



MAKER EDUCATION

MAKER EDUCATION

No. 1 - 2020

October 2019 - January 2020



ISSN 2668-7852 ISSN-I 2668-7852

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



MAKER EDUCATION

Colegiul Tehnic "Gheorghe Cartianu"

Piatra-Neamț, Bd. Traian, No. 31

Neamț County, Romania

Tel/fax: +40233222800

E-mail: colegiulcartianu@gmail.com

Editors and Authors:

Horlescu Gabriela-Brândușa, teacher

Secară Ana-Irina, teacher

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.Europe Code Week

Gabriela-Brândușa Horlescu, teacher

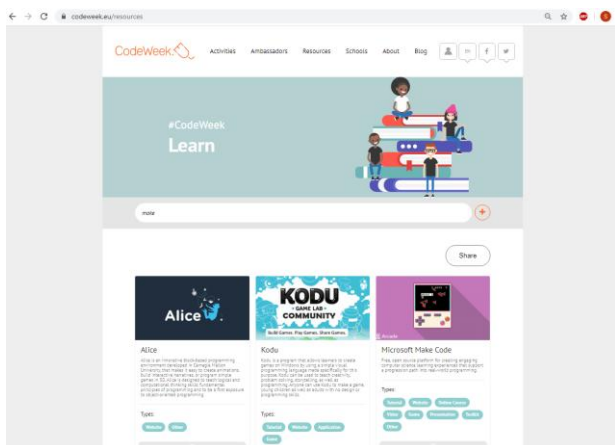
EU Code Week aimed to bring coding and digital literacy to everybody in a fun and engaging way.

We celebrated EU Code Week in our "Maker Education" Erasmus+ Project.

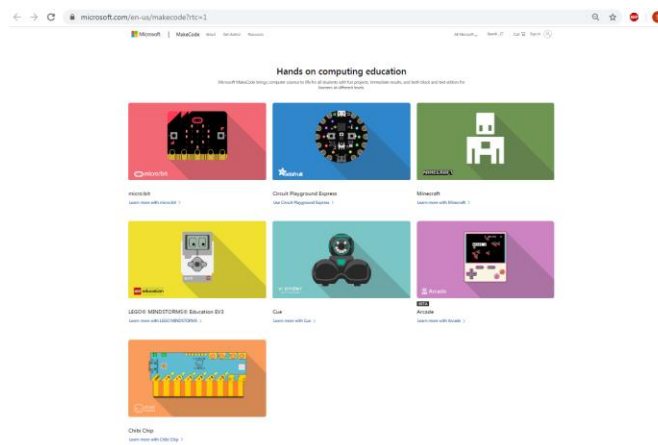
Main objectives of the project: exchange of good practices, the development of technological education in order to have well-prepared students which can be capable to master and efficiently explore the new technologies. We wanted to bring coding to students in a fun way.

We used Microsoft MakeCode:

- micro: bit - <https://makecode.microbit.org/>
- Circuit Playground Express - <https://makecode.adafruit.com/>
- LEGO® MINDSTORMS® Education EV3 - <https://makecode.mindstorms.com/>
- Cue - <https://www.makewonder.com/robots/cue/explore/>
- Chibi Chip - <https://makecode.chibitronics.com/>



<https://codeweek.eu/resources>



<https://www.microsoft.com/en-us/makecode?rtc=1>

Photo Gallery

Europe Code Week in Romania, October 8, 2019, "Gheorghe Cartianu" Technical High School - the first steps in LEGO® MINDSTORMS® Education EV3.

"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."



Europe Code Week, 8th and 9th October in SABA - Skopje, Macedonia.



Europe Code Week in Turkey



"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

2. Erasmus Days 2019

Gabriela-Brândușa Horlescu, teacher

Ana-Irina Secară, teacher

European Feast at Cartianu, [#ErasmusDays](#) 2019

On October 10, 2019 "Gheorghe Cartianu" Technical High School in Piatra-Neamț, Romania, celebrated the first day of the third edition of Erasmus Days 2019 by organizing an educational event where students, teachers and parents gathered to express their European ideas.

The participants shared impressions and good practices acquired along the years, made plans for the future and last, but not least, created friendship relations ("juniors" met the "seniors" of the Erasmus+ team).

As a good example of continuing the European path, we mentioned the results we had got so far regarding the EU project "Creative Opinions Differentiate Education in Maths", implemented by our high school (implementation period: 1 September 2018 – 31 August 2020) and which has as main objective the development of professional skills in the fields of STEM, Informatics, Robotics, Mathematics, Physics, The Technology of Information and Communications.

A number of 50 students from the 5 partner countries (Turkey – the coordinating country, Poland, Italy, Spain and Romania) will participate in mobility exchanges. We also mentioned the 4 European projects that our high school will coordinate starting with October 2019.

It was a truly special day, a day in which our students became aware of the opportunities that the EU offers through the Erasmus+ projects, the advantages of developing these projects in our high school and also the need to perform lifelong education in the fields mentioned in each project as well as to acquire English competences at advanced levels.

The conclusion of today's event was that the whole experience from these European projects will be used in such a way as to turn our high school into a better educational environment which can meet the high European standards.

<https://www.erasmusdays.eu/event/descopera-programul-erasmus/>

"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

Erasmus Days in Romania



Erasmus Days in Turkey



MAKER EDUCATION

PROJENİN AMACI
21. Yüzyıl becerilerine sahip, teknolojik gelişmelere hakim, geleceğe iyi hazırlanmış ve yeni teknolojileri kullanabilen öğrenciler yetiştirmek, matematik, mühendislik ve fen bilimleri alanlarında yeni öğretim yöntemlerini sınıf ortamına taşımak, yaratıcı ve yenilikçi beceriler geliştirmek.

PROJENİN ORTAKLARI

COLEGIUL TEHNIC GHEORGHE CARTIARIU	ROMANYA KOORDİNATOR
SKBN	MAKEDONYA
INSIGMARE - ASSOCIACAO DE ENSINO E FORMACAO	PORTEKİZ
ERBAKIR FEN LİSESİ	TÜRKİYE
ISS ALESSANDRO VOLTA	İTALYA
CENTRUM KSZTALCENIA PRAKTYCZNEGO W JASTRZEBIU-ZDROJU	POLONYA

PROJENİN BÜTÇESİ
31320 EURO

PROJENİN SÜRESİ
24 AY

PROJE FAALİYETLERİ

ROMANYA	Robot ve otomasyon	Kasım 2019
MAKEDONYA	Nesnelerin İnterneti (IoT)	Şubat 2020
TÜRKİYE	LEGO Eğitim, Çözümleri	Mayıs 2020
PORTEKİZ	3D Yazıcı teknolojileri ve dijital beceriler	Kasım 2020
İTALYA	Bilim ve sanat	Şubat 2021
POLONYA	Mesleki Eğitim	Mayıs 2021

Bu proje Avrupa Birliği tarafından finanse edilmektedir.



"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

3. ZÎN- Non-Formal Learning Day 2019, #ZÎN Practice of awareness and self-awareness... Nosce te ipsum!

Raluca Orza, teacher



Seen as adventure or journey, revelations or simple disappointment, self-awareness is the step you need to take since your adolescence. Why is that? The answer is simple: knowing yourself you become aware of your value, of the intellectual potential inside yourself, you learn how to trust yourself and your own forces.

You become part of a group easier, be it a class, a team of an ERASMUS+ project or a future job. So... Nosce te ipsum! Here is what we tried to do on an ordinary Friday, October 11, 2019, right on the Day of Non-Formal Learning (in a non-formal environment, of course) at the school's "Impact" Teashop: during a form class, with a group of students in the 9th grade from "Gheorghe Cartianu" Technical High School in Piatra-Neamț.

