



# MAKER EDUCATION

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Magazine No. 2, 2020

February 2020 - April 2020



ISSN 2668-7852 ISSN-I 2668-7852

Co-funded by the  
Erasmus+ Programme  
of the European Union



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Co-funded by the  
Erasmus+ Programme  
of the European Union



**Project Title: Maker Education**

**Main objective of the project: Exchange of Good Practices**

**Project Start Date: 01-09-2019**

**Project End Date: 31-08-2021**

**Project Total Duration: 24 months**

**Applicant Organisation: Colegiul Tehnic „Gheorghe Cartianu”,  
România**

**Website: <https://makereducation6.weebly.com/>**

**Partner Organisations:**

- **SABA, The Republic of North Macedonia, partner**
- **Insignare - Associacao De Ensino E Formacao, Portugal, partner**
- **Erbakir Fen Lisesi, Turkey, partner**
- **Iis Alessandro Volta, Italy, partner**
- **Centrum Kształcenia Praktycznego w Jastrzebiu-Zdroju, Poland, partner**

# 1. Internet of things (IoT). IoT Devices

Short-Term Exchanges of Groups of Pupils, February 24-28, 2020

## 1.1. Meeting agenda

Natasha Marina, teacher

Meeting venue: Foundation „Nikola Kljusev", Private Vocational High School SABA - Skopje

Accommodation: Hotel „London" and Hotel "Alexander Square" – both in the city centre

### February 22-23, 2020 (Saturday, Sunday)

#### Arrivals of the participants

### February 24, 2020 (Monday)

9:00 am to 9:30 am	Morning tea and coffee; Signing the list of participants
9:30 am to 12:30 pm	<b>Cultural Presentation</b> <ul style="list-style-type: none"><li>- Participants present their <b>countries, regions, cities and schools</b> (15 minutes for each country to present itself)</li><li>- Coffee break</li><li>- Expectations of the week</li></ul>
12:30 pm to 13:00 pm	<b>Team building activities</b> – name learning – ball game
13:00 pm to 14:00 pm	<b>Lunch</b>
14:00 pm to 17:00 pm	<b>Sci-Fi Festival</b> <u>Presenting a Sci-Fi book or a film</u> – each country presents a Sci-Fi book or film putting the emphasis on the technology used in the film or book and the possibility of being used in real life – How far from the reality is that technology or is there basis in real science? Free time, visiting the city

### February 25, 2020 (Tuesday)

9:00 am to 9:30 am	Morning tea and coffee; Signing the list of participants
9:30 am to 13:00 pm	<b>Students:</b> <ul style="list-style-type: none"><li>- Presentation of <b>microcontrollers</b></li><li>- Presentation of <b>IoT</b></li><li>- Practical work – <b>Arduino workshop</b> – Presentation of the work done in the project</li></ul> <b>Teachers:</b> <ul style="list-style-type: none"><li>- <b>eTwinning workshop</b> where all participants will enter the platform and simulate a video chat. If there are any problems with the signing in to the platform it will be</li></ul>

	resolved during this workshop
13:00 pm to 14:00 pm	<b>Lunch</b>
14:00 pm to 16:00 pm	<b>Teaching activity</b> – Teachers attend classes. <b>Students</b> play <b>team building games</b> , memory games, language games, visual and spatial games, reasoning games in order to get to know each other better. Free time, visiting the city
<b>February 26, 2020 (Wednesday)</b>	
9:00 am to 9:30 am	Morning tea and coffee; Signing the list of participants
9:30 am to 13:00 pm	<b>Students:</b> <ul style="list-style-type: none"> <li>- <b>Presentation</b> of the system for detecting gasses accenting the IoT component of the system</li> <li>- <b>Workshop – Arduino and sensors</b> – systems for detecting temperature, humidity, vibration and gasses in the air</li> </ul> <b>Teachers:</b> <ul style="list-style-type: none"> <li>- <b>Training course</b> – Innovation in didactic,</li> <li>- Kahoot!</li> <li>- Quizizz</li> <li>- Edmodo educational platform</li> </ul>
13:00 pm to 16:00 pm	<b>City Tour</b> (Starting from the Memorial House of Mother Teresa, continuing to the city Square, Old Bazaar – <b>Lunch included</b> - and finishing with The Skopje Fortress)
<b>February 27, 2020 (Thursday)</b>	
9:00 am to 9:30 am	Morning tea and coffee; Signing the list of participants
9:30 am to 13:00 pm	<b>Students:</b> <ul style="list-style-type: none"> <li>- <b>Presentation</b> of the system for improving efficiency of solar panels</li> <li>- <b>Continuing the workshop with Arduino and sensors</b></li> <li>- Successful teams continue the activity with adding a relay</li> </ul> <b>Teachers:</b> <ul style="list-style-type: none"> <li>- <b>Visiting an institution</b></li> </ul>
13:00 pm to 14:00 pm	<b>Lunch</b>
14:00 pm to 16:00 pm	<ul style="list-style-type: none"> <li>- <b>Students</b> will fill out the evaluation forms.</li> <li>- <b>Teachers</b> will evaluate the overall activity and discuss about the next mobility in May in Turkey.</li> </ul>
20:00 pm to 23:00 pm	<b>Festive dinner</b> - Handing out Certificates to the participants
<b>February 28, 2020 (Friday)</b>	
7:30 am to 20:00 pm	<b>Cultural visit</b> - a whole day trip to <b>Ohrid</b> , the largest city on the Lake Ohrid (42,000 inhabitants) once had 365 churches, one for

each day of the year and has been referred to as “Jerusalem of the Balkans”. The city is rich in culture, tradition and in 1980 Ohrid and Lake Ohrid were accepted as Cultural and Natural World Heritage Sites by UNESCO.

Departure of the participants

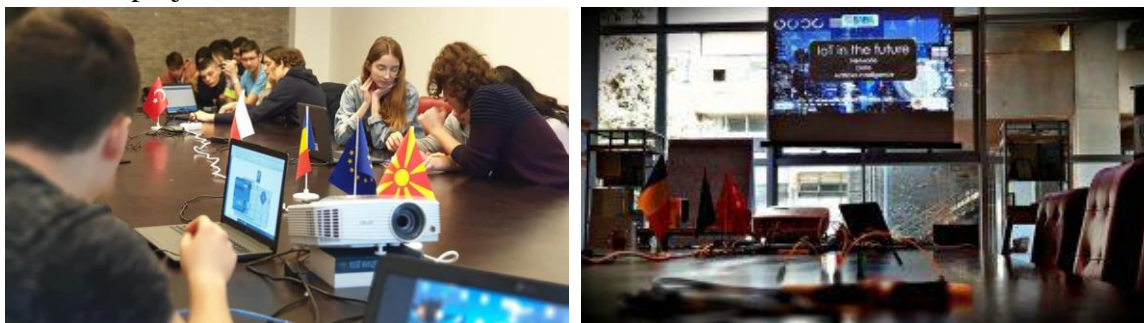
February 29, 2020 (Saturday)

Departure of the participants

## 1.2.Mobility in Skopje

*Natasha Marina, teacher*

From 24 February to 28 February, the SABA High School hosted students and teachers from five European countries: Romania, Turkey, Portugal, Italy and Poland. During the one-week training in Skopje, topics of Internet of things (IoT), IoT devices and Artificial Intelligence were discussed. This training was part of a two-year Maker Education project.



The first day of the Mobility was intended for making new acquaintances. At the beginning some ice-breaking games were played to introducing the participants from the six different partner countries to each other and after that followed the presenting of each other's countries, cities where they come from and their schools. At the end of the working day there was a **Sci-Fi Festival - Presenting a Sci-Fi book or a film** – each country presented a Sci-Fi book or film putting the emphasis on the technology used in the film or book and the possibility of being used in real life. We tried to answer the question – How far from the reality is that technology or is there basis in real science?

The next three following days were linked with the Practice Based Learning for the students. At the beginning of every workshop were the presentations on Microcontrollers, the notion of Internet of things and its vast implications. The presentations were aimed at the students, but the teachers also attended them and were notably impressed as they stated later on.

Students from abroad, along with students from SABA Skopje, worked on practical exercises using Arduino, microcontrollers and sensors. They were learning how to connect successfully sensors to the Arduino and program them for a specific purpose.





Teachers, on the other hand, after the presentations, had different Agenda than the one of the students. They received training in the use of new teaching techniques and attended classes at the High School SABA where they were able to see how the new techniques were applied in SABA.

Fortunately, it wasn't only work and learn all week long. During the week-long stay in Macedonia, the visitors from our partnering countries, students and professors alike, went on a **City Tour** around the capital of Macedonia – Skopje starting from the Memorial House of Mother Teresa, continuing to the city Square, Old Bazaar and finishing with The Skopje Fortress.

The last day of the Mobility was reserved for the **Cultural visit** - a whole day trip to the city of **Ohrid**, the largest city on the Lake Ohrid (42,000 inhabitants) once had 365 churches, one for each day of the year and has been referred to as “Jerusalem of the Balkans”. The city is rich in culture, tradition and in 1980 Ohrid and Lake Ohrid were accepted as Cultural and Natural World Heritage Sites by UNESCO. This cultural trip also included the **Monastery of St Naum**. It is an Eastern Orthodox monastery in Macedonia, named after the medieval Saint Naum who founded it. It is situated along Lake Ohrid, 29 kilometers south of the city of Ohrid.



## Short report of practical activities

Day	Activity
25.02.2020	<p><b>Presentation about Internet of Things.</b></p> <p>In this presentation was have given explanation about the area of this technology, comparison of global data and usage of IoT, referring to the benefits of technology to society. IoT architecture was explained and video animations were played to visualize how things are working.</p> <p>On the practical part of the daily activity students were divided in 5 groups and were working on creating a startup project and managing signals for 3 LED lights, programming the Arduino board and changing code parameters in order to effectively deliver different signals to the electronic components and create code driven managing system.</p>
26.02.2002	<p><b>Presentation about structure of IoT systems.</b></p> <p>We presented a group of elements as part of the IoT architecture. Sensors were explained with their specifications, and comparison between analog and digital sensors was provided. Furthermore, microcontrollers and their description took place with an electronic scheme elaboration. The second part was a presentation of a “prototype air pollution detection and filtration system” where was visible on sight how IoT systems are implemented and what is the workflow of every single element.</p> <p>On the third part of activity students started creating IoT systems using different kinds of sensors. We created a temperature and humidity measuring system, a machine based tilt sensor system, a rotating motor security vibration sensor system, movement detection ultrasonic system, and flame detection infrared sensor system.</p>
27.02.2020	<p><b>Presentation about IoT computer networks and data transfer systems, sensor data over internet, usage of wireless networks in IoT topology, analog to digital signal converters, and artificial intelligence.</b></p> <p>Later on we had presentation of a prototype IoT system for solar panel efficiency increase and cooling system which is consisted of several interconnected sensors who share data and manage micro controlling and sub module elements.</p> <p>On the third daily activity we started with a brief presentation and practical example of measuring signals and electronic values with digital multimeter and we continued with practical development of several modules using temperature and humidity sensors, a tilt sensor system, vibration sensor system, movement detection ultrasonic system, and</p>



	<p>flame detection infrared sensor. In these activities we had second level of implementation of real situation scenarios and increase usage of programming code, preparing to manipulate and manage other subsystems with signals triggered upon sensor data processing.</p>
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### 1.3.Mobility log

*Gabriela-Brândușa Horlescu, teacher*  
*Constanța Șalaru, teacher*

#### **February 24, 2020 - Science, fiction & Technology Festival Day**

- Cultural presentation - the participants presented their countries, regions, cities and schools.
- Weekly expectations and suggestions
- Team building activities - learning the names - playing ball
- Sci-Fi Festival - Presentation of a Sci-Fi book or movie  
Each country presented a book or Sci-Fi movie focusing on the technology used in the film or book and the possibility of being used in real life - How far is that technology or is there a basis in real science?



#### **February 25, 2020 - IoT -Internet of Things- Day**

Students' activities:

- Presentation of microcontrollers
- IoT presentation
- Arduino Workshop
- Students played team building games, memory games, visual and space games, reasoning games to get to know each other better.

