



ARDUINO EXPLORE IoT KIT



INNOVATE, CREATE, TRANSFORM: TAKE YOUR FIRST STEPS IN BUILDING INTERNET-CONNECTED OBJECTS

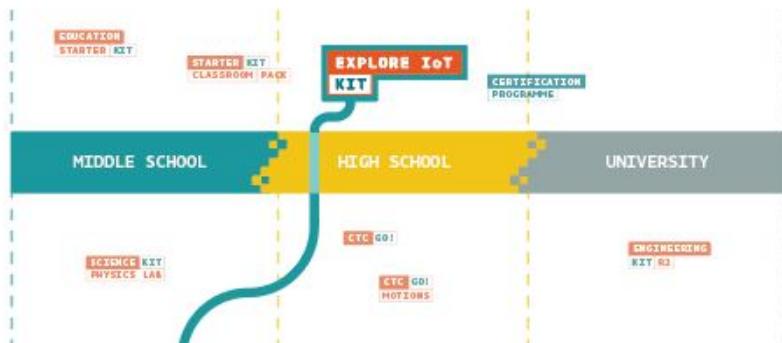
EXPLORE THE INTERNET OF THINGS WITH ARDUINO
EDUCATION



ARDUINO EDUCATION LEARNING EVOLUTION

ARDUINO® EDUCATION LEARNING EVOLUTION

Our aim is to help students achieve their dream careers in STEAM. Our cross-curriculum content and open-source approach are essential tools for STEAM classes that develop with students as they progress through middle school, high school, and university, preparing them for a successful future.



Step by step, we champion students as they progress through their STEAM education with projects that increase in complexity to challenge them as they develop their skills.

We support students in achieving successful careers in STEAM-related fields with educational kits that are targeted to their age and ability. The technology is practical, creative, and fun. Students learn using the same products that companies around the world use in applications like rapid prototyping, AI, drone technology, and developing machine learning.

BUT FIRST... LET'S TALK ABOUT THE INTERNET OF THINGS

The **Internet of Things (IoT)** is a giant network of **digitally connected devices** that collect and share real-time data from all over the world, and it's changing the way we live, work and study as more and more people use these kinds of devices every day. Examples include smart lights that can be controlled from your phone, and surveillance cameras that can be monitored remotely.

More importantly, the Internet of Things (IoT) is shifting the way everything works by **allowing virtually endless opportunities and connections** to take place.

More and more industries are discovering the benefits of the IoT and it is, therefore, important for **educators to prepare students** for this future.



WHAT IS THE ARDUINO EXPLORE IOT KIT?

The Arduino Explore IoT Kit has been created as a gateway to provide a comprehensive understanding of how the digital world of connected objects and people work.

The kit helps you get advanced high school and college students started with the **fundamental concepts of the Internet of Things** quickly and easily.

Students will learn to harness the power of the Arduino IoT Cloud to collect data, understand how devices communicate with each other, and which tools to use to facilitate communication. They'll also learn about data management, analysis, and computational thinking - serious technology made simple as it's based on open hardware and plug-and-play connections.



WHAT IS THE MKR IOT CARRIER?

The Arduino Explore IoT Kit includes a MKR IoT Carrier, which was **specially developed for this kit.**

The MKR IoT Carrier has been designed to help students and teachers focus more on **software and testing** and less on wiring the circuits.

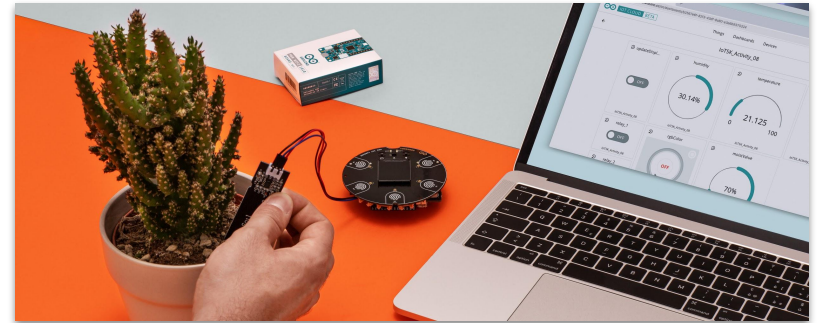
The MKR IoT Carrier is an extension of your board, and makes wiring and troubleshooting easier, so you can focus on prototyping your ideas and programming.

Just connect your device to the computer and you're ready to go!