The topic? "Self-awareness", of course. The task? Ask yourself: "WHO AM I?" writing answers on eight different pieces of paper. Then put them into an order according to your will. Ask two of your classmates what they think about your classification. "How do they see you?" , "What would they add?" What came next?... the DIY workshop... a pillow fight, moments of introspection... ranking...becoming aware of certain qualities or flaws...and discussions! Strange result: usually there is a difference between who I think I am and how others perceive me.

Conclusion? I know I know nothing (quoting a Greek philosopher)... "about me" we added today. What is next? Certainly, some other steps in this fascinating journey which means... Growing up!



 Tot educație.
Nonformală 

"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

4. Maker Education – on the eTwinning platform

Gabriela-Brândușa Horlescu, teacher

eTwinning is the community for schools in Europe.



<https://live.etwinning.net/projects/project/198833>

Main objectives of the project: exchange of good practices, the development of technological education in order to have well-prepared students which can be capable to master and efficiently explore the new technologies.

Specific objectives:

- to develop the research technical and scientific spirit;
- to develop creative and innovative abilities;
- to provide technical and practical training;
- to become aware of the new technical jobs for a future work place.

Key competences developed in the project:

1. Scientific, Engineering, Technological and Mathematical Competences - development of technological education
2. Digital competence - 3D Printing, Internet of things, IoT Devices
3. Linguistic competence, communication in English- training opportunities and finding workplaces across Europe
4. Personal, social and learning competences –development of creativity, critical thinking, problem solving, decision making.
5. Civic competence –involvement in building a sustainable future
6. Enterprise competence-development of entrepreneurship
7. Cultural awareness and expression competences -meeting new European cultures and civilizations.

"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

Participating organisations:

1.Colegiul Tehnic "Gheorghe Cartianu", Romania, applicant, coordinator

2.SABA,The Republic of North Macedonia, partner

3.INSIGNARE - ASSOCIACAO DE ENSINO E FORMACAO, Portugal,
partner

4.Erbakir Fen Lisesi, Turkey, partner

5.Iis Alessandro Volta, Italy, partner

6.Centrum Kształcenia Praktycznego w Jastrzebiu-Zdroju, Poland, partner

All participants:

-used the platform resources;

-used the modern pedagogical tools which integrate ICT in education;

-communicated with other members of the eTwinning community;

-joined other educational projects on the platform;

-found partners for future Erasmus+ projects;

-participated at online courses, seminars and webinars;

Each teacher uploaded the students from the target group on the platform so as to offer them the chance to communicate among themselves in a safe environment.

Digital resources: "Maker Education" magazine, ISSN certified:

-No. 1 of the magazine will be published in January 2020, Romania is responsible.

-No. 2 of the magazine will be published in April 2020, responsible is Macedonia.

-No. 3 of the magazine will be published in July 2020, responsible is Turkey.

-No. 4 of the magazine will be published in January 2021, responsible is Portugal.

-No. 5 of the magazine will be published in April 2021, responsible is Italy.

-No. 6 of the magazine will be published in July 2021, responsible is Poland.

Our activities on the eTwinning platform:

- [Gabriela-Brandusa Horlescu](#) created a new page [C1. Robotics and automation, November 25-29, 2019](#), 15:53, 30.11.2019

- [Gabriela-Brandusa Horlescu](#) created a new online meeting [C1. Robotics and automation](#), 21:32, 11.11.2019

- Natasha Marina

"Hi everyone! This video is made by our students in Macedonia for this Erasmus+ Project. The students acted, filmed and edit it all by themselves.

"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

Turn on subtitles on youtube clip for English translation. Enjoy it!"
<https://www.youtube.com/watch?v=-S6CCPwblsg&t=47s>



Gabriela-Brandusa Horlescu, Colegiul Tehnic „Gheorghe Cartianu”, Piatra Neamt, ROMÂNIA
GÜNEŞ ACAR, Denizli Erbakır Fen Lisesi, TURCIA
Marcin Mazur, Centrum Kształcenia Zawodowego w Jastrzębiu-Zdroju, POLONIA
Ana Irina Secară, Colegiul Tehnic „Gheorghe Cartianu”, Piatra Neamt, ROMÂNIA
Carmen Simona Stanciu, Colegiul Tehnic „Gheorghe Cartianu”, Piatra Neamt, ROMÂNIA
Claudia Vaideanu, Colegiul Tehnic „Gheorghe Cartianu”, Piatra Neamt, ROMÂNIA
Constanta Salaru, Colegiul Tehnic „Gheorghe Cartianu”, Piatra Neamt, ROMÂNIA
Eleonora DRAGOMIR, Colegiul Tehnic „Gheorghe Cartianu”, Piatra Neamt, ROMÂNIA
Mihai Irimia, Colegiul Tehnic „Gheorghe Cartianu”, Piatra Neamt, ROMÂNIA
Sérgio Fernandes, Escola de Hotelaria de Fátima, PORTUGALIA
Carlos Mendes, Escola Profissional de Ourém, PORTUGALIA
Charly Silva, Escola Profissional de Ourém, PORTUGALIA
Elsa Reis, Escola Profissional de Ourém, PORTUGALIA
Sandra Monteiro, Escola Profissional de Ourém, PORTUGALIA
Laura Venuti, IISS "A. Volta", ITALIA
Maurizio Corvino, IISS "A. Volta", ITALIA
Angela Nenovska-Krstevska, Приватно средно училиште САБА, Macedonia de Nord
Natasha Marina, Приватно средно училиште САБА, Macedonia de Nord

au primit Certificatul pentru proiectul:

Maker Education

02.09.2019



Simona Velea
Biroul național de asistență
ROMÂNIA



Mehmet Fatih Döğür
Biroul național de asistență
TURCIA



"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

5.The First meeting November 2019, SABA, Macedonia

Natasha Marina, teacher

05.11.2019

Foundation „Nikola Kljusev”

09.00 – 09.30 Welcome Coffee, signing list of participants etc.

09.30 – 10.00 Presentation of the meeting agenda and other activities.

10:00 – 11:30 Presentation of the partner countries.

11.30 – 13.00 Management and Implementation of the Project.

13.00 – 14.00 Lunch (at the Foundation provided by the School SABA).

14.00 – 15.00 Day 1 conclusion.

Free time

20:00 – Dinner in a Traditional Macedonian Restaurant.



06.11.2019

Private High School SABA

09.00 – 10.30 Discussions about next steps of the Project (first students visit in Romania, partners' responsibilities etc.).

10:30 – 11:00 Presenting the school.

11.30 – 12.30 Day 2 conclusion and evaluation.

12:30 - 14:00 – Lunch (at the Old Bazaar).

14.30 – 15.30 - Sightseeing tour around the city – starting from Kale Fortress of Skopje and ending at Memorial house of Mother Teresa.

Free time or departures

"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."