Teachers' activities:

eTwinning workshop where all the participating teachers used the platform, we coordinated an online meeting to test and improve knowledge.

Teaching activity - The teachers attended the classes.



#### **February 26, 2020 - Discover Arduino Day**

Students' Activities:

- Presentation of the gas detection system that accentuates the IoT component of the system
- Workshop - Arduino and sensors - systems for detecting temperature, humidity, vibration and gases in the air

Teachers' activities:

- Training course - Innovation in the teaching field
- Kahoot!
- Quizizz
- Edmodo educational platform

City tour: Memorial House of Mother Teresa, City Square, Old Bazar, Skopje Fortress.



### **February 27, 2020 - Renewable Energy Day**

Students' activities:

- Presentation of the system for improving the efficiency of solar panels
- Continuation of the workshop with Arduino and sensors, adding a relay

Teachers' activities:

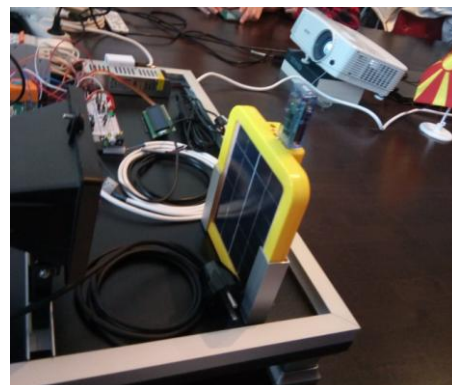
- Visit the National Bank Museum, the Numismatic Collection -

<https://www.nbrm.mk/muzej-en.nspk>

- The teachers evaluated the general activity and discussed the following mobility that will take place during the period 4-8 May 2020 in Turkey.

Handing out Certificates to the participants

Festive dinner, presentation of traditional dances from Macedonia



### **February 28, 2020 – Cultural Day - Discover Ohrid**

Cultural visit - a whole day trip to Ohrid, the largest city on the Lake Ohrid (42,000 inhabitants) once had 365 churches, one for each day of the year and has been referred to as “Jerusalem of the Balkans”. The city is rich in culture, tradition and in 1980 Ohrid and Lake Ohrid were accepted as Cultural and Natural World Heritage Sites by UNESCO.

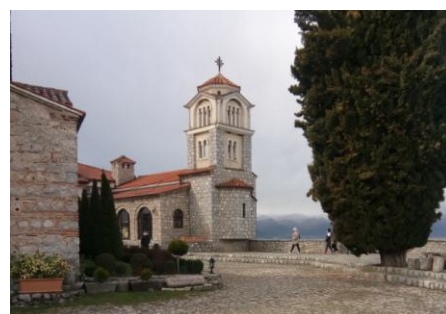
*Discover Ohrid, a place that offers you Peaceful and Balance!*

<http://www.exploringmacedonia.com/ohrid.nspk>

<https://www.youtube.com/watch?v=bX7aITWckTI>

<https://www.youtube.com/watch?v=kCbEjT3VERY>

<https://www.youtube.com/watch?v=uTmuniQcphY>





hardware was an Arduino UNO in conjunction with a breadboard, wire jumpers and the device needed for each experiment.

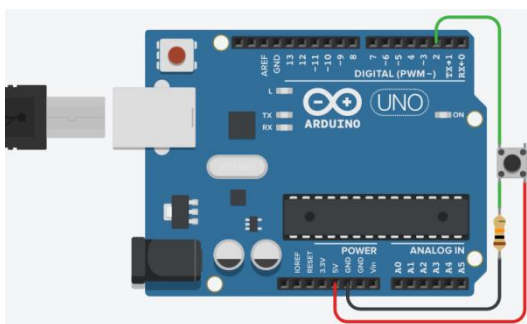
### 1) Detecting a digital signal (Button with LED)

The task in hands was to detect the state of a digital sensor attach to a digital input. Because a digital sensor only gives two logic states, one is LOW (logic level 0) and the other is HIGH (logic level 1), it's possible to mimic any digital sensor with a simple push button or switch. This task allows us to understand how it's possible to read the state of any detector and make an automation for the IoT to act and control any device.

We first did the electrical connection as it is shown in the picture below using and Arduino UNO, a push button, a resistor and some jumper wires the LED used was the on board one, attach to pin 13.

After that, it was time to do the coddng for this experiment. The code consists in initially create some variables for the device in use, then we enter the *setup()* function were the pins of the Arduino UNO will be setup as input or output and finally we enter the *loop()* function were the main code is created. In this case, the code will read the digital state of the pin were the push button is attached and, according with the state of the push button, turn on (button pressed) or turn off (button not pressed) the LED.

*Electrical schematic*



*Code*

```
const int buttonPin = 2;
const int ledPin = 13;

int buttonState = 0;

void setup() {
  pinMode(ledPin, OUTPUT);
  pinMode(buttonPin, INPUT);
}

void loop() {
  buttonState = digitalRead(buttonPin);

  if (buttonState == HIGH) {
    digitalWrite(ledPin, HIGH);
  } else {
    digitalWrite(ledPin, LOW);
  }
}
```

### 2) Automate a digital output (LED blink)

The task in hands was to control, using only the software, the logic state of an output pin. With this task, it's possible to understand how we can automate some tasks in the IoT side of things.

We first did the electrical connection like shown in the picture below using and Arduino UNO, a LED, a resistor and some jumper wires.

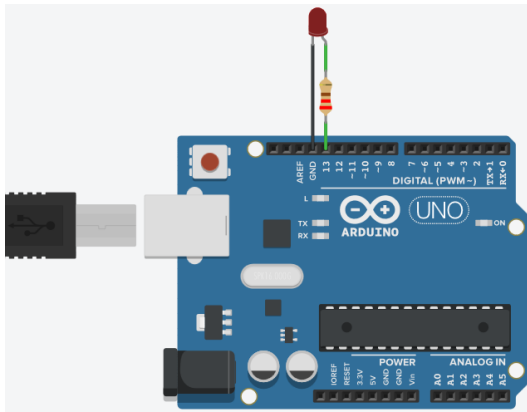
After that, it was time to do the coddng for this experiment. The code consists in the *setup()* function were the pin 13 of the Arduino UNO will be setup as output and finally the *loop()* function were the main code is created. In this case, the code will write the digital state of pin 13 as logic level HIGH, wait for 1000ms (1 second), write the digital state of the pin 13 as logic level LOW, wait for 1000ms (1 second) and do this infinitely. Since the Led is attached to pin 13, we can visualize the chance of logic state by



watching the LED turn on and turn off. Once this task was over, we did some changes to the code for modifying the blink sequence of the LED, that is, living the LED on more time and off less time and vice-versa.

Electrical schematic

Code



```
void setup() {
  pinMode(13, OUTPUT);
}

void loop() {
  digitalWrite(13, HIGH);
  delay(1000);
  digitalWrite(13, LOW);
  delay(1000);
}
```

**3) Sensing a digital signal (Vibration switch with LED)**

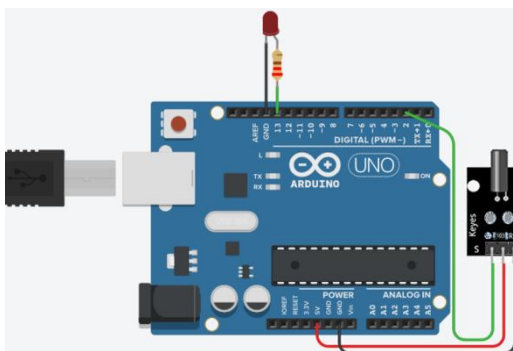
The task in hands was to read the digital value of an input pin. Because as said in the first task, a digital sensor only gives two logic states, it is now time to prove this concept with a vibration switch. This task allows us to understand how it's possible to read the value of any sensor and make an automation for the IoT to act and control any device. For example, with this vibration switch it's possible to make an intrusion alarm for burglars, or even a notification system when someone knocks at the front door.

We first did the electrical connection like shown in the picture below using an Arduino UNO, a LED, a resistor, a vibration switch and some jumper wires.

After that, it was time to do the coding for this experiment. The code consists first of all define some variables for better understanding of what is attached, then in the *setup()* function we set the pin 13 of the Arduino UNO as output for the LED and set the pin 2 as an input for the sensor. Finally the *loop()* function where the main code is created. In this case, the code will read the digital state of the pin where the sensor is attached and, according with the state of the sensor, turn on (sensor activated) or turn off (sensor not activated) the LED.

Electrical schematic

Code



```
const int statusLED = 13;
const int switchTilt = 2;

int val = 0;

void setup() {
  pinMode(statusLED, OUTPUT);
  pinMode(switchTilt, INPUT);
}

void loop() {
  val = digitalRead(switchTilt);
  if (val == HIGH) {
    digitalWrite(statusLED, HIGH);
  }
  else {
    digitalWrite(statusLED, LOW);
  }
}
```



communication between devices for short distances and the RFID will be used to identify a specific device.

For example, it will allow you to receive notifications when the laundry has just been washed. The IoT will change our everyday lives completely.

### **b)The IoT in industries**

The IoT will not just be a part of people's everyday life but will also be part of the industry 4.0 or fourth industrial revolution. The IoT industry is simply the link between devices in a factory, allowing the development of cyber-physicals systems and communication between devices. The industrial IoT will allow to monitor the status of production and each device, remotely, such as the temperature of a specific sensor or the logic level of a door switch. The IoT industry is essentially connecting the devices on the same network.



### **c)The IoT and its applications:**

Next is a list of practical applications of IoT in various sectors of economic activities:

- Hospitals/ Clinics – Real-time monitoring of patient's status.
- Agriculture – Sensors spread throughout the plantations informing the state of the plants, from temperature, humidity to air and soil.
- Factories – Status and monitoring of the states of the machines and their current production in real time.
- Public transports – It will be possible to see on the smartphone or on the bus stop screens, the location of the bus and the estimated time it will arrive.
- Public services/ Utilities – For example, in waste bins, with a sensor that will monitor if it is full, optimizing waste collection.

## **II.Pros and Cons of the IoT**

### **a) Advantages of IoT:**

- Cost savings and downtime.
- Gains of efficiency and productivity.
- Monitoring devices in real time, offering greater control.
- Appearing of new business models.
- Facilitating and simplifying the performance of various daily tasks.

### **Disadvantages of IoT:**

- Privacy, security and data reliability are most at risk.
- Limits of the battery life of the sensors.

### III.Conclusion:

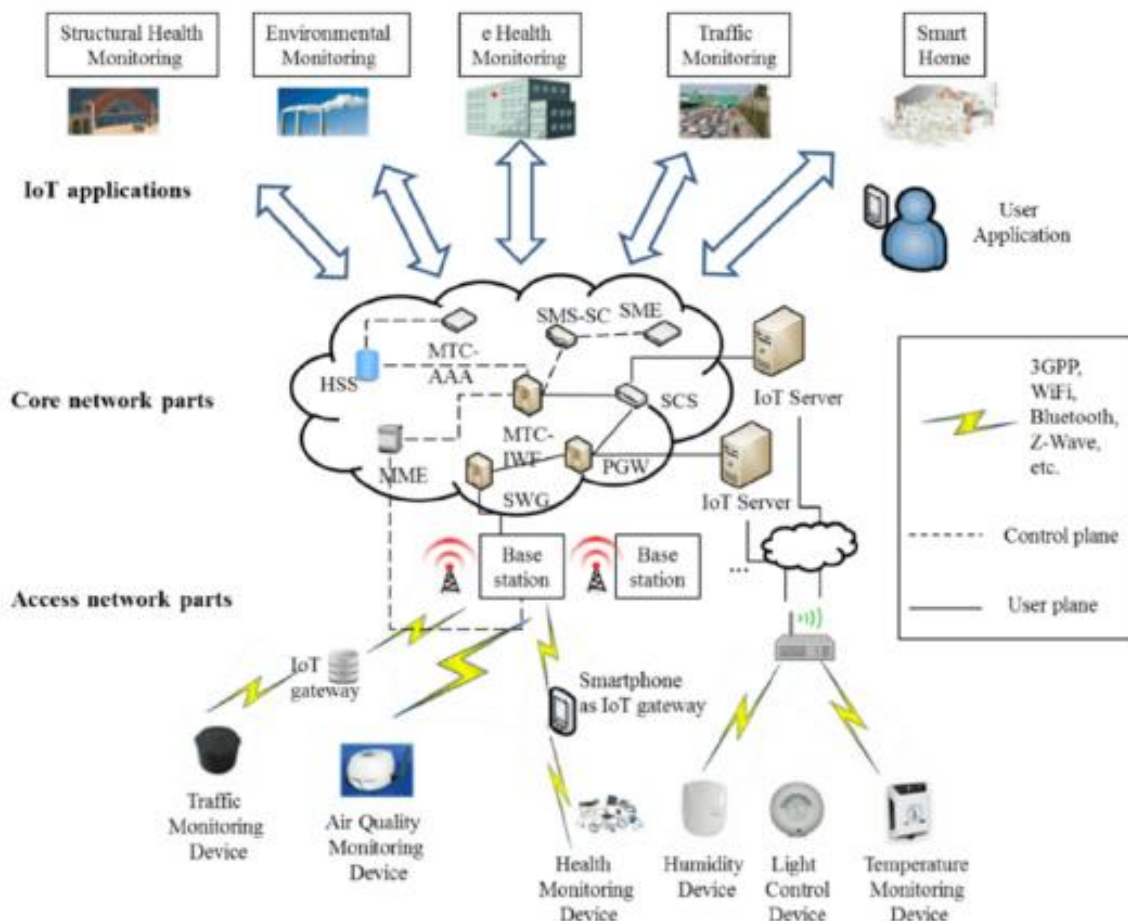
The IoT is here to stay, many of us already use it without knowing. The spread of the technology and the price drop of the many devices are nowadays a clear pass to massification of the IoT. The revolution of the industry 4.0 is a reality, even in our homes, we just must learn and understand the advantages of using it and enjoy the progress.

