one of the many free step-by-step activities for beginner, intermediate and advanced levels.

AGE 6+

ORDER CODE 2479888



Teachers can easily guide students to practice and progress through Wonder Workshop's Learn to Code and Applied Robotics curriculums.

AGE 6+



Cue Wonder Workshop

AGE 11+

Choose from four unique avatars to customize Cue with a personality that's right for your classroom. Engage in witty chat with Cue, use the Cue app to control movements, create reactive sensor behaviours, or code creative interactions using block or JavaScript programming at the skill level that's right for your students.

Intermediate

Robotical

MEET MARTY

Marty the Robot is a fully programmable robot, designed to give kids a fun and hands-on introduction to coding and robotics. He is designed to make learning about computer science, engineering, and teamwork a fun and engaging process. Marty is also an expandable robot that grows with your students.



> micro:bit / Arduino / Raspberry Pi compatible

approaches. Students can explore Arduino in a hands-on, constructive

Arduino Education offers solutions

for the classroom, including

learning paths for individual

kits, bundles, and boards with

and collaborative educational

way as they work through the kits discovering the creative capabilities

farnell.com/arduino

Intermediate

Arduino

TEACHING, INSPIRING AND EMPOWERING

ARDUINO

of each board.

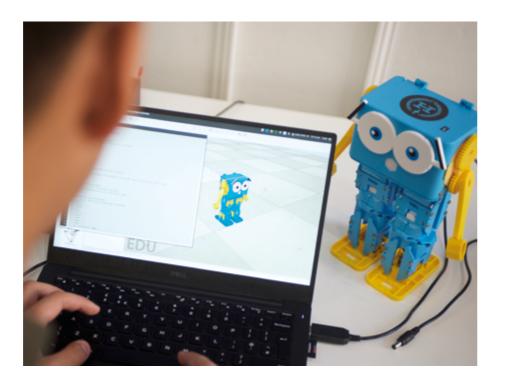


Marty the Robot Robotical

A fully programmable, Wi-Fi, enabled walking robot for educators, kids, and makers. Get coding with Scratch, Python, JavaScript, and more. With lesson plans and suggested activities to classroom downloads and curriculum guides, Marty has everything you need to get up and running smoothly in a classroom or code club.

AGE 8+

ORDER CODE 2917888





Arduino Starter Kit Arduino





The Starter Kit is a great way to get started with coding and electronics! The Starter Kit includes an Arduino Uno and all the components you need to make 15 fun projects following the step-by-step tutorials in the Project Book. Available versions: English, Italian, French, Spanish, Deutsch, Japanese, Chinese, Korean.

ORDER CODE 2250862

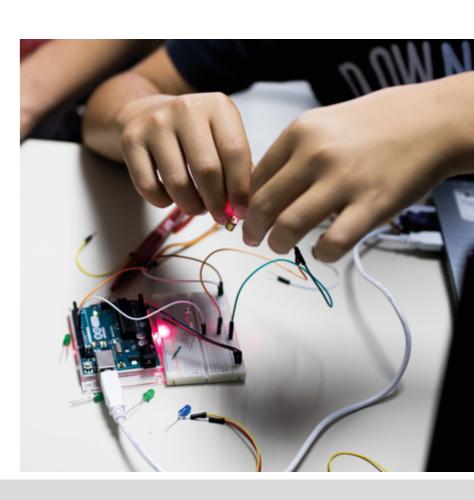


CTC101, Modular STEAM Program Arduino

Creative Technologies in the Classroom 101, or CTC 101, is Arduino's one-of-a-kind STEAM (Science, Technology, Engineering, Arts, and Mathematics) program. An online Platform with 25+ Projects, easy to assemble experiments, and educators guidance. Tailored for students ages 13 to 17, CTC 101 is the ideal professional development program for educators.

AGE 13+

ORDER CODE 2851780



farnell.com/robotical/marty



Perfect for advancement within education, Marty is a useful tool for introducing beginners to programming right through to university.