"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

6.C1. Robotics and automation
Short-term exchanges of groups of pupil

Gabriela-Brândușa Horlescu, teacher

Days	Activity
24 November 2019	Arrival
November 25, 2019	
9.00-11.00	Welcome coffee, signing list of participants. Visit the school.
11.00-13.00	Culture Fest Each partner school made a presentation about their educational system and how the informal education aiming at 14-18-year-old students takes place in their countries according to legislative rules and administration. Presentations about schools and countries. Romania, Turkey, Poland, The Republic of North Macedonia, Portugal, Italy
13.00-14.00	Lunch
14.00-17.00	Visit the school. Technology Festival - each country promoted technology and exhibited some products made by students
<i>Free Time, visit the city.</i>	
November 26, 2019	
9.00-11.30	Robotics workshop – Arduino, toys - Arduino platform, Arduino Uno plates, Arduino Nano, sensors used in experiments (temperature, humidity, light, laser, etc.), driving motors. Toys were made using the Arduino platform: smart homes, cars, light commercials, etc. Teachers visited the school.
11.30-12.30	Lunch
13.00-18.00	Cultural trip – Neamt region, Piatra Neamt-Targu Neamt area - visiting the main tourist attractions: memorial houses, fortress, craftsmen's workshops.
<i>Free time, visit the city.</i>	

"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

Days	Activity
November 27, 2019	
9.00-17.00	<p>Study visit to Hydropower Plant in Piatra Neamt, "Dimitrie Leonida" Hydropower Plant, the Bicaz dam –Hydropower Branch in Piatra Neamt. This plant manages the hydropower in the Moldovian area, mainly on the Bistrita, Siret, and Prut rivers. Components include a total of 51 hydroelectric power stations, micro-hydropower plants and low-power hydroelectric plants, over 100 energy groups producing more than 1,500 GWh annually. -"Dimitrie Leonida" Hydro Power Plant, commissioned in 1960, is the most important objective in the administration of the branch. -The Bicaz dam - The Izvorul Muntelui-Bicaz dam is a 127-m-thick concrete barrier with a length of 435 m. For the construction of the dam, 1,650,000 cubic meters of concrete and reinforced concrete were needed. The accumulation lake has a total volume of 1,230 million cubic meters, an area of 310 hectares and a length of 35 km. In the semiaerian plant, the 6 Francis vertical turbines are located: 4 27,5 MW and 2 50 MW. And we continued the trip to the Red Lake.</p>
17.00. Free time, visit the city.	
November 28, 2019	
9.00-12.00	<p>Robotic workshop: Raspberry PI. Automation workshop - renewable energies Introduction in Raspberry Pi - a small computer that can do lots of things. Experiments and programming. We made many applications (https://curriculum.raspberrypi.org/), using the phases: design, programming, physical computing, manufacture, community and sharing. -Fundamentals of Raspberry Pi Electronics - Software and Hardware Tools for Raspberry Pi -Input/Output Interfaces -Input Sensors -Output Devices Teachers visited the school.</p>
12.00-14.00	Lunch
14.00-17.00 18.00-22.00	<p>Visit the city, museums, travel by cable gondola. Festive dinner - <i>Colibele Haiducilor</i> Restaurant</p>

"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

Days	Activity
<i>Free time, visit the city.</i>	
November 29, 2019	
9.00-13.00	Teaching activity: guest teachers attended Romanian classes. Students' activity: memory games, attention games, language games, reasoning games, visual and spatial games. Each country presented their traditional games. Feedback questionnaires.
13.00-14.00	Lunch
14.00-17.00	Teachers evaluated the overall activity and discussed about the next mobility. Internal report was revised. Evaluation. Departure
29-30 November 2019	Departure

On November 25, 2019 we organized 2 events:

- the Festival of Culture;
- the Technology Festival.

"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

6.1. The Festival of Culture

Gabriela-Brândușa Horlescu, teacher

The presentation of the school, the city, the country, the culture specific to each country was the first activity of the project, which brought together teachers and students from Romania, Turkey, Poland, Macedonia, Portugal and Italy.

The moments of dance and traditional Romanian music were appreciated by all the participants in the event.



"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

6.2. Technology Festival

Gabriela-Brândușa Horlescu, teacher

Technology Festival - each country promoted the technology and exhibited some products made by students.

The Electronics and Robotics Group within the Neamt County Center of Excellence supported this scientific event.

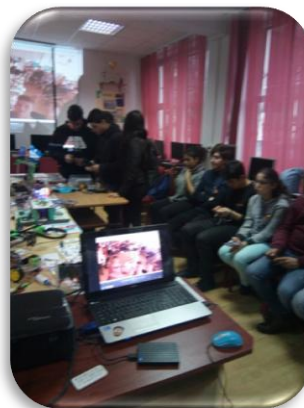
The World Science Day for Peace and Development.

Because on every 10 November we celebrate *World Science Day for Peace and Development* in order to highlight the important role of science in society, each school prepared some applications dedicated to this day.

<https://en.unesco.org/commemorations/worldscienceday>.

Some applications of robotics were presented:

- robotic arm;
- robot ordered from the phone via Bluetooth;
- robot with obstacle sensors;
- robot tracking a line;
- Plotter 2D;
- 3D printer;
- 4X4X4 cub led;
- light box for light commercials;
- smart house;
- robot who dance;
- sun follower solar panel;
- traffic lights simulator;
- automatic watering system.



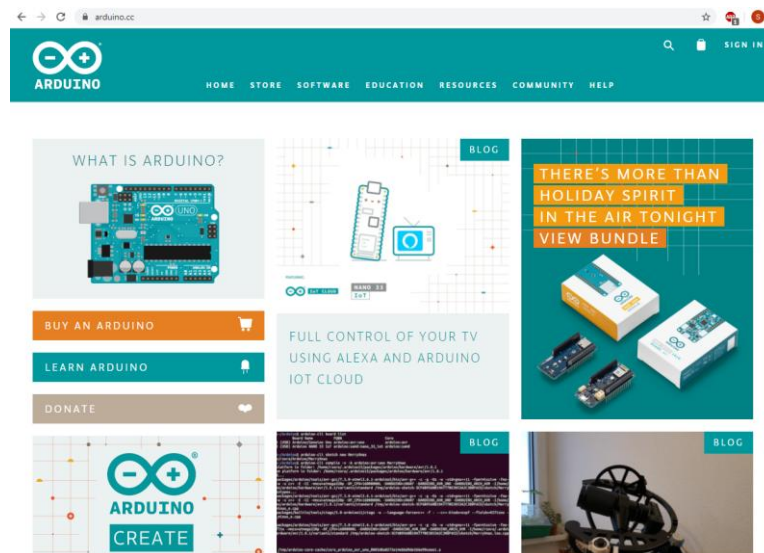
"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

6.3. Robotics Workshop in Arduino

Gabriela-Brândușa Horlescu, teacher

Robotics Workshop - in the first part of the November 26, 2019, with the help of the Arduino platform, the students developed basic practical applications in the field of robotics.

Arduino platform



<https://www.arduino.cc/>

Each Arduino program has two sections.

1. **setup** section, which is run only once, when the board is turned on or when the Reset button is pressed.

2. **loop** section, which is repeated when the Aeduino board is powered.

// the setup function runs once when you press reset or power the board

```
void setup()
```

```
{
```

```
.....
```

```
}
```

// the loop function runs over and over again forever

```
void loop()
```

```
{
```

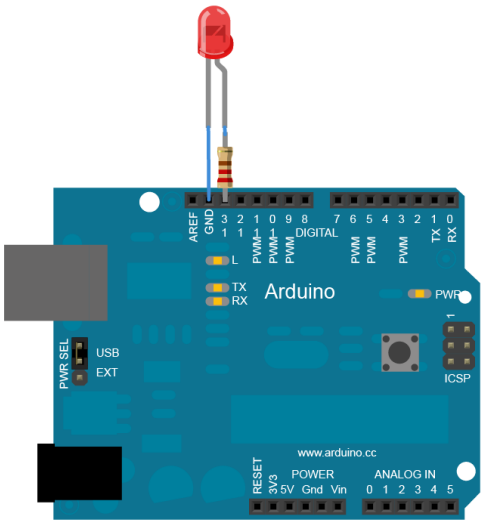
```
.....
```

```
}
```


"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

6.3.1.Arduino Blink

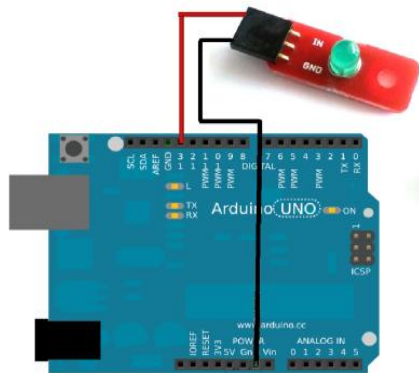
We used the LED included on the Arduino board. The LED was bound to digital PIN 13. When PIN13 was set to HIGH the led turned on and when PIN13 was set to LOW, the LED turned off.