#### 1.6. IoT- Internet of Things

*Şalaru Constanța, teacher*

The Internet of Things (IoT) is a system of billions of various physical devices, that are connected to the internet, all collecting and sharing data. IoT's components are uniquely identified and the communication between them it's in real-time, without the interaction of the human being. This devices are used in daily activities (cars, home security systems, doorbells, thermostats, lighting fixtures, water meters, splitters, gas detectors. electric current reader, refrigerators, microwaves, even aeroplanes,etc.).

IoT connects people, devices and places in a unitary whole, to assist the daily lives. This is possible by implementing sensors and communication skills to all the devices around us. Through sensors, the devices will collect data from the environment, will connect and communicate with each other and will change the data obtained.



### ***Advantages and benefits***

IoT makes people's life easier. So, when we want automatically the light can turn on, the TV turns on favorite channel, the espresso machine prepare the coffee toaster to toast bread, the car is ready when we want to leave, select the best in safety way, parks automatically.

So, in smart cities, we will live in smart homes and we will drive smart cars.



Our health will be monitored, every minute, continuously, and it will be possible to inform automatically and timely the doctors if occur health problems.

*In agriculture*, most agricultural equipment will be connected to an intelligent management system, which eliminates downtime and reduces fuel consumption.

*In industry*, IoT will allow the optimization of workers and cargo flows, that it is essential in profit.

### ***Disadvantages and risks***

*Connectivity issues* - When a device is compromised, gives up or delivers erroneous data, the effect will spread to all systems that depend on it directly or indirectly.

*Security issues* - In this moment the devices are vulnerable; these devices not have software for automatic updating and use poorly encrypted communication channels.

*Data privacy issues* – Most of these systems are vulnerable to cyber attacks.

### ***Conclusions***

The evolution of technology is beneficial, if is no risk of compromising the interconnected intelligent systems and endanger the data.

It is estimated that the positive impact of the IoT will be greater than the associated dangers. And, surely, this is the future.

### ***Biography***

<https://techtimes.ro/ce-este-si-la-ce-serveste-iot-internet-things/>  
<https://intelligence.sri.ro/igiena-cibernetica-dispozitivelor-iot/>  
<https://cybersecuritytrends.ro/internetul-lucrurilor-vis-frumos-sau-cosmar/>  
<https://pressone.ro/internetul-lucrurilor-sau-cum-ne-aruncam-voiosi-in-matrice>  
<https://www.zdnet.com/article/what-is-the-internet-of-things-everything-you-need-to-know-about-the-iot-right-now/>  
<https://medium.com/@s.azad4/iot-internet-of-things-summarized-d2d97909bd27>  
<https://www.researchgate.net/>



## 2.Programming in Arduino of a Temperature

### Measurement System with Sensor Tmp36

*Carolina Santos, Rafael Guerra*

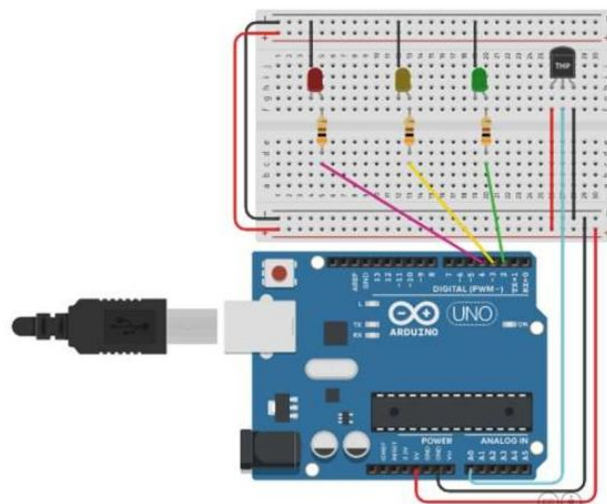
#### INTRODUCTION

In this paper we will talk about the activities carried out in class using an online simulator, called Tinkercad, and then practice it only with a breadboard, 3 LEDs, a temperature sensor and 3 resistors.

It is intended to make a system capable of reading the temperature while lighting up the LEDs. When the temperature is 25°C, +/- 5°C (i.e. between 20 and 30°C), it is still quite acceptable, and under these conditions a green LED will be illuminated. Deviations greater than +/- 5 ° C but equal to or less than +/- 10°C are reason to care, so a yellow LED should light up. Finally, deviations greater than +/- 10°C are reasons to call attention, so it should light up the red LED. In every moment only one LED is lit, while all the others will remain off.

#### ELECTRONICS

First, we designed the electronic circuit, where the LEDs (yellow, red and green) and their resistance of 300  $\Omega$ , to limit the current passing through them, were inserted on the breadboard. Then we connected the positive (red wire) to + 5V pin of Arduino UNO, the negative (black wire) on the GND input. For the sensor, a wire is connected to an analog input (A0), thus connecting the temperature sensor [TMP36] at its output pin "Vout", and feeds respective Vcc and GND. These connections can be seen in Figure 1.



*Figure 1 - electrical circuit diagram*

## ***UTILITY / FUNCTION COMPONENTS:***

### **Temperature Sensor [TMP36]:**

Sensors are devices able to read the room temperature and turn them into information to know which LED lights. The sensor used has three pins available, the left and the positive supply (Vin), the center of the analog output (Vout) of the right and the mass (GND).



*Figure 2 - Temperature sensor*

### **LEDs:**

The LEDs have the function to provide visual information depending on the temperature of the LED lights (green, yellow and red). They consist of two pins, the longer being the anode, usually connected to positive supply part, and the shorter pin, called the cathode, typically connected to the low potential.



*Figure 3 - LEDs*

### **Resistances:**

The resistors are components that are intended to provide an opposition to the passage of electric current. They have the function of controlling the electrical current on the desired components and are constituted by two pins that have no polarity.



*Figure 4 – Resistance*

## **PROGRAMMING**

Here we highlight the main parts of the code done, which are the creation of the variables, the pin configuration and the main cycle.

Initially, the variables were created for our code, as shown in Figure 5.

```

const int onegreen = 2;
const int LedAmarelo = 3;
const int LedVermelho = 4;
A0 = const int sensor;
const int = 25 TempREF;
int TempAnalogica;

```

*Figure 5 - Declaration of variables*

After the setup () function, the pins are configured as they would be used as inputs and outputs, as shown in Figure 6.

```

void setup () {
    pinMode (onegreen, OUTPUT);
    pinMode (LedAmarelo, OUTPUT);
    pinMode (LedVermelho, OUTPUT);
    pinMode (sensor input);
}

```

*Figure 6 - setup () function - pin settings*

Finally, the main loop () function, where was first carried out a read operation of the value of the sensor, after a conversion of the voltage value into a temperature value; finally, the necessary comparisons to activate the LED corresponding to each situation as it can be seen in Figure 7.

```

void loop () {
    TempAnalogica analogRead = (sensor); 0 // -> 1023
    TempAnalogica float * Vout = (5.0 / 1023.0);
    // Set for TMP36 sensor
    Vout = Vout - 0.5;
    TempAtual = Vout / 0.01; // 10mV / ° C
    Account = abs (TempREF - TempAtual);

    if (Account <= 5) {
        digitalWrite (onegreen, HIGH);
        digitalWrite (LedAmarelo, LOW);
        digitalWrite (LedVermelho, LOW);
    }
    if (Account > 5 && Account <= 10) {
        digitalWrite (onegreen, LOW);
        digitalWrite (LedAmarelo, HIGH);
        digitalWrite (LedVermelho, LOW);
    }
    if (Account > 10) {
        digitalWrite (onegreen, LOW);

        digitalWrite (LedAmarelo,
        LOW); digitalWrite
        (LedVermelho, HIGH);
    }
}
}

```

*Figure 7 - loop () function - the main code loop*

When the sensor detects a temperature of 20°C to 30°C the Green LED turns on; between 15°C to 19°C the yellow LED illuminates; from 31°C to 35°C the red LED lights up. Above 35 ° C and below 15 ° C the red LED lights up.

If the calculated value of "Count" variable is less than or equal to 5, it will light the green LED up and delete the rest; if it is between 5 and 10, it will be lighten the yellow LED up and delete the rest; if greater than 10 will light the red LED and the others (Green, Yellow) will all go out. As the result cannot be below 0, it will therefore always give a higher result than 0. All these comparisons were made possible using cycles "if"

## **CIRCUIT ASSEMBLY**

### ***INSTRUCTIONS:***

First, the components needed are:

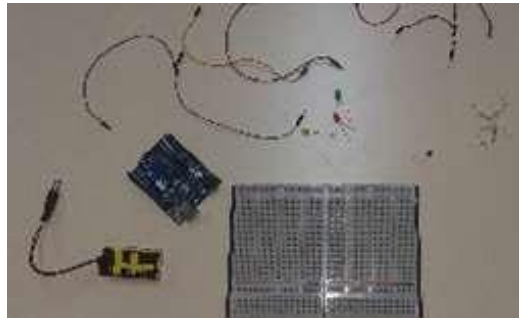
- 9 wires;
- A temperature sensor (TMP36);
- 3 resistances of 300 Ω (ohm);
- 1 9V Battery;
- 1 Breadboard;
- 1 Arduino UNO.

Then we put the 3 LEDs, then the 3 resistances and finally the temperature sensor (TMP36) on the breadboard.

We connect with a wire beneath each resistance the red, yellow and green to each pin and finally is connected one of the nine wires to the middle of the temperature sensor (TMP36). Then, just connect the battery to the Arduino so the components have energy.

### ***PRACTICAL REALIZATION:***

First all the necessary components are gathered.

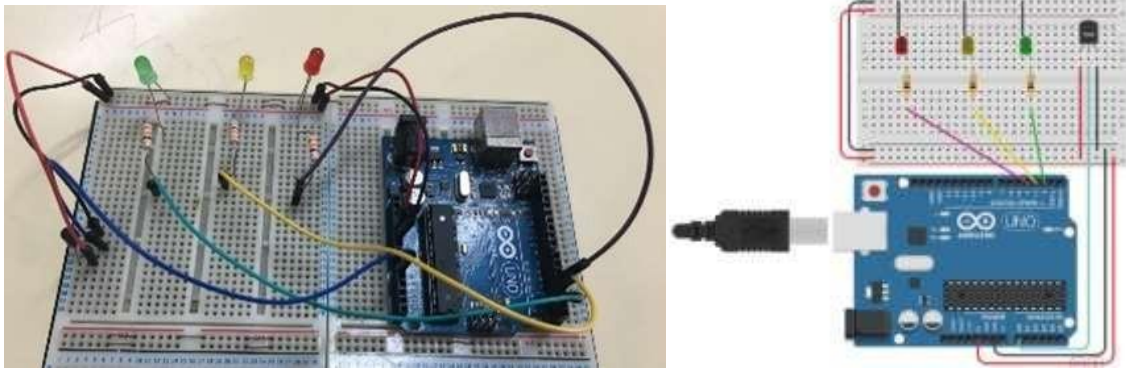


*Figure 8 - Gathering of components*

Then all components are connected, without the energy, to the slots.

