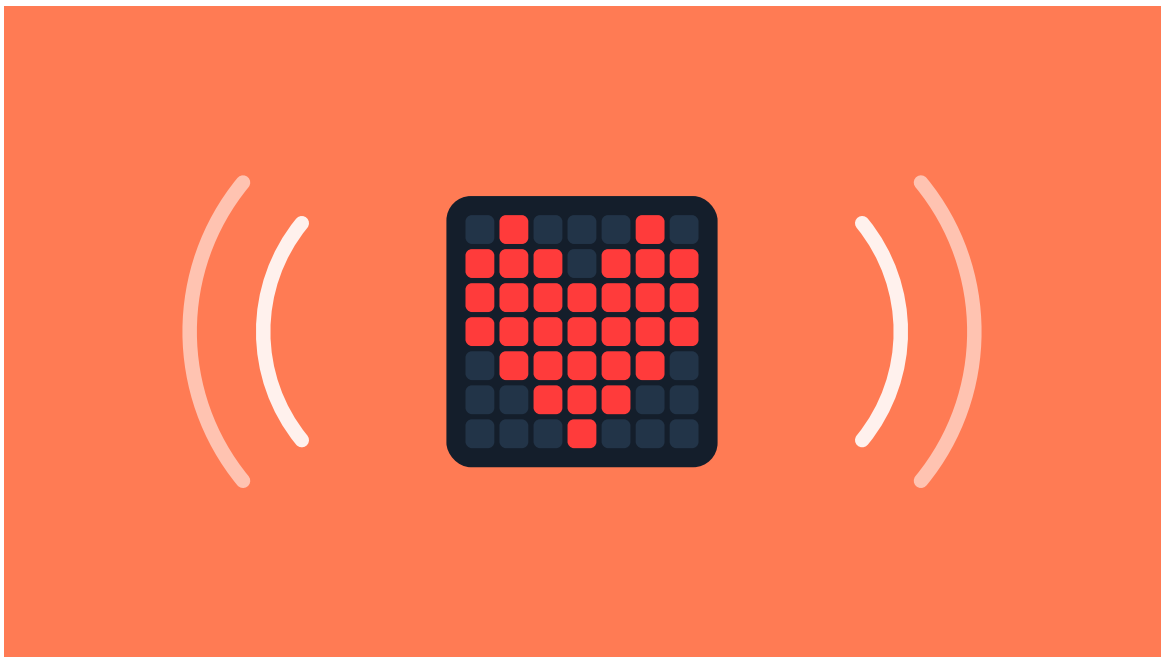

The Blinking Heart

Discover sequences and timing: program a glowing heart that turns on and off with the rhythm you decide.

Grades

- Grades 3-12

Materials

- Mobile phone, tablet or computer
- Internet connection

Description

In this activity students learn two fundamental programming concepts: the sequence (instructions run one after another, in order) and timing (the pauses that make actions visible). They will use them to program a glowing heart that blinks on an LED panel.

Educational Goals

- Understand the concepts of "sequence" and "timing".
- Create a technological object (prototype) using a device.
- Identify the relationships between technology and the surrounding world.
- Evaluate their own work and that of others, individually and in teams.
- Discuss and reflect on ideas for improvement.

Opening (10 minutes) - Introducing the Concept of Time

1. Welcome the students and present the activity: **"Today we will program a glowing heart that turns on and off, as if it were beating."**
2. To spark the discussion, start with a question: **"Do you know what makes the screen of your phone light up?"**
3. After they share their ideas, explain that the screen is made of tiny lights called LEDs. Then pose a thought experiment: **"Imagine writing a program that tells the heart to turn on and, on the very next line, to turn off. What do you think you would see?"** Let them discuss. The answer is... nothing! This is the perfect moment to explain that

computers are incredibly fast and why we need to program pauses, introducing the concept of "timing".

What is an LED?

Have you ever looked closely at the screen of your TV or smartphone? It is made of millions of tiny, powerful lights called **LEDs**. LEDs are all around us, from the big ones that light up a room to the small ones that work together to create the images you see on a screen.

And the phone screen?

Your phone's screen is full of thousands of these tiny LEDs. When you watch a video or look at a photo, these are the lights turning on and off to form the image. Our glowing heart works the same way: it is a drawing made of LEDs, and with our code we decide when it turns on and when it turns off.

The Speed Problem

Here is a riddle: imagine telling your prototype to turn the heart on and then, in the very next instruction, to turn it off. You would expect to see a quick flash, right? But you would actually see nothing! Why? **Machines are incredibly fast!** The heart turns on, but it goes dark so quickly that our human eyes cannot even notice it.

The Pause that Makes Everything Visible

Computers cannot guess what we want: we have to tell them **how long to wait** between one instruction and the next. This act of pausing for a precise amount of time is called **timing**. In programming we can measure time in **seconds** or in **milliseconds** (1000 milliseconds = 1 second). With a 400-millisecond pause between turning on and turning off, the heart's blink becomes perfectly visible.

A Sequence with Rhythm

In programming, a **sequence** is a series of instructions that run one after another, in strict order, from top to bottom. Our sequence will be: turn the heart on, wait, turn the heart off, wait. And then again, as many times as we want the heart to blink. The pauses between one instruction and the next are what gives the **rhythm**.

Development (20-30 minutes) - Building the Blinking Heart

1. With the theory of timing covered, it is time to put it into practice and make the heart blink.
2. Guide your students through **the instructions to connect the device and program the sequence**, detailed in the hands-on section below. Encourage them to experiment with different waiting times to see how the rhythm of the blink changes.

Closing (5-10 minutes) - Reflection and Future Applications

1. Excellent! Once every heart is blinking, move to a final discussion to consolidate their understanding and challenge them to think big.
2. Start the reflection with the key question of the activity: **"In what other situations could we use timing?"** Use the following questions to guide a conversation about how time is used in everyday technology.

Reflect

Your heart is blinking! In what order do the instructions of your sequence run?

What would happen if you removed the pauses? And if you made them longer, or shorter?

In what other real-world situations could you use timing? Think of traffic lights, illuminated signs, games, or even tools you use every day.