ARDUINO

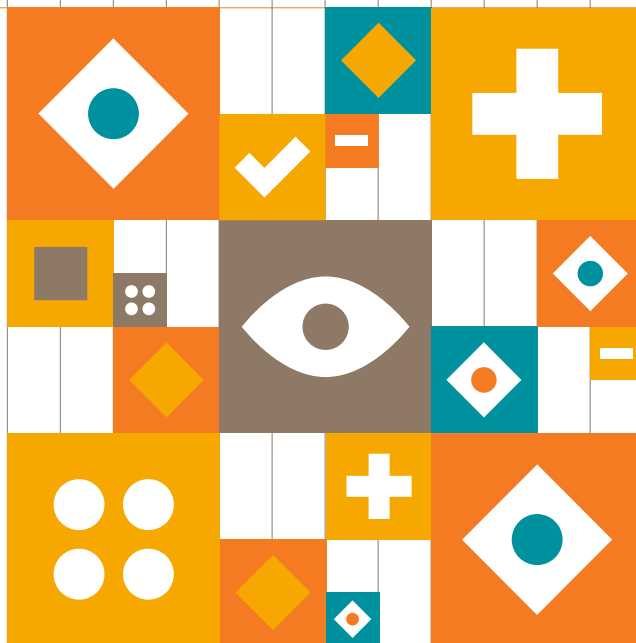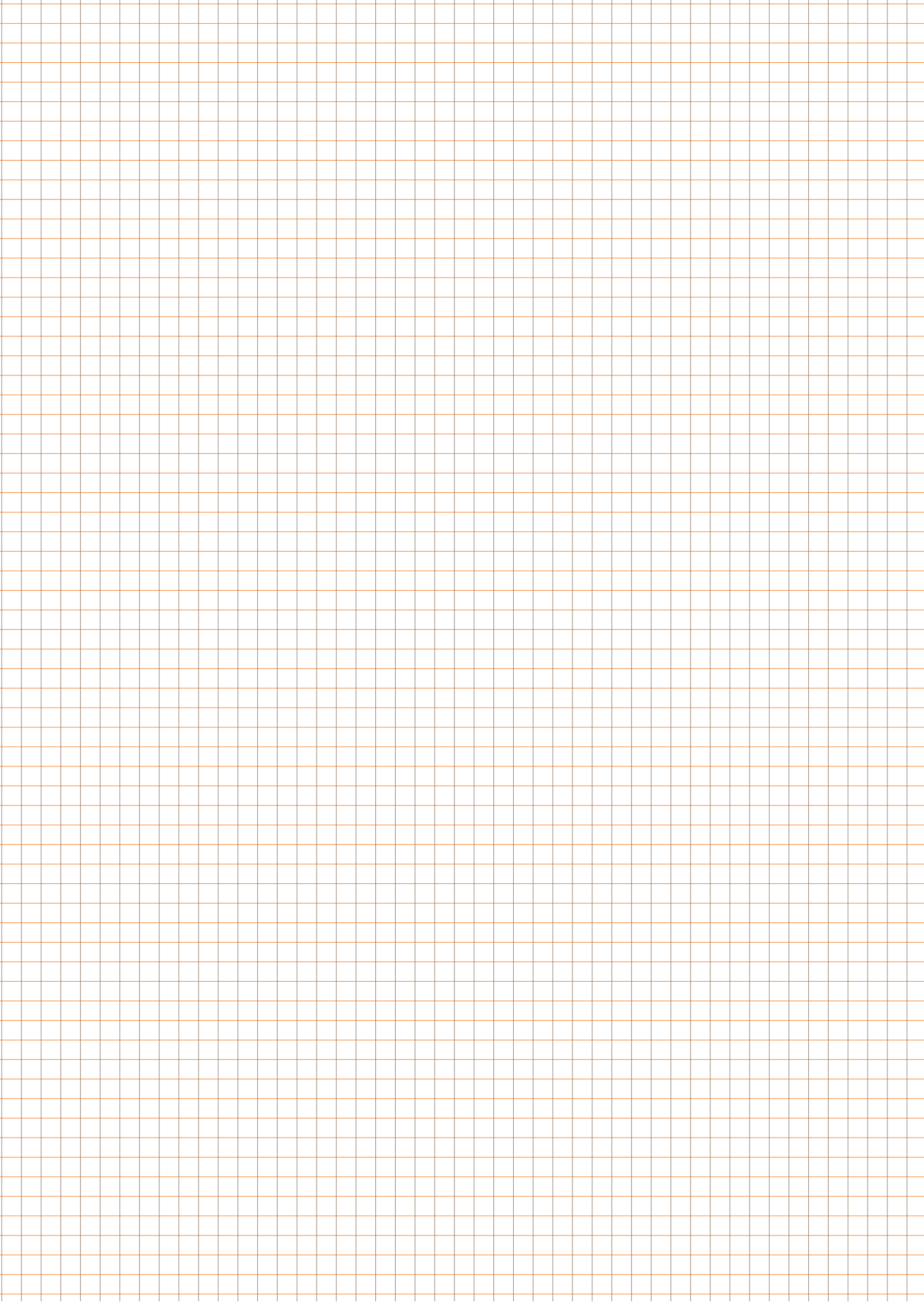## CTC 101