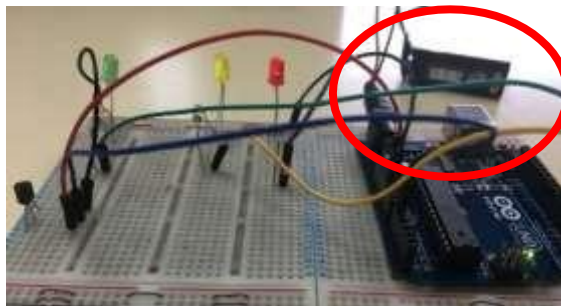
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*Figure 9 - Connections according to the circuit diagram*

After that, the battery is connected to the Arduino so all components can be powered.



*Figure 10 - Circuit Power*

It is verified if the sensor is measuring a temperature between 20°C and 30°C, so the green LED is lit.



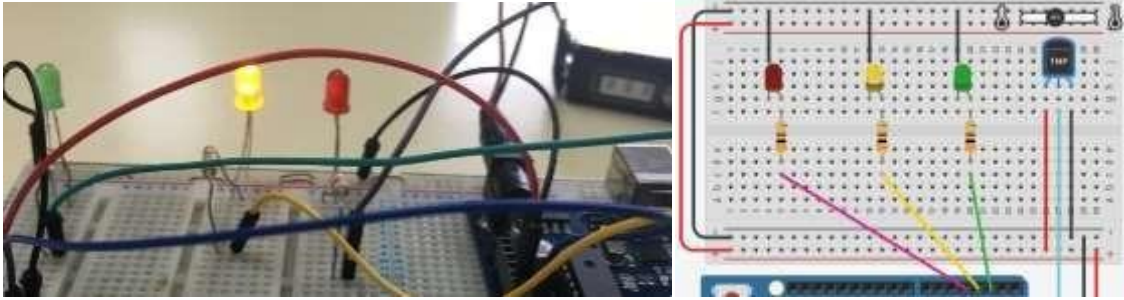
*Figure 11 - Green LED Operation Check (temperature between 20 and 30 ° C)*

Here it can be seen that the yellow LED is lit, that is to say that the temperature sensor is measuring a temperature between 15°C to 20°C and between 31 to 35°C.

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*Figure 12 - Operation Check the Yellow LED  
(temperature between 15 and 20 and between 25 and 30°C)*

Finally, we the sensor is detecting a temperature below 15 ° C and above 35 ° C, when the red LED is lit.



*Figure 13- Red LED Function Check (temperature below 15°C or above 35°C)*

## CONCLUSION

We concluded that with this type of work we had a greater opportunity to know better the subject terms. From the beginning we had difficulties to understand the matter and made some mistakes, but then as we begin to develop it, we began to understand it. In the end we realized much better instead of seeing someone to do it for us.

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### 3.Educational Events in Early Spring

*Gabriela-Brândușa Horlescu, teacher*  
*Ana-Irina Secară, teacher*

The paper presents the activities implemented within the project in March 2020:

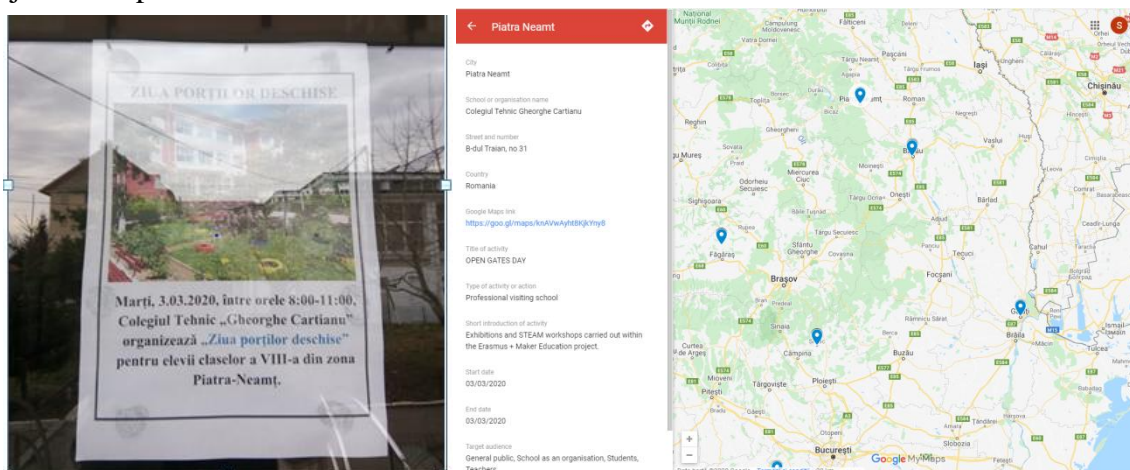
- *Stem Discovery 2020 Week, Open Day, March 3, 2020*
- *Robotics - linking bridge among high school students, March 4, 2020*
- *Spring Festival, March 1-9, 2020*

#### **Stem Discovery 2020 Week, Open Day** **March 3, 2020**

The activity of the **Open Day**, organized within the Erasmus + Maker Education project, was selected within the STEM 2020 Discovery Campaign.

This is a joint international initiative organized by Scientix that invites projects, organizations, libraries, schools, universities and youth clubs in Europe and around the world to celebrate careers and studies in the fields of Science, Technology, Engineering and Mathematics (STEM). (<http://www.scientix.eu/events/campaigns/sdc20>)

The students from the eighth grade from the secondary schools in the neighborhood of Piatra Neamț, visited the IT lab of our high school. On this occasion, the **Maker Education** project team presented the STEAM activities.



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Erasmus+ project presentation



The exhibition "Winter holidays" containing handmade objects



Exhibition "Spring Holiday" containing handmade objects



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**„Arduino”  
workshop**

**Robotics**



**„Raspberry PI” Robotics  
workshop**



**„Lego Mindstorms EV3”  
Robotics workshop**



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## „3D Printing” Workshop



The students in the 12th E have presented the qualification "Technical computer operator".



Our school offers many opportunities for vocational training and development for students. In addition, the activity carried out within the educational projects, develops the creative sense, the skills of teamwork and the responsibility towards the work done.



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## Robotics - linking bridge among high school students

March 4, 2020

The students from the “Petru Rareș” National High School Piatra Neamț, the members of the **SNAKE TECH** team made an interesting demonstration in robotics in the Conference Room of our high school. The team is currently preparing for the national stage of the International Robotics Competition for High School Students **FIRST Tech Challenge Romania**.

Complete details about the contest can be accessed from the address: <https://natieprineducatie.ro/>.

The exchange of experience continued with the presentation of the works of our students from the **Electronics and Robotics** group of the **Neamț County Excellence Center**, made within the **Maker Education** Erasmus + project.



## Spring Festival

1-9 March 2020

Once the spring has come Romanians from everywhere celebrate **Mărțișor** with great enthusiasm.

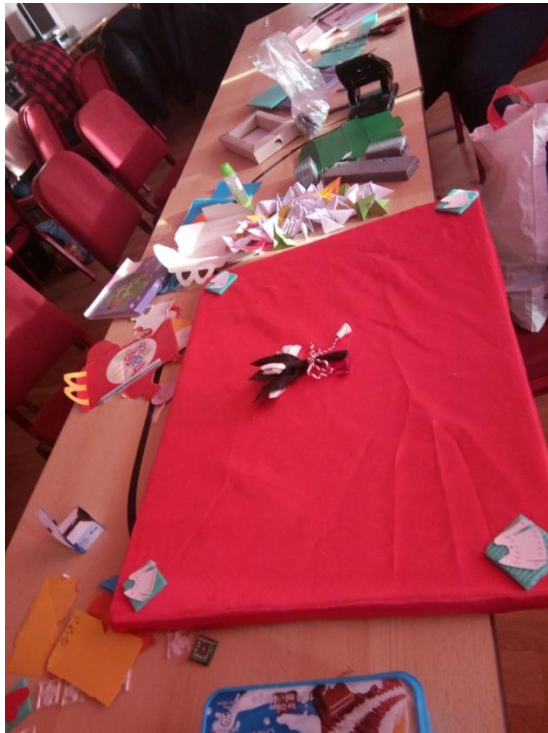
An element of great cultural heritage, in 2017 UNESCO listed **Mărțișor** in the Representative List of the Intangible Cultural Heritage of Humanity.

Using recyclable materials, a beautiful exhibition of **Mărțișor** and ornaments dedicated to spring was made by the students of our high school.

From the desire of keeping and transmitting the habit of offering and receiving a **Mărțișor** in spring, the Erasmus + project implementation team offers all of you a virtual **Mărțișor** and wishes you a beautiful spring!

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## 4. *Mărțișorul* - the symbol of spring

### 4.1. *Mărțișor* - between tradition and literature

Oana Airinei, teacher

*Mărțișor* is a small object of adornment connected with a string braided with a white and a red thread, which appears in the tradition of Romanians and neighboring countries. It is said that in ancient times the *mărțișor* was made of two threads of coloured thread, white and black or white and blue. The custom of the *mărțișor* is actually a sequence from the ritual scenario of spring time to the death and symbolic rebirth of the old woman Dochia. Some traditions say that the thread of the *mărțișor* would have been twisted by the old woman Dochia as she climbed the mountain. Like the Fortune Teller that twists the thread of human life, Dochia twisted the thread of the year. That is why the ethnologist Ion Ghinoiu called the *mărțișor* 'the rope of the days, weeks and months of the year, gathered in a two-colour string'.

With this symbol of spring, early spring flowers are often offered, the most representative being the snowdrop. Women and girls receive *mărțișor* and wear it during the month of March, as a sign of the spring arrival.

The origins of the *mărțișor* are not known for sure, but its presence in both Romanians and Bulgarians (under the name of *Martenița*) is considered to be due to the common Dacian-Thracian substrate, prior to Romanization to the former and to Slavicization to the latter, although popular legends give it other origins. In the modern mythology of the Bulgarians the *mărțișor* was related to the founding of their first *hanat* on the Danube in 681, but the Latin name indicates something else. It is also considered that the feast of *mărțișor* appeared during the Roman Empire, when the New Year was celebrated on the first day of spring, in the month of Mars (the god of war, but also of fertility and vegetation).

From the documentary point of view, the *mărțișor* was certified for the first time in a work by Iordache Golescu. The folklorist Simion Florea Marian reports in the work *The Romanian Holidays* that in Moldova and Bukovina the *mărțișor* was made of a gold or silver coin, caught with a white-red thread, and was worn by children around the neck. The adolescent girls also wore thongs on the throat during the first 12 days of March, so that they would then catch it in their hair and keep it until the arrival of the first migratory birds and the flowering of the trees. At that moment, the girls took out their *mărțișor* and hung it by the branch of a tree, and the coin was used to buy cheese. These "rituals" ensured a productive year.

Nowadays, this symbol of spring is worn throughout March, after which it is caught by the branches of a fruit tree. It is believed that this will bring prosperity in people's homes. Also, it is said that if someone makes a wish when hanging it on the tree trunk, it will be fulfilled. The wearing of the *mărțișor* differs, in our country, from one region to another. To

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be loved, the girls in the Banat area wash with snow. In the Dobrodja area the *mărțișor* is worn until the arrival of the migratory birds. Then they are blown up so that happiness reaches its highest levels. In order to scare the evil spirits in the Transylvanian areas, the *mărțișor* is hung by the doors, windows, the horns of the animals. The people in Bihor believe that if people wash with rainwater on March 1, they will be more beautiful and healthier. The exception is the area of Moldova where on March 1 girls offer *mărțișor* to boys. In their turn, they offer them *mărțișor* and flowers on March 8th.