	<pre>void setup() { pinMode(13, OUTPUT); } void loop() { digitalWrite(13, HIGH); delay(1000); digitalWrite(13, LOW); delay(1000); }</pre>
---	--

6.3.2. Led Brick, ON/OFF

	<p>A LED brick is the easiest way to make light using an Arduino. A LED brick needs a spare digital PIN so it can be controlled by the Arduino.</p> <p>Brick LED is a component that emits light. When the Arduino port was connected it switched to HIGH (1).</p>
---	--

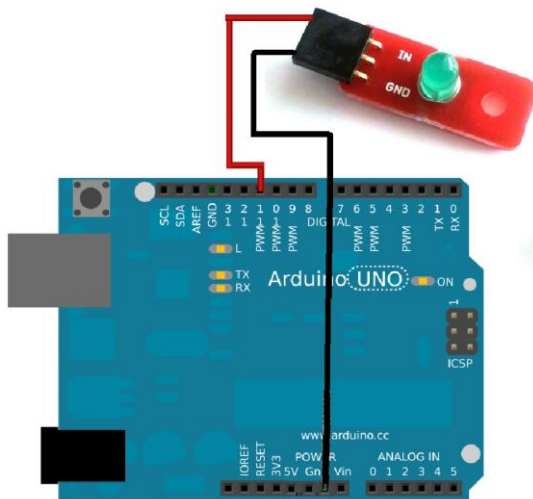
"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."



```
void setup() {
  pinMode(13, OUTPUT);
}
void loop() {
  digitalWrite(13, HIGH);
  delay(2000);
  digitalWrite(13, LOW);
  delay(2000);
}
```

The signal pin is coupled to the digital pin 7. The LED blinks once every 2 seconds.

6.3.3.Led Brick with variable light intensity

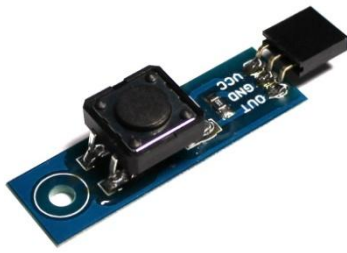


```
void setup() {
  pinMode(11, OUTPUT);
}
void loop()
{
  for (int i = 0; i < 200; i++)
  {
    analogWrite(11, i);
    delay(70);
  }
  for (int i = 199; i > 0; i--){
    analogWrite(11, i);
    delay(70);}
}
```

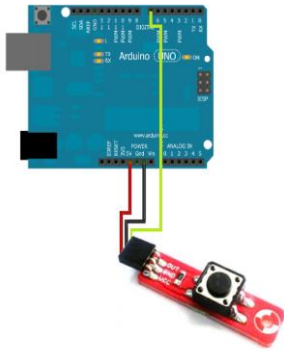
In this example, the LED lights up, but this time with variable light intensity.

"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

6.3.4.Button Brick

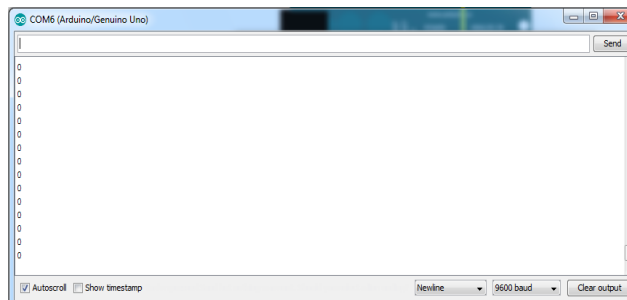


The brick button is a component that observes pressing. Pushbuttons or switches connected two points in a circuit when students pressed them.



```
void setup()
{
  pinMode(7, INPUT);
  Serial.begin(9600);
}
void loop()
{
  int ButtonState = digitalRead(7);
  Serial.println(ButtonState); delay(20);
}
```

The loop function read the state of the button (it can be either 0 or 1 - pressed or not) and it showed its value in the console. Students could see this by opening the Serial Monitor in Arduino IDE.

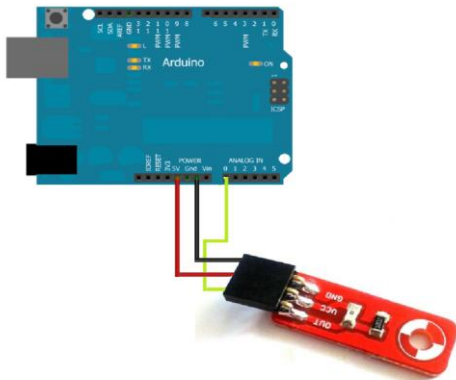


"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

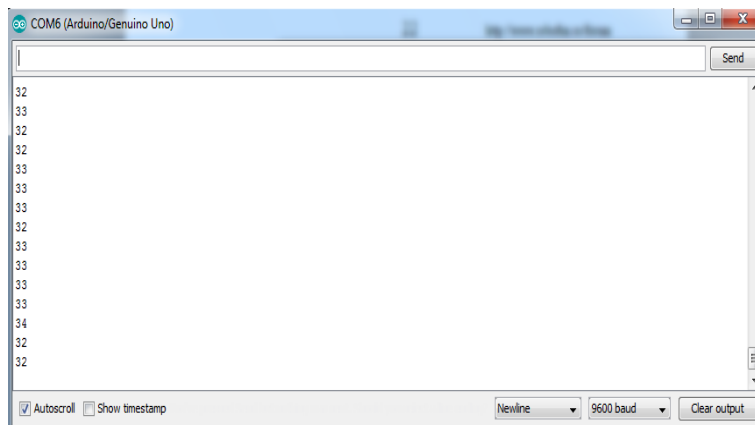
6.3.5. Brick Light Sensor



This is a brick component specially designed for the Arduino board, used to measure the environment light level.




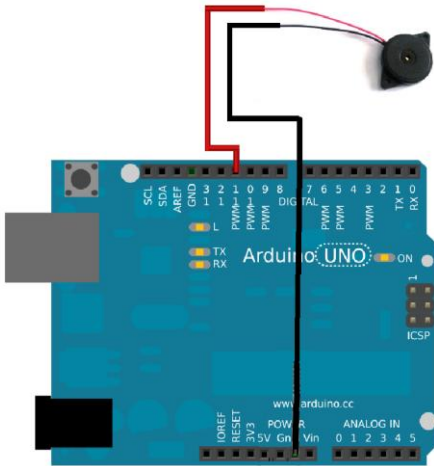
```
void setup()
{
  Serial.begin(9600);
}
void loop()
{
  int LightLevel = analogRead(0);
  Serial.println(LightLevel);
  delay(10);
}
```



"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

6.3.6. Mini Speaker

	<p>The mini brick speaker is a simple Arduino speaker that can be connected directly to one of the PWM pins on the board to create sound effects or melodies.</p>
---	---

	<pre>void setup() { pinMode(11, OUTPUT); } void loop() { for (int i = 1500; i < 4000; i++) { tone(11, i); delay(10); } for (int i = 4000; i > 1500; i--) { tone(11, i); delay(10); } }</pre>
--	--

"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

6.3.7.Axial Double Solar Panel

Andrei Azoitei, student

A double axial solar panel is more useful than a classic one. This is because it has the possibility to rotate depending on the position of the sun for a whole day.