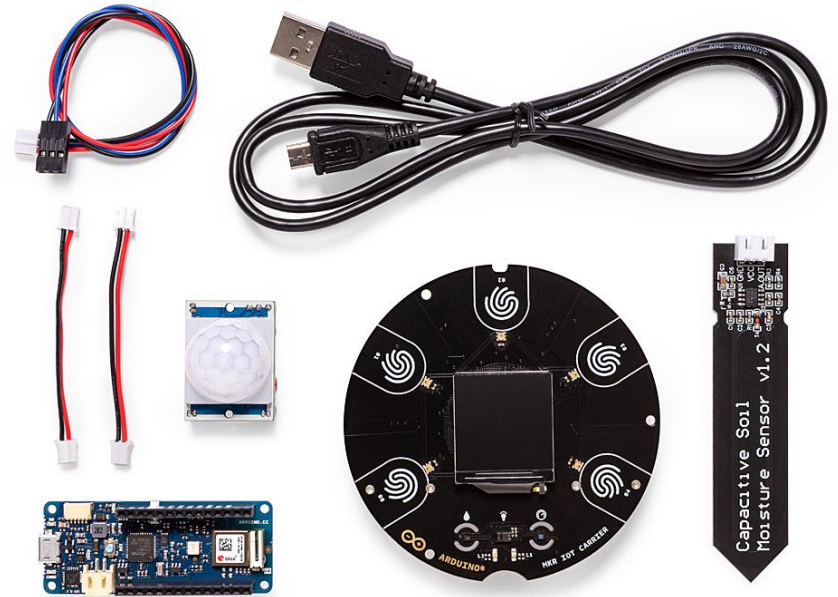
FEATURES OF THE ARDUINO EXPLORE IOT KIT

- Educators have all the guidance and support they need
- Arduino Create is included, so you get unlimited compilation time, more storage, and the possibility of syncing up to 20 “properties”, such as LED status, display values, and text interface, which gives you the full Arduino IoT Cloud experience
- The exclusive MKR IoT Carrier
- All the activities adopt a learning-by-doing approach, through which students acquire knowledge step-by-step by constructing fully functional solutions, including experiments, challenges and building meaningful applications
- The activities teach students how to collect and present data, and how to use devices and services safely and securely



BENEFITS OF THE ARDUINO EXPLORE IOT KIT

- Get started quickly and easily with the Internet of Things by making a complex subject simple and accessible
- Enhance students' understanding of real-world technology and its applications and combine your knowledge with real-world industry innovations
- Learn critical future skills for 21st century careers
- Be an innovator - learn how to use technology to make an impact on society
- Build functional prototypes inspired by real-world applications and gain confidence in designing and making your own connected projects



LEARNING OUTCOMES

- The Arduino Explore IoT Kit has been created to provide a comprehensive understanding of the Internet of Things.
- After looking into **current academic and industrial standards**, we have **identified important concepts this kit should touch upon**.
- Students will learn how devices communicate and the tools used to facilitate communication, data management, analysis and computational thinking by using real-world sensors to capture meaningful data from the environment and modify it by remotely controlling actuators such as LEDs, buzzers, displays, through the Cloud.

ACTIVITY CLASSROOM TRACKER

Introduction
Sensors used in this activity
Configuring the IoT cloud
Gradually building code
Testing it out
Challenge
Wrapping up

CLASSROOM TRACKER

YOU WILL LEARN ABOUT:

■ SKILLS ■ KNOWLEDGE

INTRODUCTION

In this activity, we will build and test a classroom tracker capable of registering the amount of people that have passed through a door. We will use one of our external sensors: the Passive Infrared Sensor (PIR), an electronic component designed to detect movement. We will use this together with the gyroscope, where the IoT carrier will be mounted to a door, and when it opens, it will start recording how many people pass through that door. The data recorded will be displayed both on the IoT carrier's display, but will also be visible in the IoT cloud dashboard.

PIR sensors are very popular components: they are used for automatic lamps that turn on when someone is in the room, and are vital components for security systems to detect intruders. This makes them an excellent option when building IoT systems!

Finally, we will also learn how to set up our IoT device to be completely wireless by making it battery powered.

Learning Objectives

The objectives of this experiment are:

- ◆ Get more familiar with the PIR sensor
- ◆ Using the gyroscope to trigger events
- ◆ Learn how to use increments in the code
- ◆ Build a real-life IoT device



KEY LEARNING VALUES

- **Using the IoT Cloud and connected devices:** Control physical objects, such as a displays or lights, remotely with the Arduino IoT Cloud
- **Collecting, processing, and storing data:** Store data locally, wirelessly and remotely for analysis and backup
- **Graphing and visualizing data and understanding its meaning:** Use different tools and techniques to graph data and interpret the information collected
- **Serial communication, APIs, JSON, and web servers:** Learn the essentials of how APIs (application programming interfaces) work, how to access remote web servers, and how to store the incoming data in JSON objects to create devices that can access all sorts of data from all over the world, and display it locally
- **Network security considerations:** Understand how software developers protect devices and information from unauthorized access
- **Different sensors and how to use them:** Investigate the environment using temperature, humidity, and light sensors, collect data about movement using an accelerometer, pressure, and motion sensors, take care of your plants by following the data from moisture and UV light sensors
- **Actuators and how to use them:** Use lights, sound, display and relays, and electronic components used to activate high power devices, to visualize data and control external devices



CURRICULUM ALIGNMENT

The Internet of Things can be connected to multiple subjects. Whether you're teaching technology, biology, business or gardening, your students can benefit from adding aspects of IoT as part of their projects.