In literature, the *mărțișor* did not have a spectacular representation, generating a small literature, especially poems, occasional novels, more or less successful. It also inspired some composers, being the topic inspiration of some pop songs.

The beloved poet Tudor Arghezi had a soul connection with the *mărțișor*. He lived on the outskirts of Bucharest, by chance on a street called *Mărțișor*. There he bought a piece of land where he raised over time a farm house called *Mărțișor*. Tudor Arghezi states: *I feel the sap of my life being drawn from these lands, like the sap of trees, herbs, geese.*

The garden from *Mărțișor* probably stands at the origin of the poetic motive of the garden, frequently encountered in the poet's lyrics, combining a number of reasons such as: geese, birds, vegetables. The author himself confesses: *THE MĂRȚIȘOR is the homeland of my literature. From there came the right words and all the writings gathered now in a lot of volumes, thought of at a table in a small room that I had reserved for my reverie ...* It is at this place that the poet rests his eternal sleep.

In the edition of the volume *Verses* of 1936, besides poems such as *Mold Flowers, Words suitable for the poet* includes a cycle of poems *Little Mărțișor*. This cycle depicts the playful side of the poet who believes that *no toy is more beautiful than the word toy*. Through the game, Arghezi creates a world in which the *mărțișor* becomes a symbol with many meanings: *In the box of sidefolds and oil | New ornaments have come, | Lobsters, spiders, brooches. | Don't be scared of them. | I stuck them in silly sticks, | To find you, | Master. (It's not)*. In another poem *Broken words*, the *mărțișor* symbolizes the seemingly derisive stakes of the word art: *My words have been broken! | Walk through the mocirle with stars | By the mower | After a tide, I would gather your fruit*. In the poem *Fragedă* the *mărțișor*-book comes to complete the delicate portrait of sleeping girlfriend: *Between pillows and blankets | Her hand is sitting here and around | Put her finger down | Kiss her. || Walk slowly, hold your hand slowly, | Move it slowly, | Not to wake her up ... | In the palm of her right hand, | By the fairy godmother, | Give her a book as mărțișor*.

Ion Pillat paints a beautiful spring image in *Mărțișor* poetry, which highlights the fact that the *mărțișor* and spring overlap each other: *Look at the path that goes up the hill to us, | From the first flight the stump falls on the dock./ See the train entering the station slowly /And the man digging, the plow plowing*.

March 1st is also known as the birthday of the great storyteller Ion Creangă, which is why some church representatives considered him *the most beautiful literary mărțișor offered by God to the Romanian nation*.

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### **Bibliography:**

Simion Florea Marian, The Romanian holidays, SAECULUM VIZUAL Publishing House, 2012

Tudor Arghezi, Selected pages - verses and prose, Regis Publishing House, 2006

www.descopera.ro

foaiaromaneasca.blogspot.com

### **4.2. Mărțișor for spring 2020**

*Cristina Popa, teacher*

The year 2020 came into the existence of humanity as a dancer wrapped in the unknown as if he were wearing transparent veils. Like any new year, he was welcomed with the hope that changes would take place for the better. February and March brought them. It's just that sometimes the good starts with sad challenges. It's not a novelty! The wise people have known it since ancient times and they have been searching for, and sometimes have even found, magical remedies. Impossible for us to accept in this era, the idea that they would be effective! Taken separately, extracted from the spiritual context, shaken by the mythological-magical perception of the Universe, ritual practices, celebrations and talismans seem like outdated appearances. And that's why they also seem inefficient, useless, outdated.

The *mărțișor* is one of the "little things" thrown into the antique drawer by the 21st century people. Some people buy it at these times, out of inertia (because that was the case once) or out of nostalgia. Some others know the meaning of the string associated with some symbols: the clover or the chimney sweeper who brings good luck (although we do not know the connection between them), the red heart left from Dragobete or Valentine, the snowdrop, kittens, rabbits, flowers, snails, and other stylizations of a lost world. It is also known that the red thread can be associated with the life sustained by the blood of the living human (but which is, in fact, the dead water from fairy tales), can be associated with heat and solar fire (although they have destructive connotations). The red thread is associated with the winter which prepares to leave in March, with the cold, although it is also light (in its own and figurative sense), with the snow. So, no matter how much we know the meanings of the *mărțișor* today, it can be observed that it gathers in a small symbolic object signs of good and evil.

The *mărțișor*, like almost all the objects that the old man thought and made, has a dual role: functional and symbolic in association with mythic-magical thinking. It was part of a complex series of rituals with protective role in relation to the forces of evil in the world. In these rituals, a very important aspect was the delimitation of the protected areas, compared to those from which something bad could come. Naturally, sensitive, vulnerable areas were protected: first the ones on the human body, then those from his environment. Man's vulnerable places are those that make the passage from one part of the body to the other or

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hide vital organs. These are: the neck, the wrist, the waist. Hence the need to protect them with talismans or objects invested with protective role through prayer, ritual invocations and sometimes even through wizards. Mothers used to put on the wrist of the baby's hand the red thread intertwined with the white one for the purpose of protection. This was the first type of *mărțișor*. Then, the rich people added a silver penny, as it was known the multiple therapeutic and mystical virtues of silver. The *mărțișor* was invented by mothers for their loved ones, to protect them from the bad influences of the world, especially when there was a change. Then, gradually, it was offered by imitation, to the loved ones, regardless of age, and later, in modern times, it became a mere conventional gesture, out of politeness. But everything that is lost, from a spiritual point of view, takes revenge sooner or later.

The year 2020 came with a spring surrounded in ignored threats. Maybe the time for the *mărțișor* has passed but it seems we have to make or re-create smaller circles within which we protect ourselves and protect parts of our body and parts of society which are vulnerable. It is a time for isolation in which we are supposed to rethink a lot. And the symbols that surround us are white and red.



## 5.CNC machine

*Adrian Azoitei, Andrei Azoitei, students*

**CNC machine** or **Computer Numerically Controlled machine** is a complex equipment equipped with numerical control and movement control systems.

Machine tools with numerical control are equipped with a memory that allows to keep the program.

A CNC machine is used most often in the automotive industry and not only that.

This machine is designed to emboss different shapes or symbols and even 3D components or parts.

The machine uses a code, this initial code is a drawing or a form, which is then transformed with the help of programs or web platforms into G-code.

This code, in fact, contains a number of coordinates and distances.

Necessary components:

- 8x400mm guide bar
- 8x400mm threaded rods with brass nut
- 8mm linear bearings
- standard bearings
- Stepper motors 12V/2A
- Arduino One
- Step by step motor drivers
- 10mm plywood
- M3 and M4 screws
- mandrel
- 24V 3A motor
- leduri
- button for limits
- button without retaining
- dosa

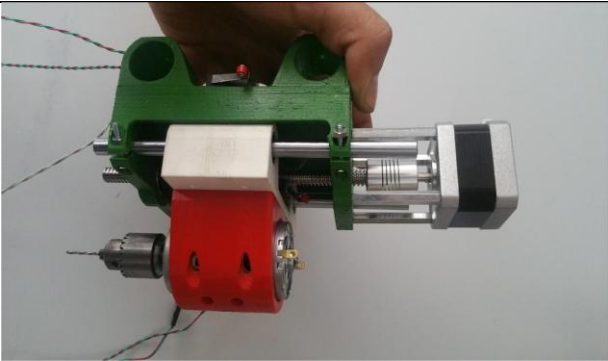
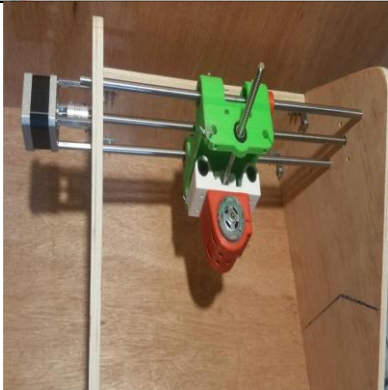
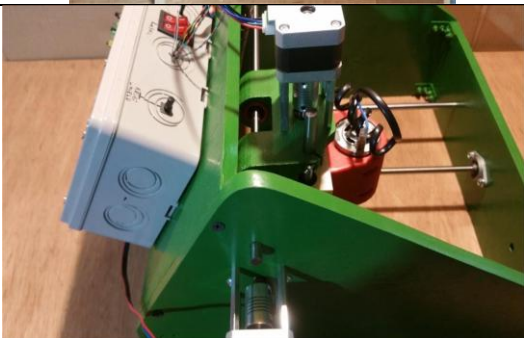

### **Assembling:**

#### *1.Creating the basic box*

- The first time we drew lines on a 12 mm wooden board;
- We cut the wood according to the markings;
- We joined the resulting plates;
- We drilled the places where the mounting clips had to be mounted;



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<p>-We marked the holes for the bars and guides.</p>	
<p><i>2. Milling and support</i>          -The components of the milling stand are printed at 3D printer;          -In this milling machine we used a 24V 5A motor (for engraving);          -Its support is fixed with M3 screws;          -We have fitted limiters for limiting for automatic adjustment.</p>	
<p><i>3. Testing the milling bracket</i>           We tested the CNC mounting bracket to see the overall image.</p>	
<p><i>4. Assembly of all components</i>           -Connecting the motor power supply (milling and stepper motors);          -Connecting the limiters to the control board;          -Connecting the motors step by step to the board command.</p>	
<p><i>5. Functioning</i></p>	

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## 6. Control WS2812B Individually Addressable LEDs using Arduino

*Cosmin-Valentin Irimia, students*

In this paper I presented a practical application that I created using a tutorial on the Internet. You can obtain much information by accessing this link: <https://howtomechatronics.com/tutorials/arduino/how-to-control-ws2812b-individually-addressable-leds-using-arduino/>.

The LED strip consist of type 5050 RGB LEDs in which WS2812B LED driver is integrated.

These "LEDs" have appeared relatively recently on the market and are not simple LEDs.

Each circuit is composed of four pieces of silicon: three LEDs of different colors (RGB) and a circuit for controlling and limiting current.

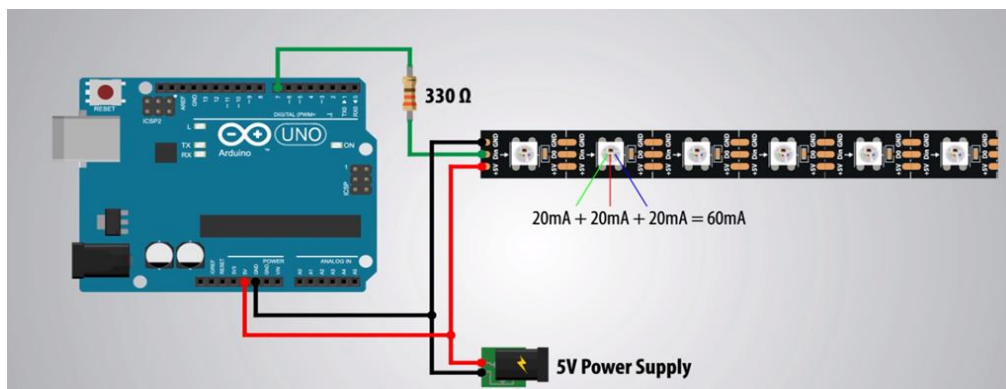
With the intensity of the three LEDs: Red, Green and Blue, we can simulate any color we want.



### WS2812B LED connection scheme to the Arduino board

The necessary components:

- WS2812B LED Strip
- Arduino Board
- 5V 6A DC Power Supply



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## Programming in Arduino - the FastLED library

Now, as an example, I will use 20 longband LEDs, connected to the Arduino via a 330 ohm resistor and powered by a separate 5V power source, as explained above. For programming Arduino, we will use the **FastLED library**.

