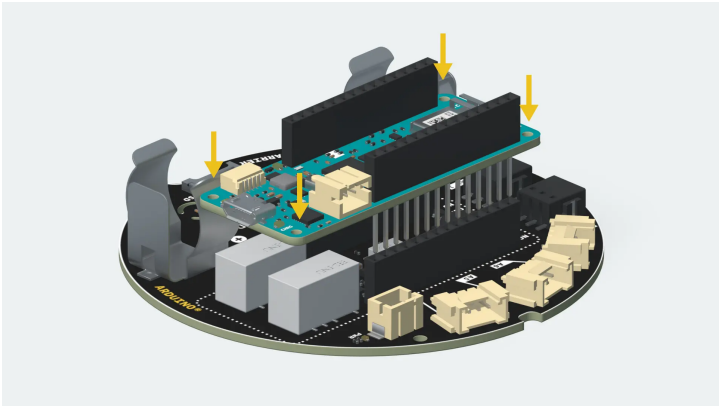


Arduino Explore IoT Kit Rev2 - Hands-on Training

- Participants individually or in small groups: every group should have a kit and computer
- Sign in to cloud.arduino.cc (Create account or use existing one)
- This example can be created with the free plan

STEP	TRAINER	PARTICIPANT	COMMENT
Pre	<p>Create a shared space for Education with School Plan or let participants use My Cloud</p> <p>Create a final project ready for the carrier</p>		<p>The advantage of using the shared space with school plan is that everyone can see each others dashboards and things but it needs to have the school plan otherwise max. 2 Things can be there at the same time</p>
1	<p>Hand out kits to everyone and tell to start playing with the pre-flashed program</p>	<p>Open the kit, mount the board and carrier together and connect to the computer.</p> <p>Start playing with the pre-flashed program.</p>	<p>Mount the Arduino MKR WiFi 1010 on top of the MKR IoT Carrier Rev2. Make sure you connect the board facing the same way as in the image below. A good way to do this is to look at the pin numbers on the board and the carrier, and make sure they match!</p> 
	<p>Show the video “How White Mountains Regional High School Used IoT”</p>		<p>https://youtu.be/9dG8J7HrwKA</p> <p>Also in the Explore IoT Rev2 Onboarding guide</p>

		Sign in to cloud.arduino.cc	Create account, use existing one or sign in using Google, Github, Apple, Facebook
	<p>A. Either users can have the free plan and use My Cloud or</p> <p>B. Trainer can have a shared space with a School plan. - > Share the code for the space</p>	Join the trainer's space	<p>Share code to join space:</p> <ul style="list-style-type: none"> - Left menu - Members - Top right button - Add member - Code or link <p>Join Space: Top right space selection and click Join space and add the code from the trainer</p>
	If wanted a short presentation of the Cloud for Education and free vs school plan	Explore the Cloud freely	<p>If participants use the free/My cloud it could be good to show how it looks different for the Education Space with School plan</p> <p>Also this introduction to Cloud can be done at the end once done with the projects</p>
	Navigate to Courses and open Explore IoT Kit Rev2	Navigate to Courses and open Explore IoT Kit Rev2	
	Short intro to the landing page and content		<p>If participants have a free account they can only access the basic content: onboarding guide, troubleshooting guide, first 2 sensor activities and first project and foundation.</p> <div style="display: flex; align-items: flex-start;"> <div style="flex: 1;"> <p>Online Learning Content</p> <p>Getting Started contains onboarding guide with introduction to hardware, software and content, and a troubleshooting guide with the most common issues and how to solve them.</p> <p>11 Sensor Activities cover all the sensors/actuators included in the kit. Each of these activities explores a sensor, what it is, where it can be used in and how to use it, including a challenge to build a project using what was learned.</p> <p>10 Projects that tackle real challenges in the IoT and sustainable development areas. Each of the projects introduces students to a problem linked to one of the UN Sustainable Development Goals, and asks to further research the problem and suggest ways of using the kit to investigate the presented issue.</p> <p>ARDUINO EDUCATION</p> <p>Available in English, more languages coming soon</p> </div> <div style="flex: 1; border: 1px solid #ccc; padding: 5px;"> </div> </div>