From teachers new to electronics to university professors and postgraduate researchers skilled in electronics, Arduino have a kit or board perfect for you.



Arduino **Engineering Kit** Arduino



Bring the power of the Arduino MKR1000 to the classroom with MATLAB & Simulink. With three advanced projects that include key aspects of mechatronics and programming this kit is the ideal solution to learn fundamental engineering concepts. It provides a state-of-the-art, hands-on incorporation of Arduino technology in an educational setting.

ORDER CODE 2901082



MKR IoT Bundle Arduino

AGE 11+

The MKR IoT Bundle is a great way to get started with the Internet of Things! This bundle includes all the components you need to make 5 IoT projects following the step-by-step online tutorials. Based around MKR1000 boards students learn to add connectivity to designs with minimal prior networking experience.

Intermediate

DFRobot

COMPREHENSIVE LEARNING KITS

DFRobot create world-leading robotics and open source hardware catering to future creators. They continually produce innovative, user-friendly hardware & software products that become the building blocks in all kinds of electronic projects, working to reshape STEM education with their mission to teach more people to make.

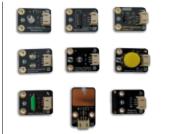


> micro:bit / Arduino / Raspberry Pi compatible



farnell.com/dfrobot

DFRobot believe the seed of making and creating will grow inside our future generation, and one day they will change the world with what they make.



Gravity Series Sensor Kit DFRobot

These kits include a range of basic sensors including light, touch, temperature, magnetic, vibration, tilt, LED lighting module, Grayscale sensor, a big button, and more. Connect to Arduino using DFRobot's IO Expansion Shield V7.1. Connect to micro:bit using DFRobot's micro:bit Expansion Board.

ORDER CODE 9PC 2946131 ORDER CODE 27PC 2946111



Analog Electrical Conductivity Meter

DFRobot

AGE 10+

A kit for measuring the electrical conductivity of aqueous solutions and evaluate water quality. With plug-andplay design, intuitive software library and support for 3.3V/5V microcontrollers it can be a simple and effective measuring solution. The software library uses twopoint calibration method, temperature compensation algorithm and automatically identifies standard buffer solution.

ORDER CODE 2946108



Arduino I/O **Expansion Shield V7.1** DFRobot

AGE 10+

Colour coded for sensor and actuators input and output. 3-pin format for signal, voltage and ground. Includes power input for salvaged/lab power supplies and Xbee socket for multipurpose wireless connectivity. Includes voltage hardware setting through a jumper allowing compatibility with a range of 3.3V components like Arduino, Raspberry Pi and others.

AGE 10+

ORDER CODE 2946070

DFRobot accessories

DFRobot create comprehensive learning kits of electronics and DIY robots for schools across the globe. Students can apply their learned skills and experiment with the hardware provided in the kit. These kits of Arduino/Electronics and DIY robots have been introduced to schools across the globe. The Gravity Series boards are also micro:bit compatible via the expansion board.

farnell.com/dfrobot-accessories





Piezo Buzzer Module DFRobot

Simple sound making module that you can use High/Low to drive. Different frequencies create different sounds.

ORDER CODE 2946097

Infrared CO₂ Gas Sensor DFRobot

Gravity series. Range up to 50,000ppm. UART connection for Arduino and Raspberry compatibility.

ORDER CODE 2946086



Ambient Light Sensor DFRobot

Gravity series. Detects light density and reflects value as an analogue voltage signal.



Digital Vibration Sensor DFRobot

Gravity series. Supply voltage range 3.3-5V. Open circuit resistance of 10Mohms.

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Infrared Motion Sensor DFRobot

Checks for infrared heat in its detection range, comparing with a snapshot, triggering if there is a recent change.

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Temperature Sensor DFRobot

Gravity series. Detects ambient air temp between 0-100°C with 10mV/°C sensitivity. Output voltage proportional to temperature.

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> micro:bit / Arduino compatible



Capacitive Touch Sensor DFRobot

Gravity series. Digital sensor with touch sensitive control. Works with anything that holds a charge.