In the **Teacher Guide**, you'll find information on different activities, learning objectives, materials needed, and extra tips, collected into one place to support educators.





The Arduino Explore IoT includes:

Arduino MKR1010, MKR IoT Carrier, Micro USB cable, Moisture sensor, PIR sensor, Plug and play cables for all the sensors,

- Age : 16 +
- 2 students per kit (recommended)
- Arduino MKR1010
- Access to an **online platform** with all the content, information and activities you need to learn and teach the basics of IoT in one place



- The **MKR IoT Carrier**, designed just for this kit, includes:
 - Two 24V relays
 - SD card holder
 - Five tactile buttons
 - Plug and play connectors for different sensors
 - Temperature sensor
 - Humidity sensor
 - Pressure sensor
 - UV sensor
 - Accelerometer
 - RGB 1.20" display
 - 18650 Li-Ion rechargeable battery holder
 - Five RGB LEDs

- Access to Arduino Create and a **free trial** to the **Arduino Create Maker Plan**:
 - Arduino Create is an integrated online platform that enables you to write code, access content, configure boards, and share projects.
 - Arduino Create comes with different plans. With the Arduino Create Free Plan, you can use the Web Editor to program your board, connect multiple devices with the Arduino IoT Cloud, browse a collection of projects on Arduino Project Hub, and connect remotely to your boards with Arduino Device Manager.
 - With the **Arduino Create Maker Plan**, you get access to additional features and increase the productivity of your tools. For example, you can save more sketches, increase the number of properties, and get support for third-party boards and LoRa devices.

FEATURES	FREE PLAN	MAKER PLAN
> Total Sketches	100	250
> Storage	100MB	200MB
> Compilation Time	200 s/day	unlimited
> Things	1	5
> Properties	5	20
> Cloud Data Retention	1 day	15 days
> Cloud API requests per second	1 req/s	10 req/s
> Cloud-enabled Linux Devices	1	3
> Cloud-enabled Arduino Boards	5 total	5 for each Arduino board type
> Cloud-enabled 3rd Party Boards	0	1
> Custom Library editing	✗	✓
> Chrome App Access	✗	✓
> 3rd Party Boards support on Web Editor	✗	ESP8266

ONLINE CONTENT

EXPLORE IOT KIT

The Arduino Explore IoT Kit is your gateway into the digital world of connected objects and people. Get started with the Internet of Things fundamental concepts in an easy way. Learn to harness the power of the IoT Cloud to gather data, acquire knowledge on communication protocols, computational thinking, tools used to connect various devices, data management, and analysis - serious technology made simple.

ACTIVITIES (3/3)

- 0** INTERNET OF THINGS
DO THIS ACTIVITY →
- 1** GET TO KNOW THE KIT
DO THIS ACTIVITY →
- 2** GRAPHING DATA IN THE CLOUD
DO THIS ACTIVITY →

ACTIVITY URBAN FARMING 101

URBAN FARMING 101

YOU WILL LEARN ABOUT:

■ SKILLS ■ KNOWLEDGE

INTRODUCTION

In this activity, we will turn our MKR IoT Carrier into an urban farming device! We will use the carrier's sensors and a moisture sensor to analyze the environment for a plant, use artificial lighting and introduce relays – an electronic component used to activate high-power devices. We will be focusing on setting up a dashboard in the IoT cloud, where we can read data, and control different components.

Learning Objectives

The goals of this activity are:

- ◆ Set up an urban farming environment
- ◆ Understand how relays work
- ◆ Understand how the moisture sensor works
- ◆ Create an ideal environment for a plant

Activity Complexity

This exercise requires having previous knowledge in:

- ◆ Configuring the IoT cloud
- ◆ Working with the carrier's different sensors

Components Used

- ◆ MKR WiFi 1010

10 step-by-step, hands-on activities that cover the fundamentals of the IoT (Hardware, Networking, Programming, Security, and Data Handling) with 10 open-ended challenges.





**THANK YOU FOR YOUR
TIME!**