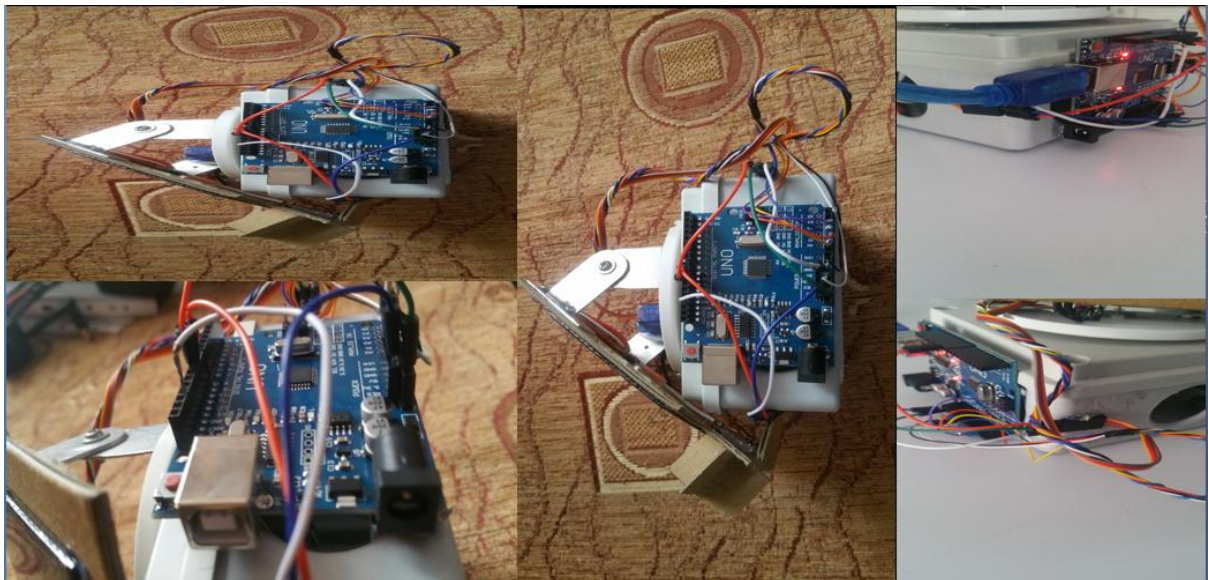
A classic solar panel offers a different voltage and current depending on the position of the sun.

A double axial solar panel offers approximately constant voltage and current because it is oriented by the position of the sun.

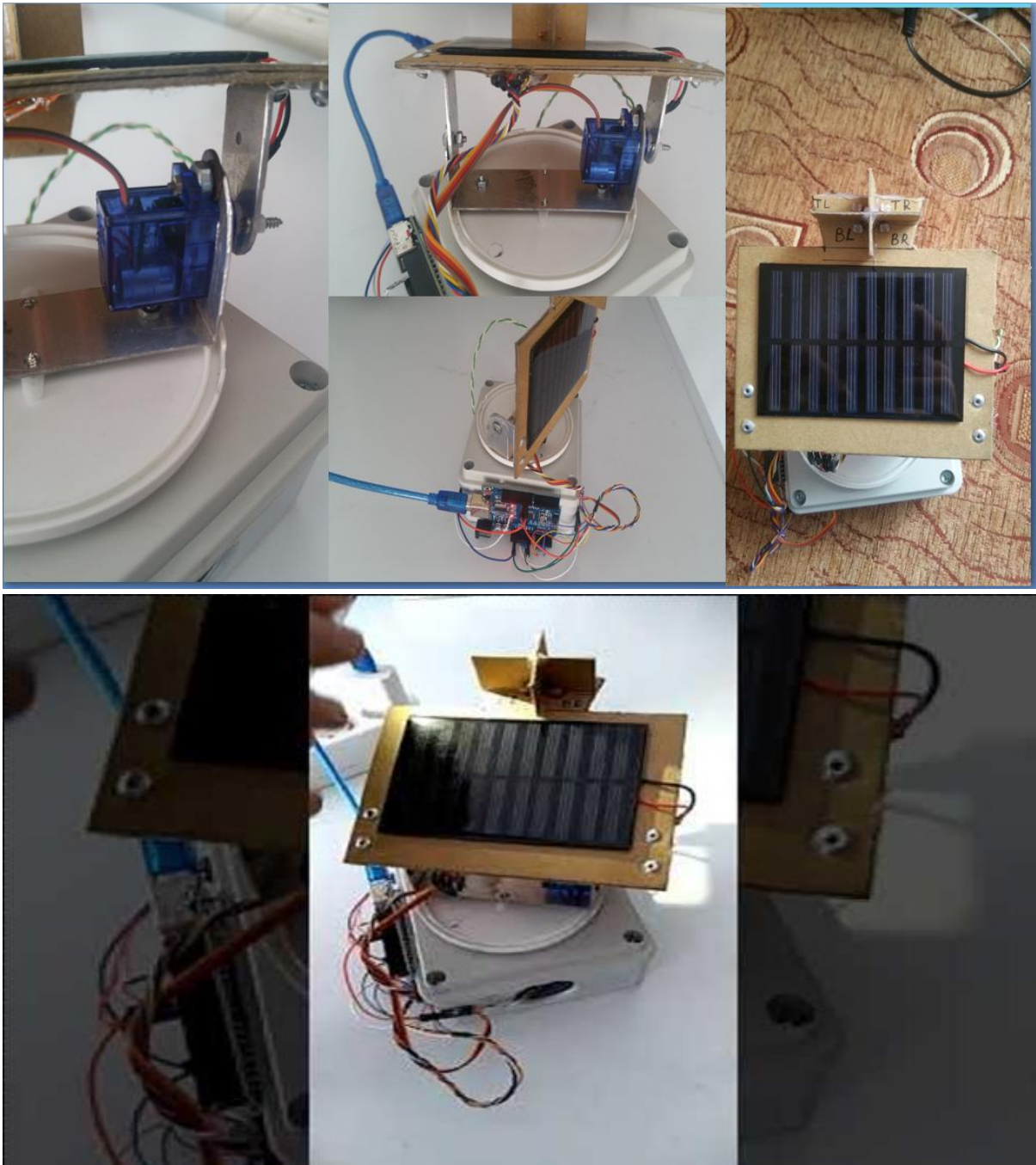
Required hardware:

- 6V/60mA solar panel;
- photoresistors;
- 220 Ω resistors;
- Servo motors SG90;
- Arduino Uno development board;
- connecting wires;
- plastic, cardboard and aluminum parts.

Photo gallery



"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."



"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

6.3.8.DYE Smart Lock with Arduino and RFID

Adrian Azoitei, student

Radio-frequency identification (RFID) uses electromagnetic fields to automatically identify and track tags attached to objects. The tags contain electronically stored information.

The MFRC522 is a highly integrated reader/writer IC for contactless communication at 13.56 MHz.

The red key as the main key, it adds or eliminates the access of the UID keys (keys or cards).

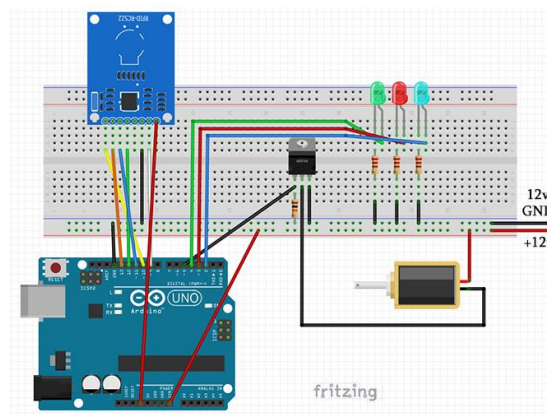
Some LEDs used in the system, show us the state of the system:

- yellow – on;
- red - prohibited access;
- blue - allowed access.