### Arduino source code:

```
#include <FastLED.h>
#define LED_PIN 7
#define NUM_LEDS 20
CRGB leds[NUM_LEDS];
void setup() {
  FastLED.addLeds<WS2812, LED_PIN, GRB>(leds, NUM_LEDS);
}
void loop() {
  leds[0] = CRGB(255, 0, 0);
  FastLED.show();
  delay(500);
  leds[1] = CRGB(0, 255, 0);
  FastLED.show();
  delay(500);
  leds[2] = CRGB(0, 0, 255);
  FastLED.show();
  delay(500);
  leds[5] = CRGB(150, 0, 255);
  FastLED.show();
  delay(500);
  leds[9] = CRGB(255, 200, 20);
  FastLED.show();
  delay(500);
  leds[14] = CRGB(85, 60, 180);
  FastLED.show();
  delay(500);
  leds[19] = CRGB(50, 255, 20);
  FastLED.show();
  delay(500);
}
```

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## Photo gallery



## Video:

<https://www.facebook.com/100007988310715/videos/pcb.2603361216658743/2614235838852668>

## Bibliography

<https://howtomechatronics.com/tutorials/arduino/how-to-control-ws2812b-individually-addressable-leds-using-arduino/>

<https://ardushop.ro/ro/electronica/331-banda-leduri-rgb-neopixels-ws2812b.html>

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## 7.Erasmus+ Projects

### 7.1.Creative Opinions Differentiate Education In Maths

*Gabriela-Brândușa Horlescu, teacher*

*Ana-Irina Secară, teacher*

Erasmus+ project "Creative Opinions Differentiate Education In Maths" is implemented in our high school between 01.09.2018 and 31.08.2020. The main idea of our project rises out from the analysis of the general requirements that the European schools have faced recently.

Our teaching experiences show that students aged 14-18 have difficulty studying mathematics. We want to improve these competences and skills for our students:

- ICT - new technologies - digital competences;
- Key Competences: mathematics and literacy, basic skills;
- Creativity and culture.

**Project reference number:** 2018-1-TR01-KA229-059796\_3

**Participating schools:**

- Denizli Erbakir Fen Lisesi, Turkey, applicant, coordinator
- Colegiul Tehnic "Gheorghe Cartianu", Romania, partner
- Technikum Informatyki Edukacji Innowacyjnej, Poland, partner
- Istituto Tecnico Settore tecnologico - Liceo Scientifico "E. Mattei", Italy, partner
- Centro Integrado De Formación Profesional Medina Del Campo, Spain, partner

**Project website:** <https://codeinmaths.weebly.com/>

**Project Facebook page:** <https://www.facebook.com/groups/706332036399378>

**Project eTwinning platform:** <https://live.etwinning.net/projects/project/177927>

#### 7.1.1.C.O.D.E in Maths

##### Creative Opinions Differentiate Education in Maths

In our project we used the *eTwinning* educational platform. **eTwinning** is the community of schools in Europe that offers the teaching staff working in schools in the participating European countries a platform for communication, collaboration, information exchange and project development. At the same time, this platform promotes school collaboration in Europe with the help of communication and information technologies, providing working tools and services to schools. In addition to these facilities, *eTwinning* offers teachers free online professional development opportunities.

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The screenshot shows the eTwinning Live interface. At the top, there's a navigation bar with 'PORTAL', 'ETWINNING LIVE', 'GRUPURILE MELE', and 'TWinspace-URILE MELE'. The user is logged in as 'română' and can 'Deconectare'. The main header features the eTwinning Live logo and navigation links: 'PERSOANE', 'EVENIMENTE', 'PROIECTE' (highlighted), 'GRUPURI', 'FORUMURI PARTENERI', and 'DEZVOLTARE PROFESIONALĂ'. The main content area displays the project 'C.O.D.E in Maths', which was registered on 04.10.2018 and is currently 'Activ'. Below the project name are links for 'DESPRE', 'MEMBRI', and 'FOTOGRAFII'. A '# ÎMI PLACE' button shows 11 likes.

<https://live.etwinning.net/projects/project/177927>

**TwinSpace** is a secure, visible platform and appeals only to teachers participating in the project. There are several sections in this virtual space: *Home, Pages, Materials, Forums, Online Meetings* and *Members*.

At the same time, there is also the possibility to invite students to *TwinSpace* so that they may have the opportunity to meet mates from partner schools, to communicate and work safely, to create an efficient and motivating intercultural bridge.

The screenshot shows the eTwinning TwinSpace interface. The top navigation bar includes 'Erasmus+', a grid icon, 'C.O.D.E IN MATHS', 'română', and 'Deconectare'. The main header features the eTwinning TwinSpace logo and navigation links: 'PRIMA PAGINĂ', 'PAGINI', 'MATERIALE', 'FORUM', 'REUNIUNI ONLINE', and 'MEMBRI'. The user is logged in as 'română' and can 'Deconectare'. There are also icons for 'Asistență', a user profile, a bell, and an envelope.

In the following pages we will present some activities published on *TwinSpace*.

### 7.1.2. Erasmus Day 2018



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*Under the high patronage of Mr. Antonio Tajani, President of the European Parliament and of the European Commission, the second edition of Erasmus Days took place on October 12 and 13, 2018.*

*#ErasmusDays 2018 announces the Erasmus + brand and talks about the results of Erasmus + projects, to make them visible to citizens, professionals and policy makers. (<https://www.erasmusplus.ro/stire/vrs/IDstire/521>)*

On October 12, 2018, at "Gheorghe Cartianu" Technical High School, Mrs. Ana-Irina Secară coordinated and organized a roundtable attended by students, teachers with experience in running European programs, but also other representatives of our school which are interested in developing Erasmus + projects.

Impressions and examples of good practices acquired over the years in European projects were shared, plans were made for the future and relationships with the newcomers in our Erasmus+ team were strengthened. Mrs. Ana-Irina Secară also presented the most recent Erasmus + project of our high school, *Creative Opinions Differentiated Education in Maths*, whose purpose is to develop professional skills in the fields of STEM, computer science, robotics, mathematics, physics and information and communication technology.

The conclusion of our activity was that the active involvement in Erasmus + projects means creating an educational environment at European level for our educational institution.



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### 7.1.3.European Researchers' Night 2019

On September 27, 2019 the students of our high school participated in the "European Researchers Night" with some practical experiments in the field of Electronics and Robotics. *"The European Researchers' Night is part of the Marie Curie series of events and aims to show the general public what it means to be a researcher and how interesting the research work can be."*

In addition to the exhibition of Electronics and Robotics that presented products and experiments made within the project – coordinators: teacher Gabriela-Brândușa Horlescu, teacher Ana-Irina Secară, teacher Carmen Simona Stanciu, teacher Virgil Baciu,– the students and teachers of our high school also presented:

- experiments in Geography: the construction of the compass, the magnetic and geographical poles of the Earth, the operation of a volcano - teacher coordinator: Doina Dumitrașcu.

- poster exhibition - Physics by telephoto - teacher coordinator: Dan Teodor Moscalu.

- thermoconductive ceramic material with high capacity for thermal energy retention - teacher coordinator: Eleonora Dragomir.

For more details about the event we attended as well as the scientific and educational activities, you can access the following links:

<https://www.noapteacercetatorilor.eu/piatraneamt>

[https://docs.wixstatic.com/ugd/c9353b\\_83ce3603131840a8b95b9f35c62c245e.pdf](https://docs.wixstatic.com/ugd/c9353b_83ce3603131840a8b95b9f35c62c245e.pdf)



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## 7.2.Future Language is Robotic Coding

*Gabriela-Brândușa Horlescu, teacher*

*Ana-Irina Secară, teacher*



**Motto: "Your Robot, Your World"**

The Erasmus+ project *Future Language is Robotic Coding* is implemented in our school between 01.10.2019 and 30.09.2021. Integrating innovative educational applications into our teaching and training activities have been inevitable in rapidly changing technology and information age. Continuous digitalization of our world requires our students to gain computational and analytical thinking skills. We implement a robotic coding project to improve our students' key competences such as digital skills, learning how to learn, Maths and science competences, creativity, entrepreneurship, innovative, social skills and self-expression so as they can be more productive in the digital era.

**Project reference number: 2019-1-TR01-KA201-077586**

**Participating schools:**

- **Denizli İl Milli Eğitim Müdürlüğü**, Turkey, coordinator
- Ataturk Mesleki ve Teknik Anadolu Lisesi, Turkey, partner
- Nezihe Derya Baltali Bilim ve Sanat Merkezi, Turkey, partner
- Istituto Tecnico Settore Tecnologico, Italy, partner
- Escola Secundária com 3.º Ciclo D. Dinis – Coimbra, Portugal, partner
- Srednja škola Valpova, Croatia, partner
- Colegiul Tehnic „Gheorghe Cartianu” Piatra-Neamț, Romania, partner

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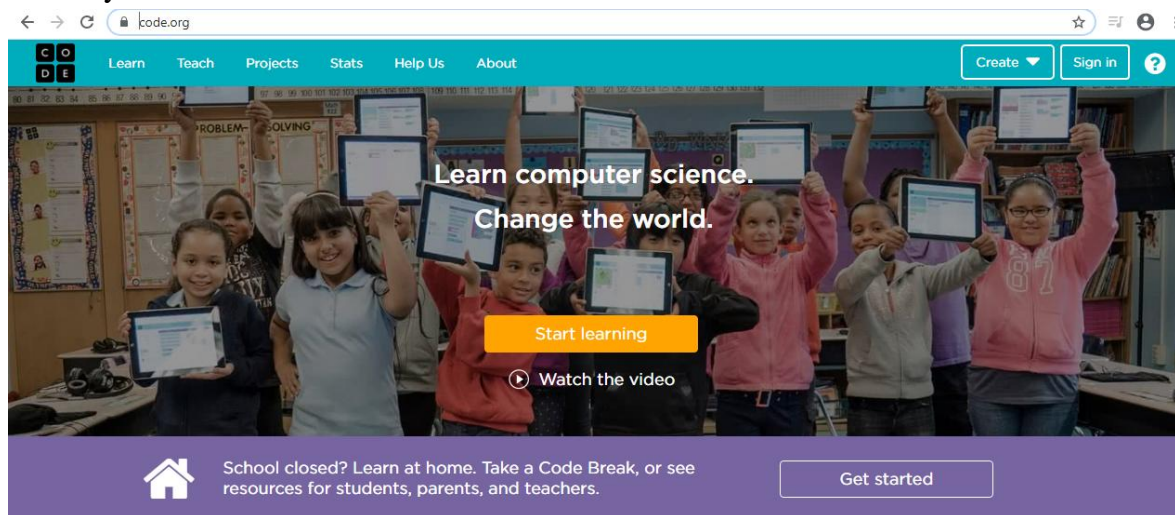
- The Federation of Swedish Ostrobothnia for Education and Culture/YA-Vocational College of Ostrobothnia, Finland, partner

**Project Facebook page:** <https://www.facebook.com/groups/2291848674476667>

Due to the development of new technologies in the IT field, **electronic learning** or **e-learning** has become an efficient and motivating modern means used in the education of children and young people of all ages.

**E-learning** is defined as all the educational situations in which the means of Information Technology and Communication are used.

In our project, we have started using the educational platform <https://code.org/> since February 2020.



**Code.org®** is dedicated to expanding access to computer science in schools and increasing the participation of women and young people in IT training. Every student in our high school has the opportunity to learn computer science. *Code.org* also organizes the annual "**Hour of Code**" campaign, which was attended by more than 15% of students worldwide.

*Code.org* is supported by donors such as: Amazon, Facebook, Google, Infosys Foundation, Microsoft, etc. and has the ability to increase diversity in computer science, reaching high school and university students from all backgrounds, at the level of their abilities, in their schools. All these facilities are due to the use of attractive methods that inspire students to continue learning.

Robotic coding is known as a type of coding consisting of a combination of mechanics and programming. The main purpose of education is to improve students' computerized and algorithmic thinking skills. The *Code.org* platform offers a diverse range of courses for students at primary, secondary and high school levels.

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Elementary school						Middle school			High school			
K	1	2	3	4	5	6	7	8	9	10	11	12
									CS Principles			
						CS Discoveries						
CS Fundamentals												
Pre-reader Express		CS Fundamentals: Express										
Professional Learning for all grade levels												Learn more

Within the *Code.org* platform, 17 students from our college, coming from the technical profile, the field of Electronics and automation, study **Course 4 - Basics of computer science**. It includes 22 lessons, each of which has a detailed lesson plan with helpful explanations. Students learn how to deal with high-complexity puzzles while developing their creativity by solving each challenge. By the end of this course, students will have created programs that allow them to use more skills, including for **repetitive structures (loops)** and parameter functions.