EDUCATORS INFORMATION GUIDE

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ARDUINO

EDUCATION

INSPIRING
TEACHING
& EMPOWERING

ARDUINO EDUCATION

WHAT IS ARDUINO?

Arduino is an open-source hardware, software and content platform with a worldwide community. Over the years, Arduino has powered thousands of projects, from everyday objects to complex scientific instruments.

THE EDUCATION TEAM AND THE MISSION

Arduino Education is a dedicated global team formed by education experts, content developers, engineers and interaction designers, focused on developing the next generation of STEAM programs and supporting teachers and students needs throughout the educational journey.
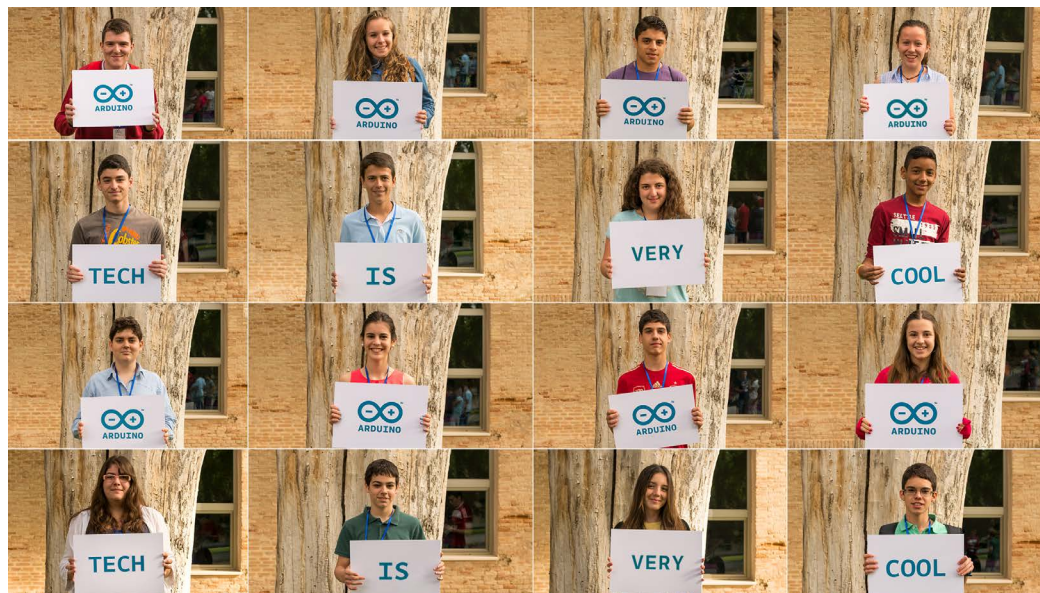

CURRENT USE CASES IN EDUCATION

Educational institutions use Arduino to:

Develop: At universities, it is widely adopted in the fields of engineering, Internet of Things, robotics, art, and design, to name just a few.
Teach and learn: Many secondary schools use it with innovative techniques for cross-curriculum studies.
Play: Primary schools use toys embedded with Arduino technology to introduce physical learning, logic, building skills, and problem solving.

Arduino's *Immersive Educational Environment* promotes the creative process through *project-based learning*, with a focus on student interaction and group collaboration.

"Back in 2012, I was given the challenge of bringing project-based learning to my first group of upper secondary schools in Spain. I realized at the time that almost no one was addressing the needs of educators when introducing curriculum. Therefore, I decided that we had to put educators at the center of our concept and help them find creative ways for using technology. Arduino Education is not just about making interesting projects with students, it is also about getting acquainted with developing technologies and new methods of teaching." - **David Cuartielles, Arduino co-founder**

WHAT IS CTC 101?

