

Program an LED Light Show – Workshop (Students)

At this workshop students have learnt the basics of using the Tinkercad Circuits interface to build a simple battery-powered LED circuit. Next, they have learnt how to connect an Arduino to the circuit and program it to blink the LEDs. Finally, they applied what they had learned to make their own LED light show. Students have also learnt some best practices for building circuits, and how to debug and troubleshoot their circuits and code.

Workshop Overview

1. Create a New Circuit - in the Tinkercad Circuits workspace, create a new circuit, and give it a name like "My First Circuit" .
2. Build a Basic LED Circuit - build a series circuit in Tinkercad with a 9V battery, LED, and 1 kilo-ohm ($k\Omega$) resistor. Make sure the long leg of the LED is connected to the positive (red) terminal of the battery. When you click "Start Simulation," the LED should light up.
3. Connect an Arduino and Breadboard - start a new circuit in Tinkercad. Add an Arduino and a breadboard to the circuit, rotate them both 90 degrees so they are upright, and put them next to each other. Connect the Arduino's 5V and GND pins to the breadboard's power (+) and ground (-) buses respectively. Use neat, color-coded wiring.
4. Blink an LED - connect an external LED to Arduino pin 13 using the breadboard in Tinkercad. This time students will need to change the value of the resistor – set it to 220Ω . Click the Code button and use the Blocks dropdown menu to select "Text." When you click "Start Simulation," the LED should blink on and off.
5. Add Multiple LEDs - add more LEDs and design your own LED light show in Tinkercad. You can make the LEDs blink on and off in different patterns, or even try to make simple animations like an "LED chaser."
6. Learn to Use Registers - registers are specific locations in a microcontroller's memory. Each register is made up of individual *bits* that can be either 1 or 0. Many registers have special functions related to the microcontroller's hardware – for example, the Arduino's digital I/O pins. There are registers you can use to replace the `pinMode()`

and digitalWrite() commands in your Arduino code. This approach lets you control up to 8 LEDs with a single line of code.

7. Transfer the Simulation to the Real World – create the LED light show on real devices.

The workshop focused on the issue of digital humanities in the context of the whole human sciences. Digital humanities are a dynamically developing sphere representing the synergy of "traditional" humanities with evolving technological tools, while the digitization of resources/objects plays a key role in the processes of preservation and accessibility of cultural heritage. The future of education in the field of cultural heritage is closely linked to the preparation of students for the meaningful articulation of humanities within the framework of digital (network) tools.