			<p>Online Learning Content</p> <p>The table below presents our time estimation of the activities. We estimate 1 lesson to be 45 minutes long, and 1 week to include 5 lessons.</p> <table border="1"> <thead> <tr> <th>Name of Activity</th> <th>Duration</th> <th>Type of Activity</th> </tr> </thead> <tbody> <tr> <td>Onboarding Guide</td> <td>2 lessons</td> <td>Introduction</td> </tr> <tr> <td>Sensor Activities</td> <td>1-2 lesson</td> <td>Hands-on activity to learn about a specific sensor/actuator and its use cases</td> </tr> <tr> <td>Projects</td> <td>Short span: 4-6 weeks, Long span: 12-16 weeks</td> <td>A project connected to sustainable development, based on the UN's SDGs</td> </tr> </tbody> </table> <p>https://docs.google.com/presentation/d/1sl1b5b4dISMmaZ2oEdXSL30-A-xNj4VKnF7JUXmXAuE/edit?usp=sharing</p>	Name of Activity	Duration	Type of Activity	Onboarding Guide	2 lessons	Introduction	Sensor Activities	1-2 lesson	Hands-on activity to learn about a specific sensor/actuator and its use cases	Projects	Short span: 4-6 weeks, Long span: 12-16 weeks	A project connected to sustainable development, based on the UN's SDGs
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	HANDS-ON PROJECT														

HANDS-ON PROJECT - INDOOR ENVIRONMENTAL QUALITY

ONSITE, but can be done online with Miro but then everyone needs to have their own kit and they can work individually

SECTION	TRAINER	PARTICIPANTS	COMMENT
Materials needed	Each group needs Explore IoT Kit Rev2, computer Each member needs sticky notes, a pen, stickers		
Introduction	Navigate to Projects - Indoor Environmental Quality Introduce the topic of the project and that we will do a shorter version.	Navigate to Projects - Indoor Environmental Quality. Listen to the trainer/read the Introduction part. In this project, you will be asked to use your Explore IoT Kit to form a better understanding of the Indoor Environment Quality. UN Sustainability Goal: 11- "Make cities and human settlements inclusive, safe, resilient and sustainable" Target: 11.6- "By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management"	
1. Exploring & Researching 5 min	Motivation to the topic	In order to understand the meaning of Indoor Environmental Quality, we need to look into wellbeing as a concept. Wellbeing is often described as the highest quality of life for a human being, which usually encompasses many dimensions such as physical, emotional, social, financial, occupational, spiritual,	Because we have a limited amount of time we will today focus on the Indoor Environmental Quality and Humidity levels in a classroom environment.

		<p>environmental and intellectual. In our modern age, we spend the majority of the time of the day indoors, which gives indoor spaces a huge influence on all the dimensions of our wellbeing. To make our indoor spaces most accommodating for our needs, we need to look into the wellbeing of a building. The physical wellbeing of a building is what we refer to as Indoor Environmental Quality (IEQ) IEQ is ensuring that the following components are in the best conditions for people who live, work & study in an indoor space:</p> <ul style="list-style-type: none"> • Noise • Light • Odors • Thermal comfort • Air quality <p>Because we have a limited amount of time we will today focus on the Indoor Environmental Quality and Humidity levels in a classroom environment.</p>	
	Divide people into groups of 2-3 people if not already.		
<p>2.Ideating & Planning</p> <p>15 min</p>	<p>Set the timer to 10 minutes</p> <p>How do _____ affect the humidity levels in a classroom?</p> <ul style="list-style-type: none"> - Sticky notes - Pens - Stickers 	<p>How do _____ affect the humidity levels in a classroom?</p> <p>Individually: Research how humidity and indoor environment quality are related to each other to gain a better understanding of it.</p> <p>Each member of the group takes as many sticky notes as they need and writes what they think could be interesting to study based on their research (things should fit to fill the blank on the question above).</p> <p>Place the sticky notes on a wall for everyone in your group to see.</p>	<p>To protect health, comfort, the school building and its contents, it is important that indoor relative humidity be maintained below 60%, ideally between 30% and 50%</p> <p>Examples:</p> <ul style="list-style-type: none"> - how do <u>the amount of people</u> affect the humidity levels in the classroom - how do <u>sunlight</u> affect the humidity levels in the classroom - how do <u>stove in the room</u> affect the humidity levels in the classroom
<p>2.Ideating & Planning</p>	Set the timer for 5 minutes	<p>In the group each of you can use stickers for voting, each group member will get to use their sticker 5 times by going around and putting it on the research questions they like most. You can use more than one of your 5 stickers on the same question if you really like it.</p> <p>Now, rank the research questions from the ones with most symbols to the least, select the top 3 ones.</p>	