Creative Technologies in the Classroom 101, or *CTC 101*, is a *modular STEAM* (Science, Technology, Engineering, Arts, and Mathematics) program, tailored for students *ages 13 to 17*. It is the flagship Arduino Educational Program for schools.

CTC 101 uses "project-based" learning methodology. Students are introduced to the foundations of programming, electronics, and mechanics through a series of playful, well-documented projects and easy-to-assemble experiments.
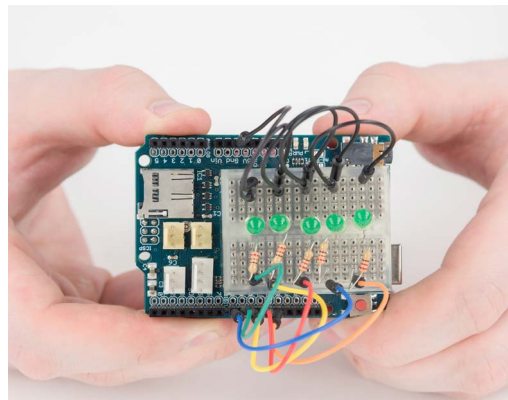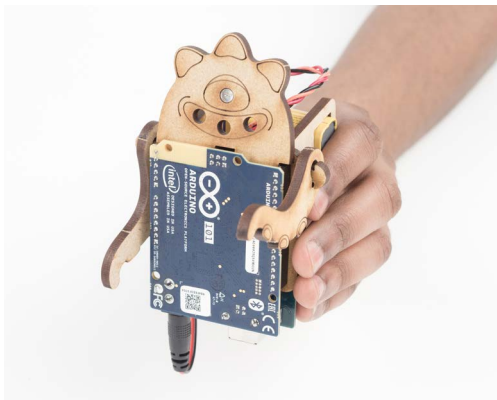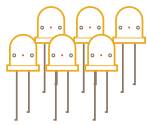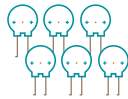
PROVEN MODEL

- *It has been tested globally with excellent results:*

735 SCHOOLS

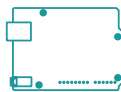**1 550** EDUCATORS

17 700 STUDENTS

1 720 PROJECTS

90% STUDENTS WANTED TO LEARN MORE ABOUT PROGRAMMING

90% EDUCATORS FELT THAT THE PROGRAMME EXCEEDED THEIR EXPECTATIONS

70% EDUCATORS LEARNED PROGRAMMING THROUGH THE CTC TRAINING

"CTC is one of our best examples of educational activities and makes us especially proud on account of its potential for teacher training, student motivation, and transformation of the society in which we live."
Javier Hidalgo, Head of Exhibitions and Programmes, la Caixa Foundation

"The CTC program, through its didactic proposal based on creative technologies, has provided important input to learning through problem solving, and the application of computational thinking and teamwork, key aspects for the development and achievement of key competences for the citizen of 21st century, among which is there is also how learning to learn. "
Rosanna Fernández, Program Coordinator, Center of Educational Resources Specific Support to Innovation and Educational Research, Catalonia, Spain

"It was new, interesting and educational. The students appreciated Arduino, and the interest is wide among students and teachers alike."
Teacher, CTC Kreatech, Skåne Sweden

"[CTC] It's a great way to get started with programming, electronics, and automation — this program is so entertaining and fun that it does not seem like you're taking a class — all classes should be as interactive and constructive just like these!"
Joel Borja Tomàs, Student, Institut de Tecnificació, Amposta, Spain

WHAT'S INCLUDED

- A toolbox with 26 playful projects and easy to assemble experiments.
- An online platform with well-documented step-by-step instructions.
- Educators guidance, including training, live webinars and forum monitoring by Arduino Education experts.