Required Hardware:

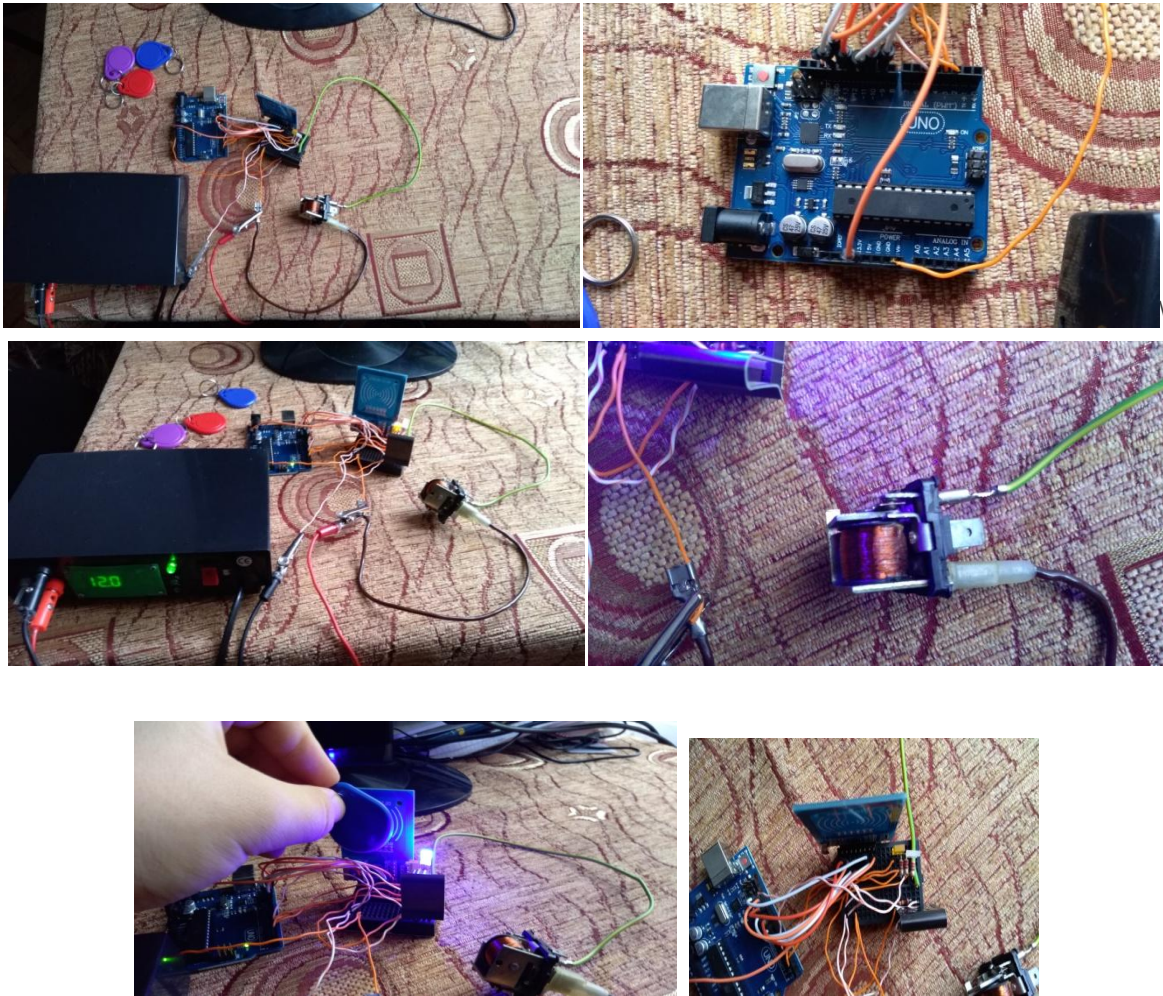
- Arduino Uno R3;
- 3x220Ω resistors;
- 10KΩ resistor;
- Logic-level N channel Mosfet;
- MFRC522 RFID;
- 3xUID tags
- Two-color LED (red, blue);
- Yellow LED;
- 12V Relay Module;
- 12V Power Adapter;
- Breadboard and connecting wires.

Wiring diagram:



"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

Photo gallery:



"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

6.4.Cultural Visit

Gabriela-Brândușa Horlescu, teacher

On November 26, 2019 we took a **cultural visit**. The first place was "Ion Creangă" Memorial House in Humulesti. We were all reminded the old stories from the coollection "Memories from My Boyhood" of the great Romanian writer Ion Creangă. In the theme park "Ion Creangă" the near the house we met the characters from the stories of our childhood.



The road continued towards the Fortress of Neamt in Târgu Neamt. A fortress that impresses on each occasion through its construction, grandeur and glorious past. The fresh mountain air, the charm of the forest and the landscape of autumn filled everybody with optimism and energy!



"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

6.5. Study Visit - Hydroelectric Energy

Gabriela-Brândușa Horlescu, teacher

"Dimitrie Leonida" Hydroelectric Power Plant from Stejaru has been operating since 1960. Inside the plant there are 6 vertical Francis turbines: 4 with a power of 27.5 MW and 2 with a power of 50 MW.

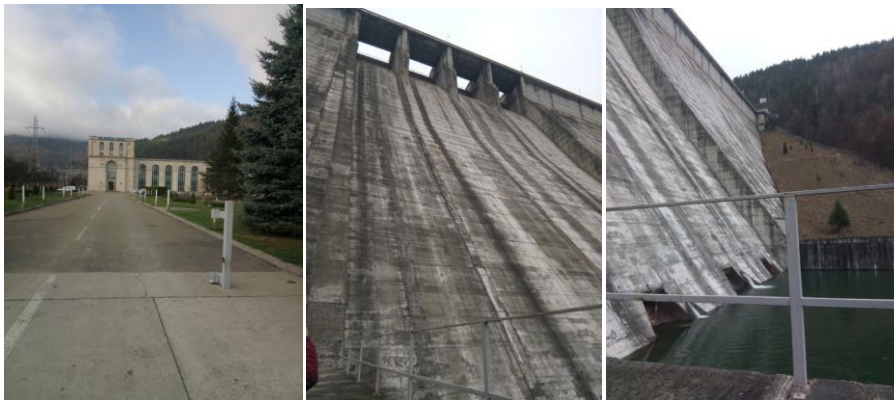
"Mountain Spring" Dam in Bicaz - completed in 1960, after a 10-year construction, has a height of 127 meters, 30 meters of which are underground and supplies water to the Stejaru hydroelectric plant through an adduction tunnel dug in the mountain, with a length of 4.8 km.

Bicaz Gorges - formed by the Bicaz River make the connection between Moldova and Transylvania, represent a particularly picturesque geographical area, being included in the Bicaz Gorges Hășmaș National Park and are part of the Bicaz Gorges Nature Reserve and Red Lake. Caves of rare beauty are found beneath the limestone walls of the rocks.

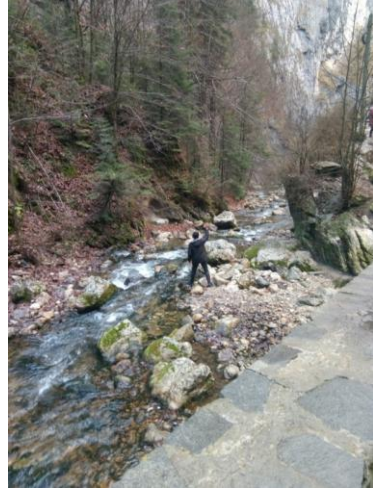
Products handcrafted by Romanian and Hungarian artisans in the area we find in small shops with souvenirs located along the road.

Red Lake (also known as Ghilcoș Lake) is a natural dam lake formed by an earthquake after the collapse of a part of the Ghilcoș Mountain. Red Lake is the largest natural and mountain dam lake in Romania. The lake is unique in our country, being the only place in Romania where a forest "sank". Local legends say that the lake's water is reddened by the blood of lovers in love with "Mount Killer".