3.Prototyping & Testing: sensor activity humidity sensor 15 min	Sensor Activity: Humidity	Put the research questions aside for a moment and open the Sensor activity: Humidity, and create a project with humidity sensor and historical graph	Use the example code from Sensor activity: humidity Steps how to create a Thing and Dashboard below
3.Prototyping & Testing: sensor activity humidity sensor		<ul style="list-style-type: none"> • Open IoT Cloud • Connect the board + carrier to the computer • Create a Thing with one variable for humidity • Associate your device + add network credentials • Open sketch tab • Remove all the code and copy paste the first code block from Sensor Activity • Upload the code to the board • Open Serial Monitor - if you can see the humidity values - everything works • Go to Dashboards • Create a dashboard • Add Chart widget • Link variable from the Thing and click Done • See the values from the humidity sensor in the chart 	Creating quick and simple example to collect humidity values variable <ul style="list-style-type: none"> - name humidity - type float - Read only - Periodically 1s If we have shared school space there can be an example ready
3.Prototyping & Testing: sensor activity humidity sensor	Back to the Indoor Environmental Quality project	Back to your research questions. To make sure that your selected question is valid, you need to take into account the validity of the dependent and independent variables, the space available for testing and the data you can measure with the Explore IoT Kit. Start collecting data: Manipulate the independent variable and see how it affects the dependent variable (humidity levels).	Independent variable: is changeable and its constant change is not dependent on any other variables. It is the variable that we are changing in every trial. Dependent variable: is measurable, its change/non-change is dependent on the independent variable. The changes occurring in this variable is what we are studying.
4.Analyzing & Concluding 5 min	Time to analyze our data	<ul style="list-style-type: none"> - Recognize the accuracy and precision patterns in your data 	While they are testing the sensor and collecting data they should analyze their results
5.Making & Changing 25 min	Exercise 5. Participants will go through the steps in a simpler way	Now that you understand your indoor environment better, it's time to use your findings to make a change!	You can have crazy 4 instead of crazy 8 so it takes less time.

		<p>In this phase you'll get the chance to ideate a solution to the issue you've investigated that not only collects the data, but can also act as part of the solution.</p> <ol style="list-style-type: none"> 1. Prepare an A4 paper each and a pen/marker, you're going to use the "Crazy 4" ideation exercise. 2. Fold the paper in half horizontally along its length (longer side) once, then fold it vertically (shorter side) in half 3. Open up the paper, you should have 4 equal rectangles. 4. Set the timer for 4 minutes, with the option to buzz every minute. 5. You'll use those 4 minutes to draw 4 ideas, one idea in each square in one minute. 6. When you hear the 1 minute buzz, move directly to the next square. 7. When the 4 minutes are done, you should have 4 different ideas of projects that could solve/improve the problem you've investigated. 8. Now, choose your 2 favorites and present them to each other. 9. When everyone has presented their top 2 ideas, vote for the best with stickers. <p>Depending on the time available you can only plan, write and draw how your solution would look like or you can actually build it using the Explore IoT Kit Rev2, external sensors and crafting materials.</p> <ol style="list-style-type: none"> 10. Once you have decided the final idea for your team plan, draw and ideate how that project would look like, what sensors and actuators it would use and where it would be placed in the classroom. 	<p>If there is a lot of time groups could actually try to build their ideas</p>
<p>Presentation</p>	<p>Trainer presents one of our solutions</p> <p>How do <u>curtains</u> affect the humidity levels in the classroom?</p> <p>We tested the humidity levels for a week with curtains open and curtains closed. When the curtains were open the sun was making the room warmer, people were sweating and breathing heavier and the humidity levels were higher. But still people wanted to have the curtains open to experience the nice sunlight and avoid using the rooflamps during daytime.</p>	<p>Present your group's idea to the rest of the participants</p>	<p>All the teams should present their ideas to the other teams and as a last trainer can present our ready built solution.</p> <p>FT Content account's Arduino Education School Space has this example</p> <p>Sketch https://create.arduino.cc/editor/FT-CONTENT/f064b92b-bafe-422d-b67b-885f7557fa20/preview</p>

<p>Our solution is to collect the humidity and temperature values, present them in an advanced chart and have an automated system that when the humidity levels are above 50% the colored RGB LEDs turn red on the carrier and we know to open the window or close the curtains.</p> <p>At the moment the project</p> <ul style="list-style-type: none">- Reads the humidity and temperature values from the carrier- Presents the values on the dashboard- Advanced chart widget compares the values from the two sensors (included only in school plan)- Collects historical data to our dashboard (school plan 6 months - free 1 day)- If humidity is above 50% RGB LEDs turn red, otherwise they are green <p>Things that can be added to the project:</p> <ul style="list-style-type: none">- The lights and display on the carrier indicate the humidity level- and the dashboard prints us a message saying "Time to turn the fan on!" This fan can be turned on from a button on the dashboard from the computer or phone. Once the humidity levels are on a good level the fan turns off automatically.		Thing and Dashboard name: Explore IoT Rev2 Training
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