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Relay Module DFRobot

Gravity series. Digital 5A relay module with LED for notification.

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Soil Moisture Sensor DFRobot

Two probes pass current through soil, using the resistance to measure the amount of moisture present.

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Line Tracking Sensor DFRobot

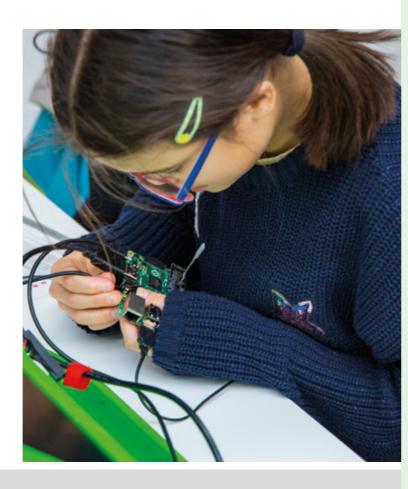
Effective line tracking functionality for identifying white from black quickly and accurately, via TTL signal.

Intermediate / Advanced

Raspberry Pi

TEACH, LEARN AND MAKE

The world's most popular small computer, the **Raspberry Pi** was designed to promote the teaching of computing in classrooms around the globe. Its low cost, accessible hardware, vast ecosystem of accessories and multi-lingual teaching materials and lesson plans make this the ideal Physical Computing choice for ages 11+. Students can learn to code in a safe standalone sandbox environment, without the danger of damaging expensive hardware, losing files, resetting operating systems or associated safeguarding risks from online access.



farnell.com/raspberrypi



The Raspberry Pi Foundation offer free online courses, allowing you to discover different ways to learn about Digital Making and Computer Science.

AGE 11+



Raspberry Pi 3 Model A+ Raspberry Pi

The Raspberry Pi 3 Model A+ is the latest product in the Raspberry Pi 3 range. Like the Raspberry Pi 3 Model B+, it boasts a number of equivalent features like a 64-bit quad core processor running at 1.4GHz, dual-band 2.4GHz and 5GHz wireless LAN, Bluetooth 4.2/BLE, but with only one USB port and no Ethernet, allowing for a smaller footprint and lower cost.

AGE 11+

ORDER CODE 2946269



Raspberry Pi 4 Model B Raspberry Pi

The latest product in the range, it offers ground-breaking increases in processor speed, multimedia performance, memory, and connectivity compared to prior-generations, while retaining backwards compatibility and similar power consumption. Available in three variations of memory capacity.

ORDER CODE 1GB 3051885 ORDER CODE 2GB 3051886 ORDER CODE 4GB 3051887

DIGITAL MAKING CURRICULUM

Access a full curriculum created for introduction and development of the following skillsets:

- ・ Design
- · Programming
- Physical Computing
- Manufacture
- Community and Sharing

PICADEMY

A free face-to-face two-day professional development programme offered by the Raspberry Pi Foundation to support educators throughout their digital making and computing journey.

Advanced

MATRIX Labs

LIMITLESS APPLICATIONS

The **MATRIX** Platform is comprised of two Raspberry Pi compatible educational development boards, which are supported by the MATRIX software libraries. They offer limitless applications to facilitate learning of various software and hardware concepts and assist in exposing students to cutting-edge technology and the latest industry concepts, such as IoT, AI, and machine learning with C++, Python, JavaScript, and more. The MATRIX Ecosystem simplifies the learning process and enables students to easily integrate hardware, software, and AI.

farnell.com/matrix-labs

Raspberry Pi accessories

Explore the latest range of HATs and accessories to extend the capabilities of the Raspberry Pi and build bigger and better projects as your class advances to higher skill levels.

farnell.com/raspberrypi#accessories



8MP Camera

Raspberry Pi

A high quality 8 megapixel

Sony IMX219 image sensor

custom designed add-on.

ORDER CODE 2510728



7" Touch Screen Display Raspberry Pi

7 inch Touchscreen Display, Adapter Board, Display Ribbon cable, 4 Jumper Wires.