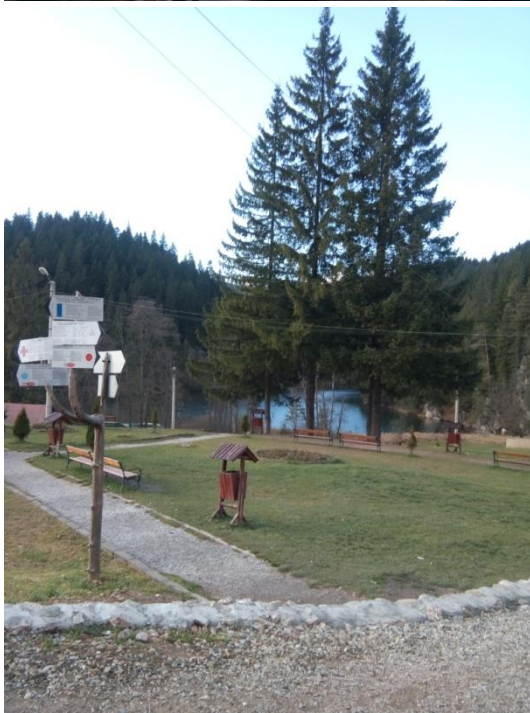
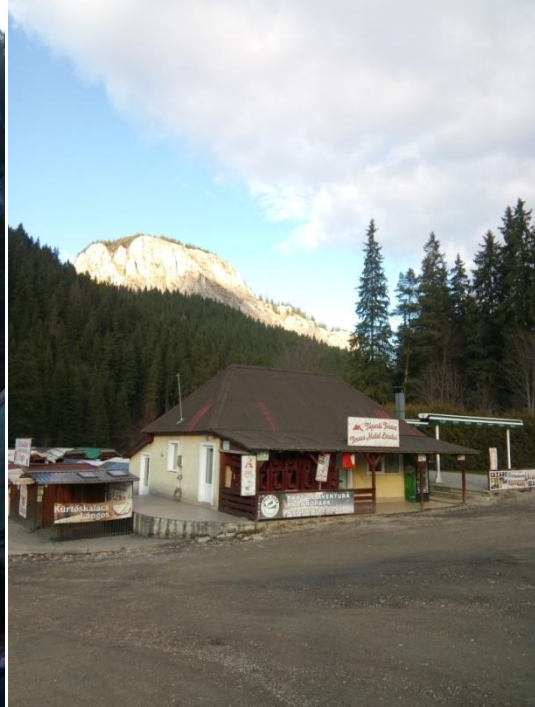
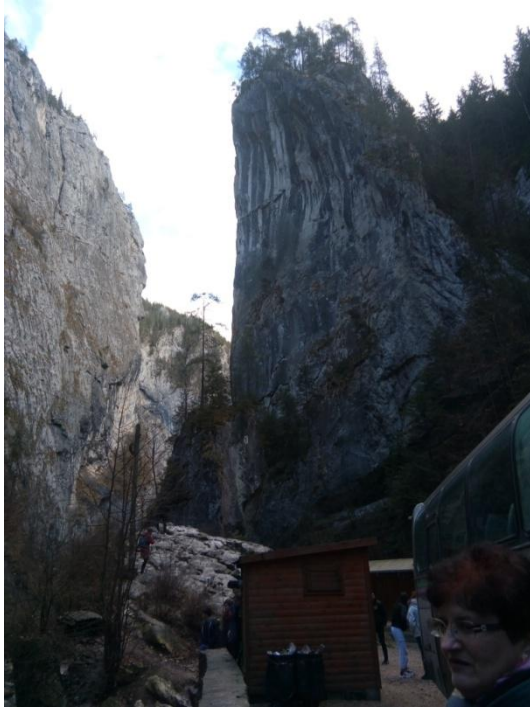
We thank the company HidroElectrica SA who helped us to rediscover ENERGY today!



"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."



"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

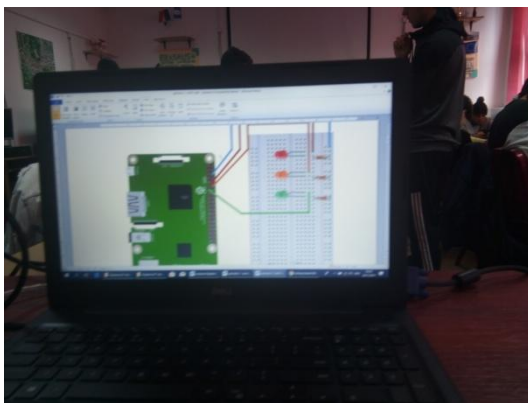
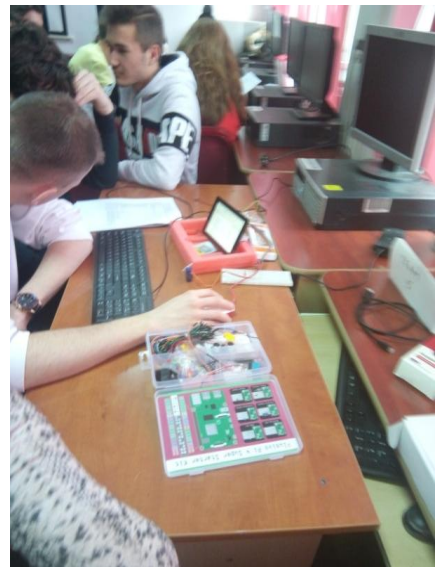
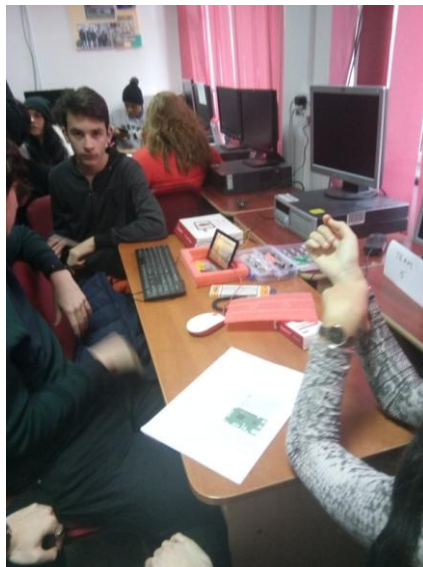
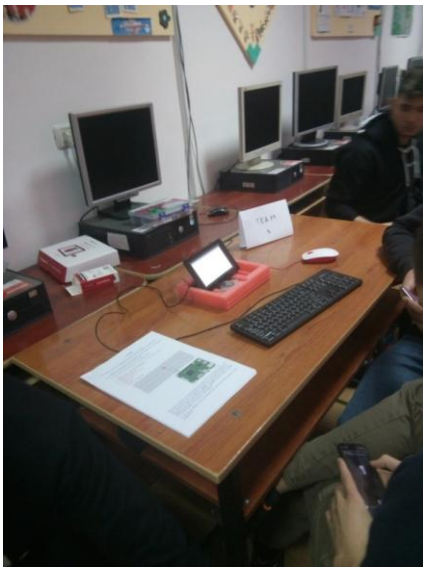
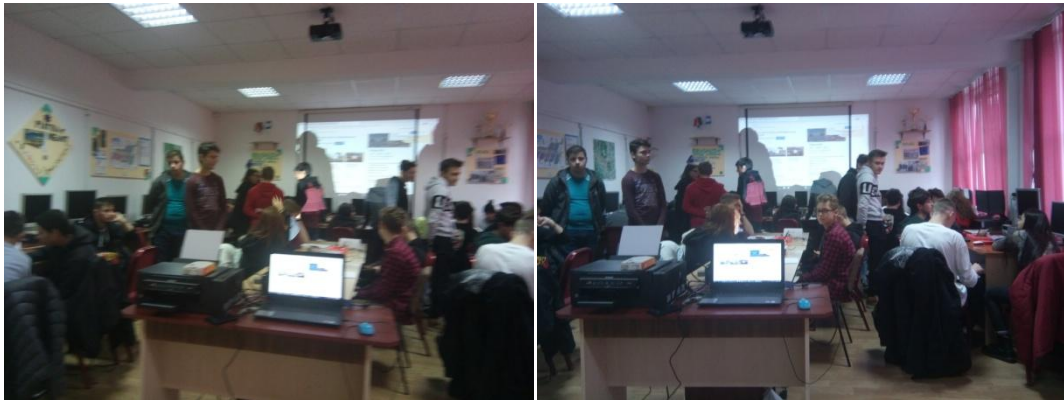


"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

6.6.Automation and robotics workshop

Gabriela-Brândușa Horlescu, teacher

On November 28, 2019 students took the first steps in Raspberry PI.