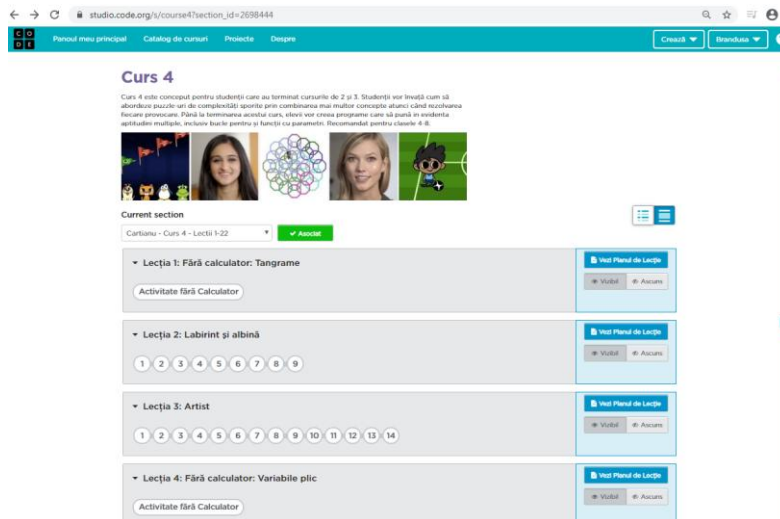
The lesson set includes:

- Lesson 1: Unplugged: Tangrams
- Lesson 2: Maze and Bee
- Lesson 3: Artist
- Lesson 4: Unplugged: Envelope Variables
- Lesson 5: Unplugged: Madlibs
- Lesson 6: Artist: Variables
- Lesson 7: Play Lab: Variables
- Lesson 8: Unplugged: For Loop Fun
- Lesson 9: Bee: For Loops
- Lesson 10: Artist: For Loops
- Lesson 11: Play Lab: For Loops
- Lesson 12: Artist: Functions
- Lesson 13: Unplugged: Songwriting with Parameters
- Lesson 14: Artist: Functions with Parameters
- Lesson 15: Play Lab: Functions with Parameters
- Lesson 16: Bee: Functions with Parameters
- Lesson 17: Unplugged: Binary
- Lesson 18: Artist Binary
- Lesson 19: Super Challenge - Variables
- Lesson 20: Super Challenge - For Loops
- Lesson 21: Super Challenge - Functions and Parameters
- Lesson 22: Extreme Challenge - Comprehensive

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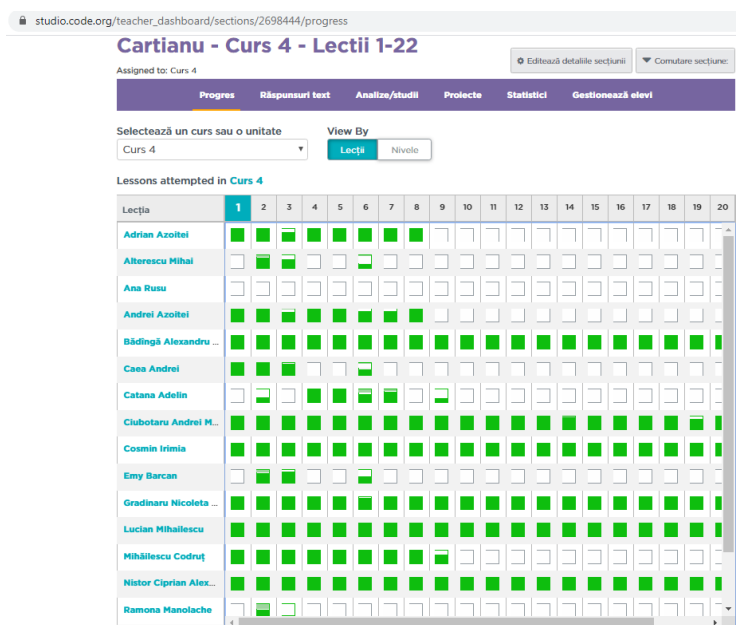
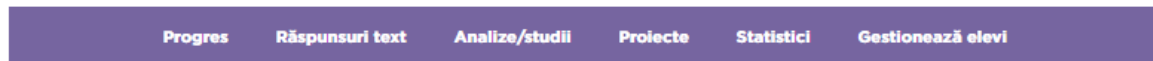


Each student can take the course individually or may request additional information from the teacher to solve those requirements which he / she has difficulties. The teacher has the possibility to follow the progress of the students with the help of several sections: *Progress, Text answers, Analysis/Studies, Projects, Statistics, Manage students.*

## Cartianu - Curs 4 - Lectii 1-22

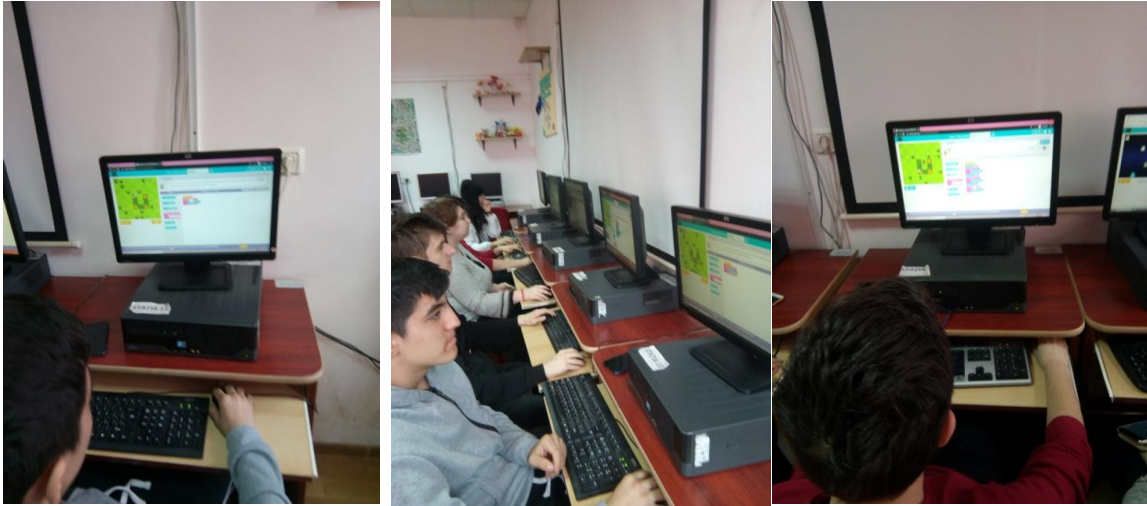
Assigned to: Curs 4

Editează detaliile secțiunii Comutare secțiune:



The students were introduced to the use of the platform in the computer lab of our high school.

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As a motivating feed-back for both the guiding teachers and the students, a number of 5 students who are passionate about computer science have already completed this course. For their very good results and work done, at the end of the course, students are awarded *Certificates of Completion*.



In conclusion, we can state that the **Code.org** e-learning platform can be easily used and it offers a set of options that, along with the traditional teaching-learning-assessment methods, provide students with solid knowledge acquisition and at the same time they are a high-tech auxiliary tool for the teachers involved in this type of teaching-learning process.

## **Bibliography**

<https://code.org/>

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### 7.3. Technology - Addiction and Internet Dependency Syndrome

Gabriela-Brândușa Horlescu, teacher  
Ana-Irina Secară, teacher



Erasmus+ project *Technology - Addiction and Internet Dependency Syndrome* is implemented in our high school between 15.12.2019 and 14.12.2021. Internet is a widely used technological tool for chatting, playing games, listening to music and doing research. We all use the Internet with at least one or more of these purposes. However, in the age of technology, there appears the concept of internet addiction. Twenty years ago technological tools such as computers and the Internet, which few people have access to today, became the tools which people of all ages could easily reach by phone, tablet, computer and smart TV. The use of the Internet has become a problem that even adults who have fallen into early childhood cannot overcome. Many universities and scientists have made researches and proposed theses related to these topics.

**Project reference number: 2019-1-TR01-KA229-076936\_1**

**Project Facebook page: <https://www.facebook.com/taidsEUproject>**

**Participating schools:**

- Konevi Anadolu Lisesi, Turkey, coordinator
- Istituto di Istruzione Superiore "G.A. Pischedda", Italy, partner
- Joniskio "Saules" pagrindine mokykla, Lithuania, partner
- Colegiul Tehnic "Gheorghe Cartianu", Romania, partner
- Ave Maria San Isidro, Spain, partner
- Agrupamento de Escolas Miguel Torga, Portugal, partner



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**Project objectives:**

- Identifying technology and Internet dependence in education and discovering the methods of correct use of the Internet;
- Discovering the signs of modern loneliness in the virtual world, developing solutions to fight against this phenomenon;
- International cooperation and remediation methods for reducing bullying and cyber bullying in school;
- Recognition of the stages of technology dependence, of changing modern loneliness into bullying;
- Development of educational approaches for the conscious use of the Internet;
- Mutual transfer of good practices, finding solutions to reduce Internet dependency.

In all the educational institutions in Romania, a secure use of the Internet is desired. Even if there is the possibility and the necessary technique that the Internet used in schools can be controlled, this is not possible outside the school program of our students. The only way to achieve this goal is to raise awareness of parents who can support us in our efforts so that students may benefit from a conscious use of the Internet.

Within our project there will also be performed *Learning, teaching and training activities*, having the following topics:

- Using the Internet consciously
- The bullying phenomenon in schools
- Modern loneliness
- Bullying on the Internet
- Social bullying

Three teachers from each of the six partner schools will participate during the exchange mobilities that will be performed during the implementation of the project. This sharing experience will contribute to the achievement of the proposed objectives, to the increase of the quality in education, to an efficient European collaboration among teachers, students and parents, to the development of the exchange of good practices among the member countries of the European Union.

We can conclude this article by asserting with all our responsibility that it is of vital importance to develop the awareness about the effective use of the Internet, to provide adequate explanations for the benefits and prejudices of the Internet on the psycho-educational training of our students, but especially to carry out studies and research on this topic at local, national and international level.

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## 7.4.VOCATIONAL-WEB-LEAP: An Open Source eLearning Platform for Training Vocational Students, Apprentices and Graduates on Web Design and Development



Cofinanțat prin  
programul Erasmus+  
al Uniunii Europene



*Gabriela-Brândușa Horlescu, teacher*  
*Ana-Irina Secară, teacher*

The Erasmus+ project "VOCATIONAL-WEB-LEAP: An Open Source eLearning Platform for Training Vocational Students, Apprentices and Graduates on Web Design and Development" is implemented in our high school between 01.10.2019 and 31.08.2022. The project aims to provide educational material preparation in Moodle platform for the subject of Web Design and Development for IT Students of TVET Secondary School. The IT curriculum is implemented in our high school but we want to improve and develop our students' "Web development" skills.

**Project reference number: 2019-1-TR01-KA202-076828**

**Participating schools:**

- **Düzce University, Turkey, coordinator**
- Panepistimio Ioanninon, Greece, partner
- University of Medicine, Pharmacy, Science and Technology in Târgu Mureș, Romania, partner
- Colegiul Tehnic " Gheorghe Cartianu", Romania, partner
- 2nd (Esperino) Epal Ioanninon, Greece, partner
- SOU Jane Sandanski Strumica, The Republic of North Macedonia, partner
- Duzce Ticaret ve Sanayi Odasi, Turkey, partner
- Instalofi Levante SL, Spain, partner
- Kentro Epagelmatikis Katartisis Dias Epe, Greece, partner

**Main objective of the project:** innovation, design and development within the Moodle educational platform with the topic "Web Design & Development", intended for the students of our high school:

- "Web design and development for beginners", for students in the 10th grade;
- "Advanced topics for web design and development", for students in the 11th grade;
- "More advanced topics in Web Design and Development", for students in the 12th grade.

These courses can also be attended by the graduates of our high school, the employees in the IT field as well as the students from the professional and post-high school education.

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The project idea was adopted and strongly supported by the current strategic partnership, made up of 3 universities, 3 vocational schools, 2 companies and a business network, from Turkey, Romania, North Macedonia, Greece and Spain.