ORDER CODE 2473872





MATRIX Creator

AGE 18+

15 on-board sensors, microphone array, wireless communication (including Zigbee and Z-Wave), and an FPGA.

ORDER CODE 2675819



MATRIX Voice MATRIX Labs

AGE 18+

A microphone array and FPGA suitable for building sounds driven behaviours and interfaces.

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> Raspberry Pi compatible



Essentials



Power Supplies Micro SD Card (NOOBS) Case HDMI Cable And more...



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Sense HAT Raspberry Pi

Several integrated circuit based sensors that connects to Raspberry Pi via the 40 GPIO pin header.

ORDER CODE 2483095



PoE HAT Raspberry Pi

Power a Raspberry Pi via an Ethernet cable, instead of a separate power supply.

Advanced

BeagleBoard

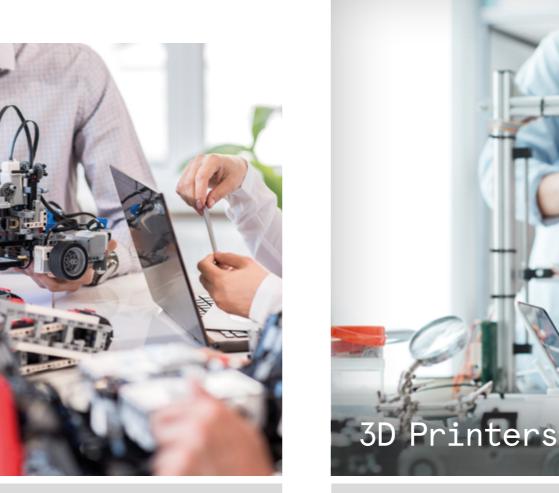
SIMPLIFY PHYSICAL COMPUTING

BeagleBone boards are low-cost computers with the expandability of today's desktop machines, but without the bulk, expense, or noise. BeagleBone boards simplify physical computing on advanced network enabled and GUI enabled devices. With an open source development platform, BeagleBone boards offer support for development environments from Android, QNX, Ubuntu and Windows Embedded, as well as web tools to bare metal and Arduino/Wiringstyle programming.

farnell.com/beagleboard



Students can have fun while learning embedded programming, by following BeagleBone guides, viewing and creating exciting projects, and attending interactive workshops.



farnell.com/3d-printers-accessories

We offer a comprehensive range of 3D printers and accessories. From specialised machines that cover educational needs to professional industrial machines from the world's leading manufacturers. We also offer a large variety of printing materials such as ABS and PLA filaments and resins in a wide selection of colours.



Pocket Beagle BeagleBoard

The newest and smallest member of the BeagleBoard family. An ultra-tiny USB key-fob computer, PocketBeagle is incredibly low cost and very simple to use, making it the ideal development board for beginners and professionals alike.

ORDER CODE 2806159



BeagleBone **Black Wireless**

AGE 18+

BeagleBoard High-expansion board focussed on connectivity, with a high-performance WiFi module with Bluetooth. Boot in 10 seconds and start developing through a web browser in less than 5 minutes using a single USB cable.

ORDER CODE 2671597



BeagleBone Blue BeagleBoard

AGE 18+



An affordable and complete robotics controller with high-performance, flexible networking capabilities coupled with a real-time capable Linux system and a compelling set of peripherals. Utilise the pre-configured WiFi access point, connect a battery, open your browser and start code development immediately.

ORDER CODE 2612583



M3-SE 3D Printer MakerGear

With WiFi connectivity offering remote control and monitoring capabilities, this 3D printer has build dimensions of 203 × 254 × 203 mm and a web-based, easy to use interface.



Ender-3 Pro **Creality 3D**

AGE 18+

Inexpensive yet extremely capable of providing quality prints. This 3D printer is stable and smooth, as well as quiet and only takes 5 minutes to heat up. It's patent technology reduces the risk of plugging and spillage and it has build dimensions of 220 × 220 × 250 mm.

