We Make Colors - Technical details

 "We Make Colors" is an open source project for both software and hardware. It is designed to be easily built in any fab-lab with a 60x30 cm laser cutter.
The electronics consists of ready-made modules available for online purchase.
The bill of the material is below 20 €, including a 3 $ donation to Arduino for the IDE support.

Source repository:
https://github.com/marcobrianza/wemakecolors

Hardware
The main electronic board is based on the ESP8266 Wi-Fi microcontroller.
The presence sensor is a passive infrared device.
The 9 digital RGB LEDs are WS2812B and can display any color.
The case is made of 3 mm acrylic plastic layers.
Some steal screws hold in place the components and the plastic layers.
The device is powered by a USB cable and a power adapter, connected to mains.

Software
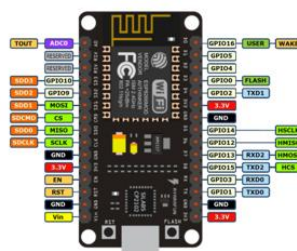
The system is based on the Arduino environment with the core for ESP8266. The network communication is based on MQTT, the current main standard protocol for IoT. The server available at the public address wmc.marcobrianza.it:1883 runs the mosquitto broker on an Arduino Yun Shield. The random color is generated based on the time between two following presence detection measured with high resolution; since this number is random so are the colors.

To avoid intentional interaction, the maximum color frequency generation is one per minute per each device.

The generated colors are sent and received from the server; even a color generated locally is displayed only when is received back from the server.

There is no identification of the device generating the new color.

The colors scroll in the device like in a social network timeline: new colors enter from the top and old ones exit from the bottom.

All the devices have the same colors at the same time.
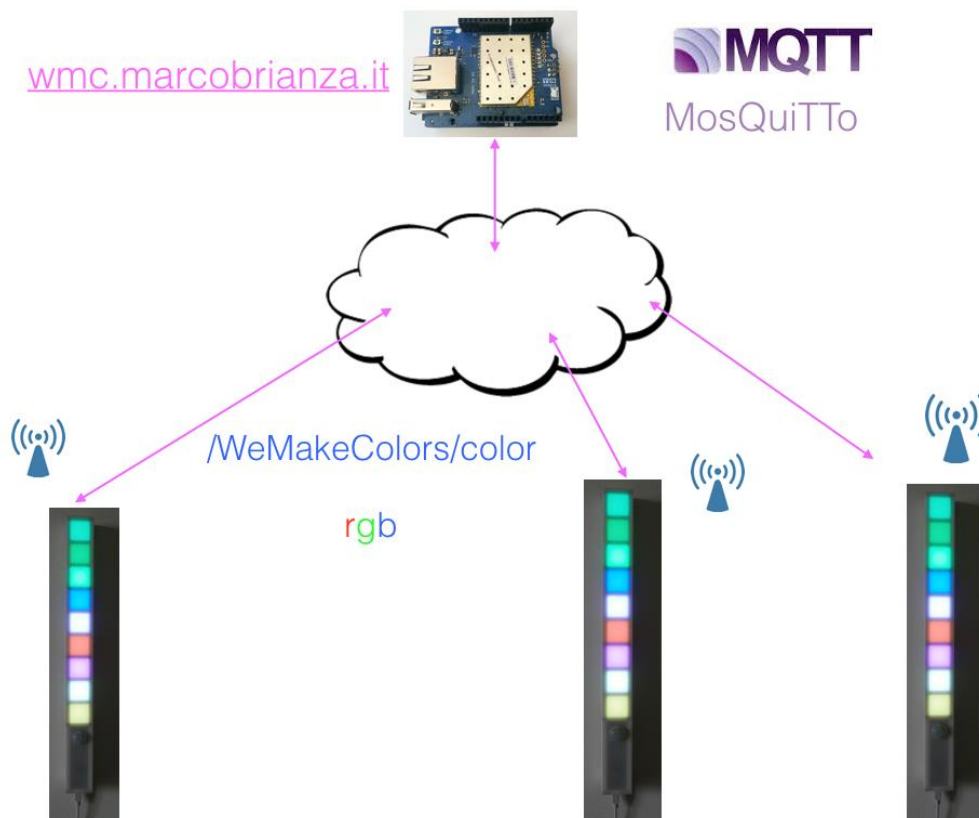
Technical requirements

The device needs Internet connection via Wi-Fi and a power socket (or USB power source) providing 2,5W.