TOOLBOX
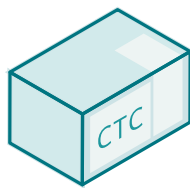
26 PROJECTS
AND EXPERIMENTS

BOARDS, SHIELDS AND
COMPONENTS FOR A CLASS
OF UP TO 30 STUDENTS

ONLINE PLATFORM

ENG/SPA/ITA/CAT
CONTENT

PROJECT BASED
LEARNING

TEACHER SUPPORT

GUIDED EDUCATORS TRAINING, LIVE WEBINARS,
AND MONITORED FORUM BY ARDUINO
EDUCATION EXPERTS

Each toolbox contains enough boards, shields and components for a class of up to 30 students, and for the educators to get trained:

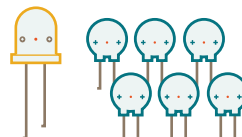**6 Arduino 101 boards:** One of the most powerful Arduino boards for education, including wireless communication (Bluetooth) and an integrated IMU (Inertial Measurement Unit). They are programmable, able to read inputs (e.g., light levels on a sensor), and capable of controlling outputs (e.g., activating a motor).

6 Arduino Education Shields: Add-on boards that connect to the Arduino 101s to extend their functionality. The Education Shield is a custom-made shield designed by Arduino Education, specially tailored for educational purposes to enable quick and easy learning when building projects.

10 mini breadboards: Used to make circuits easier to build. They can be either attached on top of the Education Shield or used separately to connect other components.

Set of electronic components: Used to create interactive electronic circuits. Includes resistors, potentiometers, LEDs, push buttons, capacitors, and diodes.

Set of plug and play modules: Sensors and actuators equipped with all the necessary components onboard, so they can be directly connected to the Education Shield. Modules include a joystick, light and tilt sensors, and an infrared array.

Set of sensors and actuators: Includes light, knock, touch/capacitive, and infrared sensors, as well as actuators like standard and continuous servo motors.

Set of batteries: Includes both 9V and 1.5V batteries, and 4-slot and 8-slot battery holders.

Media and storage: Includes webcam, SD card and a speaker. The Education Shield has an SD card reader and an audio connector.

Set of cables: Includes all the necessary cables, such as USB cables, jumper wires, module cables, battery snaps, alligator cables, and single core wires.

MDF parts: These laser-cut MDF parts can be used to build more than 10 different projects.

Storage and sorting boxes: Electronic components can be sorted inside these boxes, based on their functions and sizes. After MDF parts are removed from their frames, they can be stored for later use in the resealable storage bags. The sorting box with dividers can be used to organize smaller components.
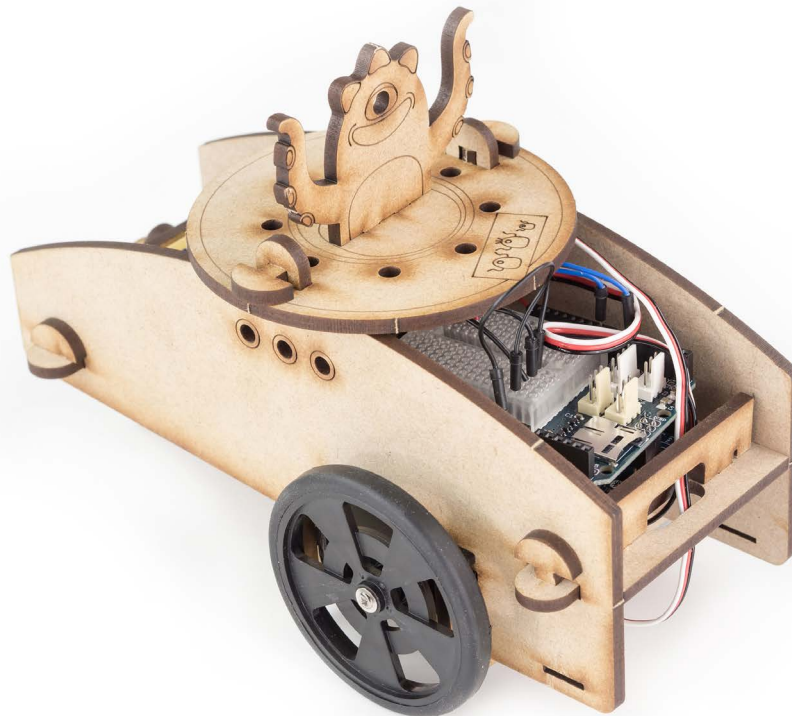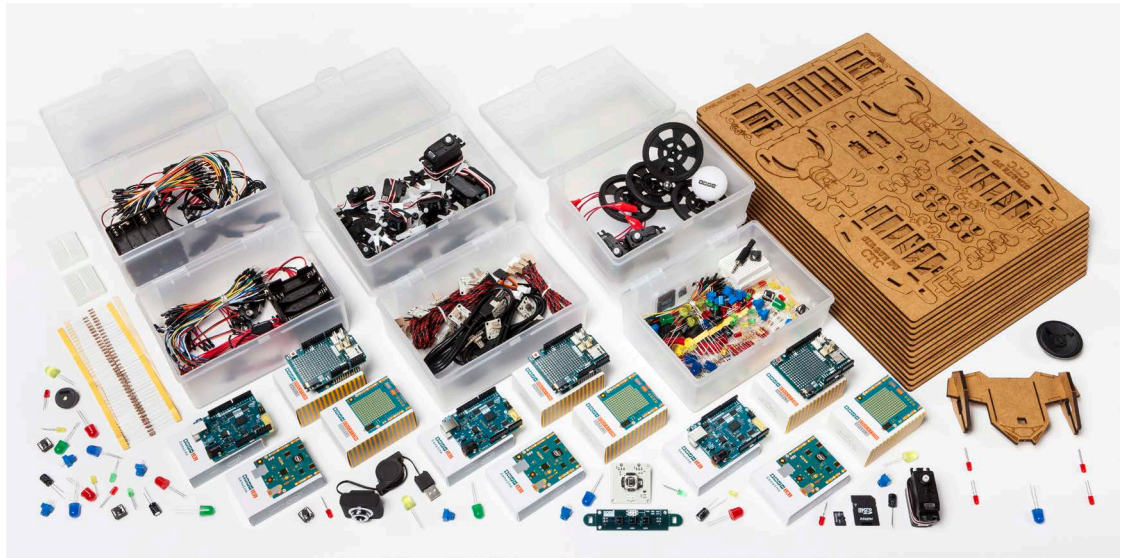
ONLINE PLATFORM