ORDER CODE 2901112



ORDER CODE 2945489



AGE 18+

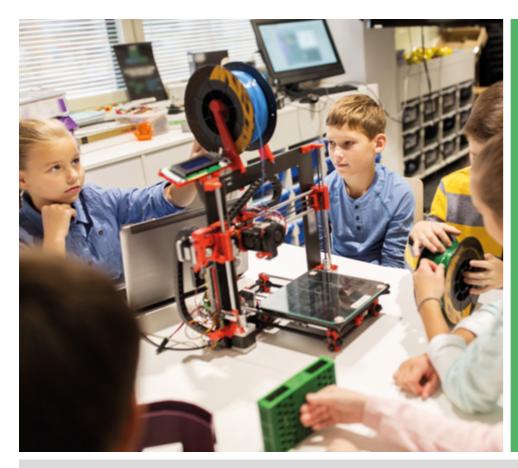


MC-120

Multicomp

AGE 18+

Ideal for educators, hobbyists, makers and engineers. This fully assembled 3D printer has an operating noise of under 50dB, therefore is perfect for an office. Its build dimensions are 200 × 200 × 200 mm and includes a convenient safety function by automatically shutting down once printing is complete.



farnell.com/tools-production-supplies

Unique makerspaces

WHAT IS A MAKERSPACE?

A makerspace is a work area within a school, a library, or another public or private facility that is dedicated for making things, being creative, learning, exploring, and sharing ideas. Every makerspace is as unique as the projects created within them. They can be filled with high tech tools and include things like soldering stations and 3D printers, or they can simply comprise of cardboard, glue, and crayons.

Makerspaces are intended to encourage creating something out of nothing, while exploring individual and collaborative interests. Providing hands on learning, these spaces help to support critical thinking skills as well as boost confidence. Some skills learnt in makerspaces relate directly to STEAM, for example robotics, electronics, coding, 3D printing, and more.

CREATE YOUR SPACE

Tools and supplies to build inspiring makerspaces and STEAM labs for children and adults alike. Create a space that will encourage collaborative working and stimulate the imagination with over 17,000 tools and supplies from leading brands.

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CK Tools

BRANDS

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- Electrolube
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TOOLS AND SUPPLIES

Plier & cutter kits Assortment kits

- Breadboards
- $\cdot \, \text{Jumper Wire}$
- Cables
- Multimeters
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 Screwdrivers
- ·Hammers
- Drills
- Tapes
- Clamps • Batteries
- Storage products
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- 3D printers
- And more

Tools and supplies

Make the most with your budget and equip your schools makerspace or STEAM lab to support a wide variety of activities. With everything required for building a class pet robot to creating an intergalactic spaceship, our large range of tool and supplies provide support for all of your students creative ideas and projects.





CV 500 Soldering Station Metcal

A soldering system featuring Smartheat power on demand technology, a 2.8" colour touchscreen, an integrated net power meter with optional tip temperature display and much more.

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WE1010 Soldering Kit

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Breadboard Twin Industries

Solderless Breadboard w/ 2390 Tie-Points, 140 Pcs of Jumper Wire Kit & 4 Binding Posts.

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Screwdriver Set Wera

Slotted/Phillips, 6-piece screwdriver set, including a practical rack for tidy storage of the screwdrivers.

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Long Nose Pliers Duratool

Long nose 160mm serrated pliers with a matted handle for a comfortable grip. Drop forged heat treated polished steel.

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Electronics Tool Kit

Proskit Electronics

A repair kit featuring 30 precision bits, double-end metal spudger, 2 tweezers, 2 opening levers, prying paddle, suction cup, nonslip handle with rotating cap, solder aid tool all in a handy storage case.

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D00122 5 Piece Mini Plier Set

Duratool

5 Piece Mini Plier Set with Ergonomic Handles, two tone anti-slip handles, supplied in a handy zipped wallet.

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Precision Screwdriver Set CK Tools

7 piece Screwdriver Set, VDE approved, with a premium quality chrome vanadium steel blade for exceptional strength and durability.