The period of the project will be 3 years, during which time we will develop an electronic learning platform based on *Moodle* in which the most modern educational methodologies and pedagogical concepts will be used. The educational content of the platform will be properly structured and will include the latest generation principles and tools in the field of web design and development.

Currently, *Moodle* is one of the most used educational platforms, representing a good choice especially for the academic environment. This platform is open-source, being constantly modified and updated. The name "*Moodle*" represents an acronym for the *Modular Object-Oriented Dynamic Learning Environment*.

The platform can be downloaded for free, with the license under the GNU General Public License.

### Web Design concepts studied in high school

Currently, the students in our high school are studying elementary concepts in Web Design during I.C.T. (Information and communication technology).

Excerpt from the **9th grade school syllabus**, High School Lower Cycle, Technology Branch, all profiles and specializations:

Use of the basic operations required to create an HTML page	<input type="checkbox"/> Launching the HTML editor <input type="checkbox"/> Publisher interface
Use of the basics tools for inserting elements into the page: text, image	<input type="checkbox"/> Inserting and formatting a text: font, size, style, color - getting color - link to Paint (Edit colors) and Calculator (Dec-Hex) <input type="checkbox"/> Inserting an image - changing the image properties: positioning, size, text framing <input type="checkbox"/> Formatting a background or theme
Applying the basic operations required to create a page - copy, move, delete	<input type="checkbox"/> Using the tools Copy, Cut, Paste to copy text or image
Enumeration and application of the ways to make a hyperlink	<input type="checkbox"/> Making a link on a text <input type="checkbox"/> Making a link on an image <input type="checkbox"/> Mapping an image
Using tables on a WEB page	<input type="checkbox"/> Inserting a table <input type="checkbox"/> Formatting the table
Making practical applications	<input type="checkbox"/> Suggestions: drawing up a personal WEB page, making the class page using personal pages <input type="checkbox"/> Means of storing pages

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Excerpt from the **12th grade school syllabus**, High School Cycle, Technology Branch, all profiles and specializations:

Working tools for creating WEB sites	<input type="checkbox"/> Text and spreadsheet editors that save documents as WEB pages, <input type="checkbox"/> HTML editors, <input type="checkbox"/> Picture editors.
The structure of a WEB site	<input type="checkbox"/> Types of WEB sites: static (informational), dynamic / interactive (e-commerce, e-learning, e-banking, etc.) <input type="checkbox"/> Structure of a page within a WEB site. Elements specific to the publication and retrieval of the site within the search engines. <input type="checkbox"/> Content elements of WEB pages: text, lists, tables, images, image maps, sounds, animation, frames, movies, buttons, dialog boxes, combo boxes, windows. <input type="checkbox"/> Hierarchy of pages within the Web site. The system of links, the home page. <input type="checkbox"/> Criteria considered when making WEB documents: upload speed, text/image ratio. <input type="checkbox"/> Requirements for presenting the information presented in WEB documents: content, accuracy, readability, design, in accordance with the requirements of the project.

When drawing the Web Design courses we started from the premise that all the participants who will participate have only basic computer operating knowledge, this being studied during the I.C.T. classes and basic knowledge in *Web Design*.

After attending the courses of the project, both in the on-line environment and in the classroom, the students will acquire the concepts of web design and programming and will develop a website at a professional level.

In conclusion, in this project, students, under the guidance of their teachers, can choose to attend free *Web Design* courses. At the end of the high school years, they will have more employment opportunities, considering that the job of *Web Page Designer* plays a priority place on the labor market.

**Bibliography:**

- Annex no. 5 to the order of the Minister of Education, Research and Innovation no. 5099 / 09.09.2009, MINISTRY OF EDUCATION, RESEARCH AND INNOVATION, SCHOOL PROGRAMS, INFORMATION AND COMMUNICATION TECHNOLOGY, 9TH GRADE, LOWER CYCLE OF HIGH SCHOOL, Technological branch, all profiles and specialization, min. 5099 / 09.09.2009.

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- Annex no. 5 to the order of the Minister of Education, Research and Innovation no. 5099 / 09.09.2009, MINISTRY OF EDUCATION, RESEARCH AND INNOVATION, SCHOOL PROGRAMS, INFORMATION AND COMMUNICATION TECHNOLOGY, XI-X AND XII-A, direct professional qualification way, XIII-XIII-A, progressive way of professional qualification, SUPERIOR CYCLE OF HIGH SCHOOL, Technological branch, all profiles and specializations, Approved by order of the minister, Nr. 5099 / 09.09.2009, Bucharest, 2009.

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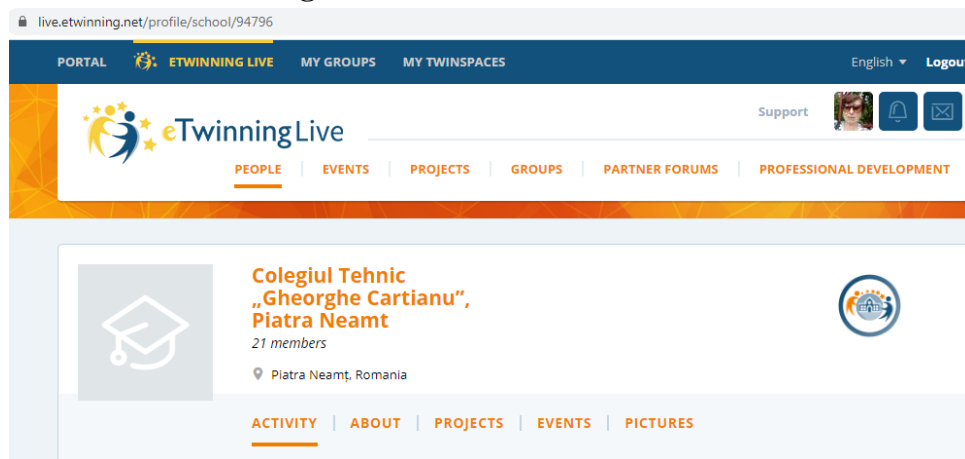
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**7.5.eTwinning School Label**  
**”Gheorghe Cartianu” Technical High School**  
**Piatra Neamț**  
**17 March 2020**

*Gabriela-Brândușa Horlescu, teacher*  
*Ana-Irina Secară, teacher*

Due to the educational activities and projects implemented last year on the *eTwinning* platform by the teachers and students of our high school, in March 2020 our educational institution became an **eTwinning School**.



<https://live.etwinning.net/profile/school/94796>

**eTwinning and its contribution to the strategic development of our high school**

**1.Certificate of quality obtained by teacher Casian Marian-Viorel**



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## 2. Professional development events attended by the school teachers

MARIAN –VIOREL CASIAN	<p>An Introduction To Design Thinking</p> <p>Core Skills -Teaching critical thinking and problem solving</p> <p>Discovering School Education Gateway</p> <p>Education for All: Making the classroom more LGBTQI inclusive</p> <p>Elementary addition and subtraction word problems</p> <p>Elementary multiplication and division word problems</p> <p>Entrepreneurial Learning with ICT</p> <p>Twice exceptional children</p> <p>Working with gender inclusion in teacher education and in the classroom</p> <p>eTwinning Online Seminar 2018 – Europeana: how to inspire learners with digital culture</p> <p>eTwinning Online Seminar 2019: Hacking hate with SELMA</p> <p>eTwinning Weeks – Online Conference</p> <p>eTwinning Weeks 2019: Project example on Democratic Participation</p> <p>eTwinning Weeks 2019: Tackling Disinformation in classrooms</p>
CONSTANȚA ȘALARU	eTwinning Weeks 2019: Tackling Disinformation in classrooms

## 3. eTwinning projects implemented by our high school

- **Future Language is Robotic Coding** – <https://live.etwinning.net/projects/project/191946>
- **Maker Education** –<https://live.etwinning.net/projects/project/198833>
- **Technology-Addiction and Internet Dependency Syndrome (T-AIDS)** – <https://live.etwinning.net/projects/project/189752>
- **C.O.D.E in Maths** – <https://live.etwinning.net/projects/project/177927>

### Projects where high school teachers are involved

- Another world...it is possible
- Araçların Diagnostik Arıza Tespiti, Bakımı, Onarımı (Diagnostics, Maintenance, Repair of Vehicles)
- Art-cafe
- AZ ATTIK, DOĞAYA KATTIK
- BOOKS SPEAK! (KİTAPLAR KONUŞUYOR!)


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- C.O.D.E in Maths
- CODING LEARNING! (KODLAMA ÖĞRENİYORUM!)
- DİĞİTAL TEACHER OF DİĞİTAL CLASSES (DİĞİTAL SINIFLARIN DİĞİTAL ÖĞRETMENİ)
- From my country ..... in Europe
- Future Language is Robotic Coding
- Hibrit/Elektrikli Araçlarda İnnovatif Uygulamalar (Innovative Applications in Hybrid / Electric Vehicles)
- Improve your skills and your future to 4.0
- Journey to Education with WEB 2.0 (WEBTECH2.0)
- Kendi Robotumuzu Yapıyor ve Kodluyoruz.
- Lets craft what we think
- Maker Education
- Making A Robot That Makes Arduino Coding Fun
- Healthy Habits for a Healthy Lifestyle
- Safe Vocational Training of Disadvantaged Students
- Say „No” to Violence!
- SCORE – Student Competences as Outputs of Research-based Education
- Sending festive wishes
- Share my classes... Share science
- Show me your school... Show me the way
- STEAM EDUCATION
- Technology-Addiction and Internet Dependency Syndrome (T-AIDS)
- The scourge of the age of Internet addiction and cybercrime
- USE YOUR MIND! (AKLINI KULLAN!)
- w@ste@rt
- WELCOME TO MATH'S COLOURFUL WORLD
- Cultural & historical heritage of my town

#### 4.eTwinning events organized by our school

 <b>Erasmus+ Projects</b>	<p><b>Erasmus+</b> 18.12.2019</p> <ul style="list-style-type: none"> <li>- Presentation of the Erasmus + projects of the school</li> <li>- Presentation of the projects carried out on the eTwinning platform.</li> </ul> <p><i>eTwinning is an integral part of the Erasmus+ program.</i></p>																								
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## LEGO MINDSTORMS Education EV3

20.12.2019

We took the first steps in LEGO MINDSTORMS EV3 and we created the first robot.

We learned and explored together with the students:  
<https://www.lego.com/en-us/themes/mindstorms>

### 5. Online safety - informative materials

5.1. The guide to the safe use of the Internet entitled *A safer Internet for all students!*

[https://oradenet.salvaticopiii.ro/docs/Ghidul\\_utilizarii\\_in\\_siguranta\\_a\\_Internetului.pdf](https://oradenet.salvaticopiii.ro/docs/Ghidul_utilizarii_in_siguranta_a_Internetului.pdf)

#### **Net Time! Together for online safety!**

*Net Time is a unique European program in Romania that promotes the use of the Internet by children and adolescents in a creative, useful and safe way.*

<https://oradenet.salvaticopiii.ro/viata-ta-online/prietenii/ce-este-cyberbullying-ul>

**Net Time** launches the campaign **A world without fear!** <https://farafrica.ro/>

We posted information about the *Net Hour* on the Facebook page of our high school.

<https://www.facebook.com/groups/159831630753834/>

5.2. General Information Regarding the Online Safety of the Under-Aged

<https://www.moldcell.md/files/Politicii/Ghidul%20siguran%C8%9Bei%20copiilor%20pe%20internet.pdf>

5.3. Internet usage guide

<https://rm.coe.int/16806ff6e7>

5.4. Top 10 Internet Safety Rules & What Not to Do Online

<https://usa.kaspersky.com/resource-center/preemptive-safety/top-10-internet-safety-rules-and-what-not-to-do-online>

5.5. Safe Internet Use

<https://www.getsafeonline.org/protecting-your-computer/safe-internet-use/>

5.6. Internet Safety for Kids

<https://edu.gcfglobal.org/en/internetsafetyforkids/>

5.7. IT Security GUIDE for civil servants

<https://www.cert.ro/vezi/document/ghid-protectie-functionari-publici>

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Co-funded by the  
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