CTC 101 is built on its own Education Learning Management System (LMS) with step-by-step instructions and lessons based on five themed modules:

Module 1: Programming and basic coding
Module 2: Arduino boards and digital signals
Module 3: Analog signals and serial communication
Module 4: Robotics, power systems, and motors
Module 5: Wireless communication via Bluetooth and advanced sensors
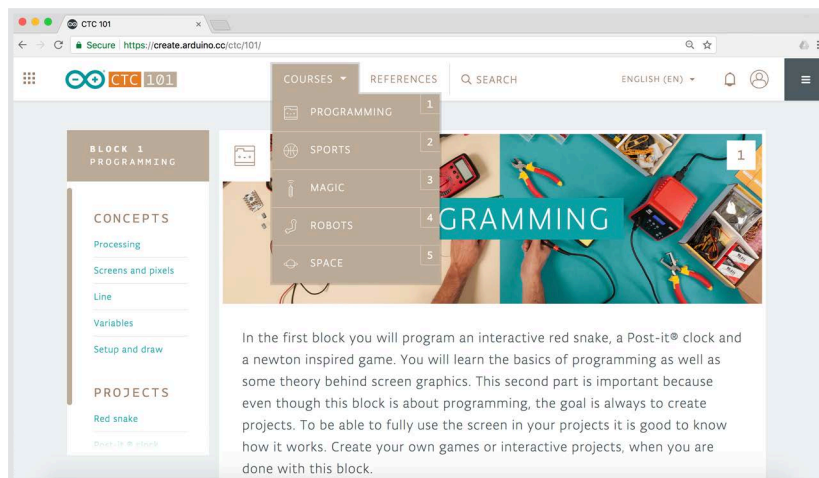
Moreover, the platform has:

An educators section with self-administered online training, materials for class preparation, guides, and other resources.
A reference section with additional material and exercises for troubleshooting and further learning.

Users receive access to the online platform for a year. Up to three educators and 30 students are granted access. Educators can then add/remove students to/from the platform at any time within that year.

The content on the online platform helps students get started with programming and electronics, while building fully-functional, interactive projects under the guidance of educators. The content is currently available in *English*, *Spanish*, *Italian*, and *Catalan*.