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Tweezers Ideal-tek

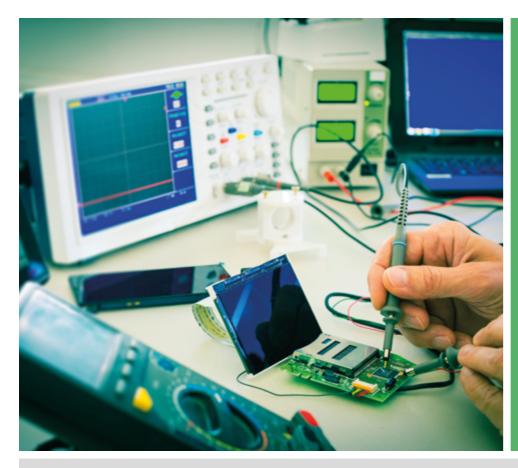
Flat round tips. 130mm length. Anti-magnetic, anti-acid stainless steel body with ESD Carbofib (CF) tips.

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Scissors 3M

Scotch Multipurpose, paper cutting, 180mm with sharp, hardened stainless steel blades for cutting performance.



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InfiniiVision 1000 X-Series, 2+1 Channel, 70 MHz, with educator resources included as standard, especially good for students and beginners.

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True-RMS Utility Multimeter, 6000 Count, Voltage Measure 600V, with features needed to repair most electrical problems, a must have for every toolbox.

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Source Meter Unit designed to simultaneously measure current, voltage and resistance with high speed and accuracy, offering a smart alternative to separate power supplies and DMMs.

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Two-pole voltage and continuity tester, Switchable load, 12V to 690V, giving the best combination of safety, ease-of-use and fast answers available anywhere.

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FPC1000 Bench Spectrum Analyser

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A 5KHz to 1GHz spectrum analyser offering 3 instruments in one: spectrum analyser, vector network analyser and signal generator, with low noise floor and high maximum input power.

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A Data Logger giving you an inexpensive entry in to the world of PC-based data logging, with built-in sensors for light, sound and temperature.

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A thermal imaging solution for reducing test times and improving product design for electronic board and device evaluation, detecting minute temperature shifts (< 0.06°C) and offering an accuracy of ±3°C.

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BS05U USB Oscilloscope Bitscope

A mixed signal scope including a powerful logic protocol analyser, waveform & pattern generator, spectrum analyser and data recorder in one tiny lightweight and waterproof USB powered package.



hackster.io

The world's largest hardware developer network with over 870,000 members in 150 countries. Hackster.io, an Avnet community, is dedicated to learning hardware, from beginner to pro. **Bringing together innovators and technology** partners from around the globe, Hackster hopes to facilitate the creation of solutions that make today's world a smarter, healthier place and support the livelihood of tomorrow's generation.

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Over 16,000 projects

automation, security,

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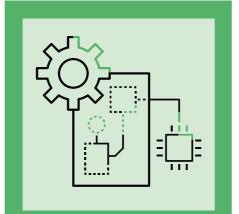
voice, wearables and

CONTESTS

Hackster organizes in areas such as home contests where anyone around the world can participate in hardware robotics, automotive, design challenges for a chance to win big prizes.

VIDEOS & NEWS

Keep up to date with the latest news and projects.



HACKSTER LIVE

Hackster Live is a global meetup led by a network of passionate ambassadors and hardware experts who run world-wide workshops you can join and build projects with.



farnell.com/further-learning

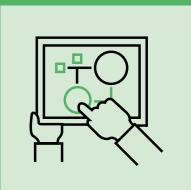
Information to inspire and empower students, educators, makers, and engineers alike. From learning new skills to understanding state-of-the-art technologies, find online courses, workshops, development tools, projects and more from industry-leading suppliers.

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Arm have carefully developed online courses to help students, hobbyists and practicing or aspiring engineers learn about state of the art technologies from the Arm partner ecosystem. The courses provide an understanding of Arm architecture and the principles of software and hardware system

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