

INTELLIGENT CONNECTED OBJECTS

SUBJECT	IoT Actuators
FORMAT	Individual, pairs, or small groups
PREPARATION TIME	1 hour
ACTIVITY LENGTH	1h30
DIFFICULTY LEVEL	Average

PEDAGOGICAL GOALS

- Develop an IoT project
- To work on the implementation of an application with an actuator
- To learn to control electronic systems using the internet

NECESSARY MATERIALS

- Computer room with computers connected to the Internet
- NodeMCU board or similar
- Breadboard
- Jumpers
- LEDs
- 200R resistors

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Conducting the activity:

- If possible, divide the class into small groups. Each group must have access to a computer with Arduino IDE installed, a NodeMCU board or similar and a cable to connect the board to the computer. If this is not possible, try to take turns so that all students have access to the materials, or work in a collective format, projecting your screen.
- Organize the materials and provide a kit with the components for each group.
- Then ask each group to connect their board to their computer and open the Arduino IDE.
- Present the steps to transfer the code below onto the board.

Code

```
#include <ThingSpeak.h>
#include <ESP8266WiFi.h>

int reading;
int led = D7;

// Network name and password
char ssid[] = "#####"; // SSID Network name
char pass[] = "#####"; // Password

int status = WL_IDLE_STATUS;
WiFiClient client;
int sensorValue; // variable that stores the read analog value

// Information available on ThingSpeak, channel number and writing key
unsigned long canal = #####;
const char * ReadingKeyAPI = "#####";

void setup() {
  WiFi.begin(ssid, pass);
  ThingSpeak.begin(client);
  Serial.begin(115200);
  pinMode(led, OUTPUT);
}

void loop() {
  //Read the last value written into the channel from the parameters below (CHANNEL, FIELD, Read Key)
  reading = ThingSpeak.readLongField(channel, 1, ReadingKeyAPI);

  //Write the value read in Serial Monitor
  Serial.print("Reading: ");
  Serial.println(reading);

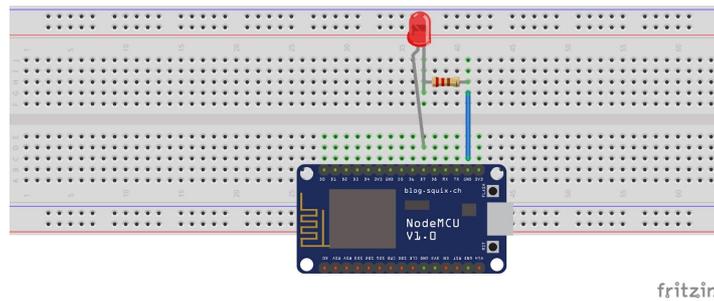
  if(reading == 1){
    digitalWrite(led, 1);
  }

  if(reading == 0){
    digitalWrite(led, 0);
  }
}
```

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Conducting the activity:

- Check the project circuit below:



- Once the network parameters, password, write and read keys and the Thingspeak channel have been changed, ask them to turn the LED on and off using the link generated on the Thingspeak platform:

Replace the last link value with 0 and 1 and check if the LED lights up.

Seguem abaixo dois exemplos de link para ligar e desligar o LED, respectivamente:

https://api.thingspeak.com/update?api_key=LZ05NSZVQGPBNP31&field1=0

https://api.thingspeak.com/update?api_key=LZ05NSZVQGPBNP31&field1=1

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Discussion:

- After completing the activity, discuss the concepts learned with the class, testing and showing the code, if possible. Some questions that can guide the discussion::
 - What is a computer program? How does this program work?
 - Where in the code does the program read information from the internet?
 - What does Thingspeak channel mean?
 - What would happen if the piece of code that is inside the void loop function was passed to void setup?

Credits:

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