Educators are granted access before students so they can prepare and adapt their lesson plans with more engaging and crea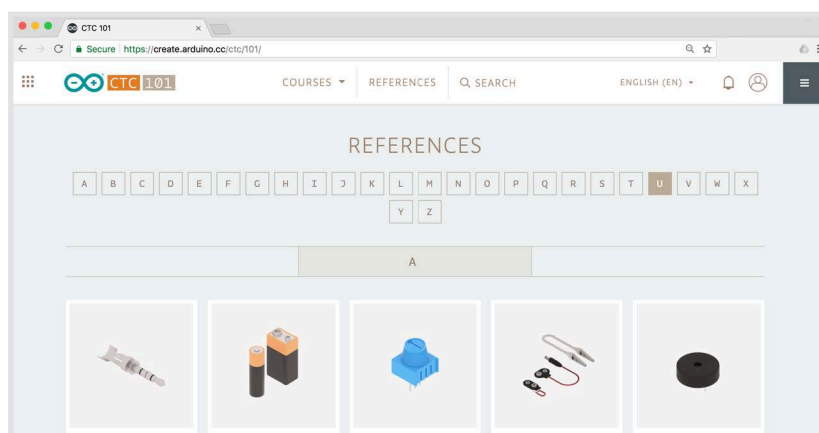tive techniques. This allows them to take full advantage of the latest technologies and integrate them into their curriculum.

The content and class dynamics are specially designed to enhance the students' problem solving and teamwork skills in a collaborative environment.

EDUCATORS SUPPORT AND RESOURCES

The Arduino Education team is committed to providing support and solving potential challenges as educators teach CTC 101 content and guide their students through new projects.

Educators support includes:

Dedicated online communication with the Arduino Education team every step of the way—purchasing advice, online platform access, student enrollment, and any additional questions regarding CTC 101 deployment in the classroom.

An onboarding live webinar where educators will go through the program's features and the tools available on the online platform, as well as receive recommendations on implementing CTC 101 in the classroom.

Access to a moderated forum that allows CTC 101 educators to share their knowledge and experiences with other educators from around the world.

Self-administered training, which consists of video tutorials and other training content for educators to complete at their own pace. There are five training sections per CTC 101, one for each module, with an auto-evaluation test at the end.

Live training webinars led by Arduino Education experts, which provide educators with the opportunity to ask questions in real-time. There are five self-administered sessions with three available booking options per day.

Live Q&A webinars to assist educators with any difficulties that arise during the implementation phase. There are ten sessions in total, all led by Arduino Education experts.

CTC 101 JOURNEY

Upon purchasing the CTC 101 program, the toolbox will be shipped and the educators will be trained in order to implement the program with their students.

PURCHASE

The CTC 101 program can be purchased from the official Arduino Store (`STORE.ARDUINO.CC/ARDUINO-CTC-101-PROGRAM`) and selected Arduino Education resellers. We recommend you allocate enough time between purchasing the program and starting the implementation, so that educators (up to three) can be properly trained. Please refer to page 17 (Educators Training).

There are two main CTC 101 packages:

WHAT'S INCLUDED	FULL	SELF LEARNING
CTC 101 TOOLBOX	Yes	Yes
ONLINE PLATFORM 1-YEAR ACCESS	Yes	Yes
DEDICATED ONLINE COMMUNICATION WITH ARDUINO EDUCATION EXPERTS	Yes	Yes
ONBOARDING LIVE WEBINAR	Yes	Yes
ACCESS TO A MODERATED FORUM	Yes	Yes
SELF-ADMINISTERED TRAINING	Yes	Yes
5 x LIVE TRAINING WEBINARS	Yes	No
10 x LIVE Q&A WEBINARS	Yes	No

Furthermore, there are additional packages for training, support, and online platform access.

ADDITIONAL PACKAGES

OPTIONAL MODULES	TRAINING	SUPPORT	TRAINING AND SUPPORT	EXTENDED ACCESS TO THE PLATFORM
ONLINE PLATFORM 1-YEAR ACCESS	No	No	No	Yes
DEDICATED ONLINE COMMUNICATION WITH ARDUINO EDUCATION EXPERTS	Yes	Yes	Yes	No
ONBOARDING LIVE WEBINAR	Yes	Yes	Yes	No
ACCESS TO A MODERATED FORUM	Yes	Yes	Yes	No
SELF-ADMINISTERED TRAINING	Yes	Yes	Yes	No
5 x LIVE TRAINING WEBINARS	Yes	No	Yes	No
10 x LIVE Q&A WEBINARS	No	Yes	Yes	No
PRICE	$315	$625	$690	$125

Note that additional packages can only be purchased if full or self-learning packages has been purchased before. Training and support packages can be purchased only while having access to the online platform. Extended access to the online platform can be online purchased within the first year after the first purchase.

Each CTC 101 toolbox contains six Arduino 101 boards for educators to divide evenly among the class, so each group of students has one. The table below shows three different scenarios based on the number of students per class.

CTC 101 - Full package	$2100		
Students per Class	18	24	30
Students per Group*	3 (recommended)	4	5 (maximum)
Cost per Student**	$117	$100	$70

** Considering 30 students within a year period

EDUCATORS TRAINING

All training content, video tutorials, and auto-evaluation tests are included with the online platform.

HOW MUCH TRAINING TIME DO EDUCATORS NEED?

LEVEL	LEVEL INDICATOR	HOURS TO COMPLETE TRAINING
BEGINNER	New to Arduino, electronics, and programming. First time implementing a STEAM program.	30+
INTERMEDIATE	Moderate understanding of Arduino, basic electronics, and programming concepts. Familiar with STEAM programs.	15-20
ADVANCED	Extensive knowledge of Arduino, electronics, and programming. Have implemented at least one STEAM program.	10-15

Educators can choose between guided (included in the full package) or self-administered training:

Self-administered training: Educators can go through video tutorials and training content on their own. There are five training sections per CTC 101, one for each module, with an auto-evaluation test upon completion.

Guided training: Self-administered training plus five live webinars with Arduino Education experts. During these webinars, educators will walk through the CTC 101 content with a member of the Arduino Education team.

Both options include a **certificate for educators**. Once educators have completed each of the auto-evaluation tests, they can download the certificate directly from the online platform.

During the training, educators will learn how to:
- Get started with programming and electronics
- Adapt their lesson plans with engaging and creative techniques
- Take a hands-on approach to achieving defined learning objectives
- Implement STEAM programs within the classroom

IMPLEMENTATION WITH STUDENTS

After purchasing the program and becoming trained, the CTC 101 program will be implemented to students. Students will go through the five themed modules in the online platform, while building experiments and projects using the classroom toolbox.

HOW LONG DOES THE CTC 101 PROGRAM TAKE WITH STUDENTS?

	CTC 101 TIMELINE
NUMBER OF CONTENT MODULES	5
LESSONS PER MODULE	5
LESSONS IN TOTAL	25
HOURS PER LESSON	1
HOURS IN TOTAL	25

At the end of the course, students will have the opportunity to design their own projects and share them with the Arduino Education community. Educators will adapt the number of lessons available for these projects based on their own class plans and curriculum.

During the implementation, students will:

- Learn programming and basic Arduino coding
- Explore digital and analog signals to build fully-functional and interactive projects
- Be introduced to robotics, power systems, and motors
- Create their first IoT devices with Bluetooth connectivity
- Enhance their problem solving and teamwork skills in a collaborative environment

CONTACT US

Purchase the CTC 101 program:

STORE.ARDUINO.CC/ARDUINO-CTC-101-PROGRAM

Learn more about Arduino Education:

ARDUINO.CC/EN/MAIN/EDUCATION

Send your CTC 101 questions:

CTC.101@ARDUINO.CC
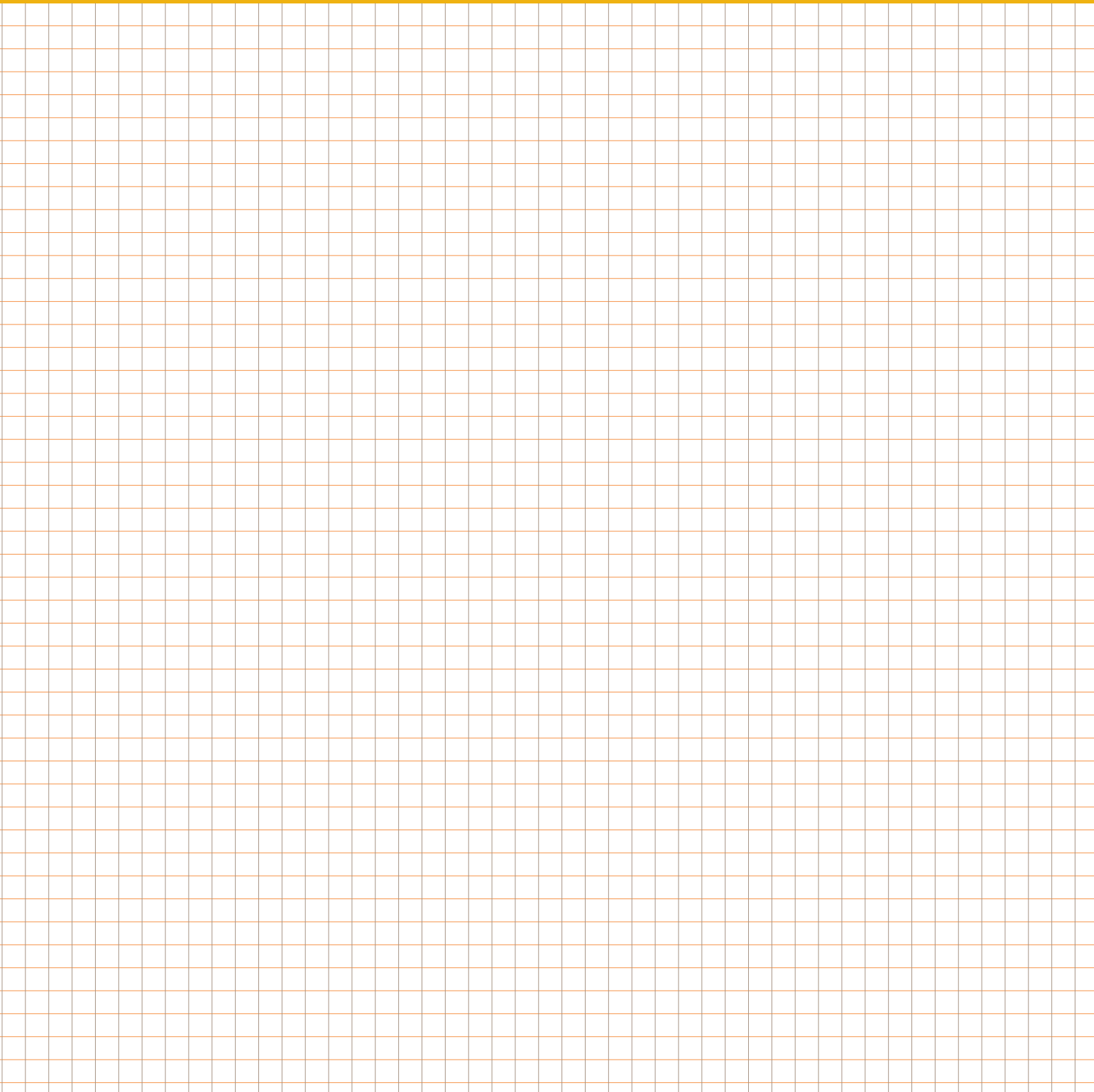
CTC 101
FAQ

CAN AN ORGANIZATION OR COMMUNITY GROUP RUN THE PROGRAM?

CTC 101 program is primarily aimed at schools, but any group interested in exploring STEAM disciplines can run it.

WHICH CTC 101 PACKAGE DO YOU RECOMMEND?

If it is the first time that an organization, school, or educator is purchasing CTC 101, we recommend selecting the full-package.

If a school already has a CTC 101 program but the educator has never implemented the program, we recommend you purchase the training and support packages, either together or separately.

If the school wants to run a CTC 101 program and the educator is properly trained, the self-learning package is a good choice.

IS IT NECESSARY TO BUY ANOTHER TOOLBOX OR ADDITIONAL MATERIALS FOR THE EDUCATORS TRAINING?

No, educators will be trained using the same materials that their students will use later on. The CTC 101 toolbox contains all of the materials needed for educators training.

WHAT ARE THE MINIMUM REQUIREMENTS IN THE CLASSROOM?

Schools running the CTC 101 program should have student access to computers with Internet access (at least one computer for three students), a dedicated room that can function as a workshop (or at least a room with tables), and common accessories such as pens, scissors, sticky tape, etc.
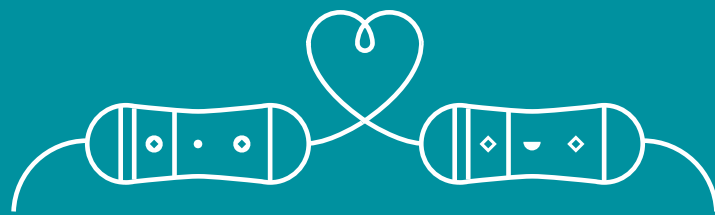
HOW EDUCATORS CAN GET AN EXTRA YEAR ACCESS TO THE ONLINE PLATFORM?

Users receive access to the online platform for a year. Up to three educators and 30 students are granted access. Educators can then add/remove students to/from the platform at any time within that year. There is an additional package (extended access to the online platform) that allows access to another 3 educators and 30 students for an additional year.

NOTES

ARDUINO EDUCATION

ARDUINO.CC/EDUCATION