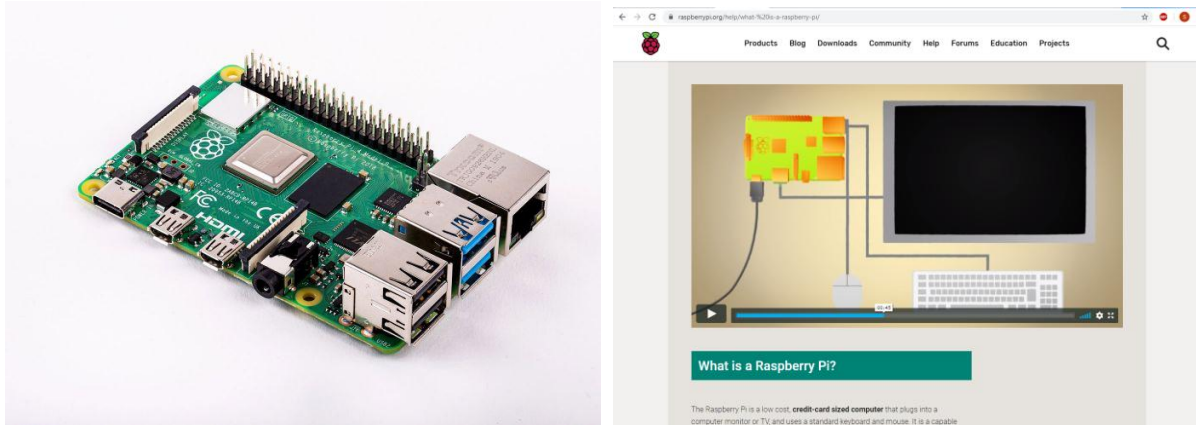


"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

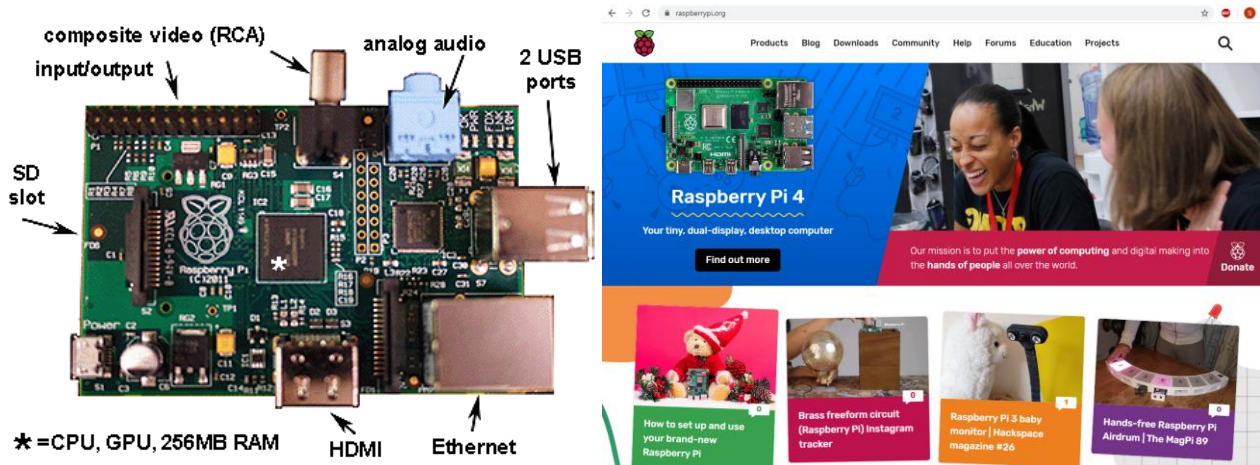
6.6.1. Raspberry PI

The Raspberry Pi is a low cost, credit-card sized computer that plugs into a computer monitor or TV, and uses a standard keyboard and mouse.

You can learn how to program in languages like Scratch and Python.



A low-cost Linux and ARM-based computer on a small circuit board sponsored by the charitable Raspberry Pi Foundation in the U.K.



"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

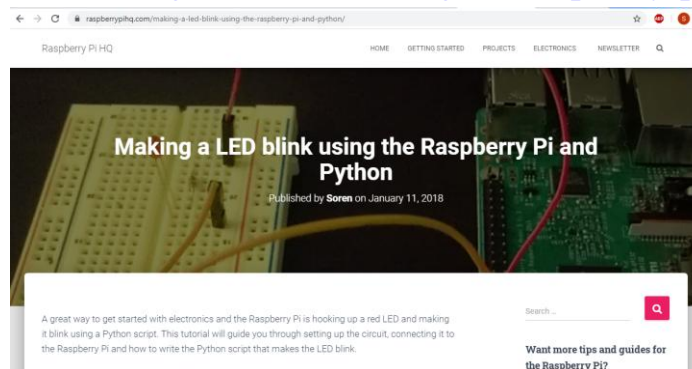
6.6.2.Raspberry PI – LED Blink

We used the Raspberry Pi to connect a red LED and flash it using a Python script.

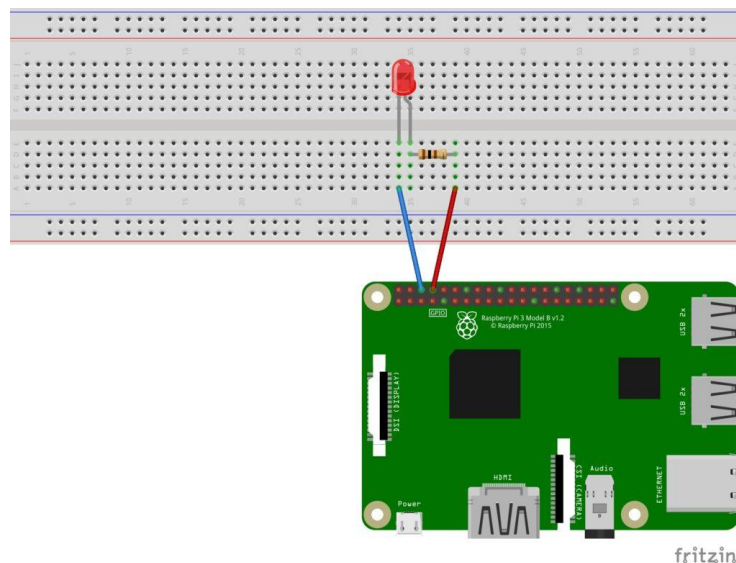
Required components:

- Raspberry PI 4
- Raspberry Pi Display LCD cu Touchscreen 7"
- USB Mouse
- Keyboard
- 1x220 Ω resistor
- 1xLED
- Jumper wires

For the application our students followed the explanations from the address:
<https://raspberrypi.com/making-a-led-blink-using-the-raspberry-pi-and-python/>.



Wiring diagram:

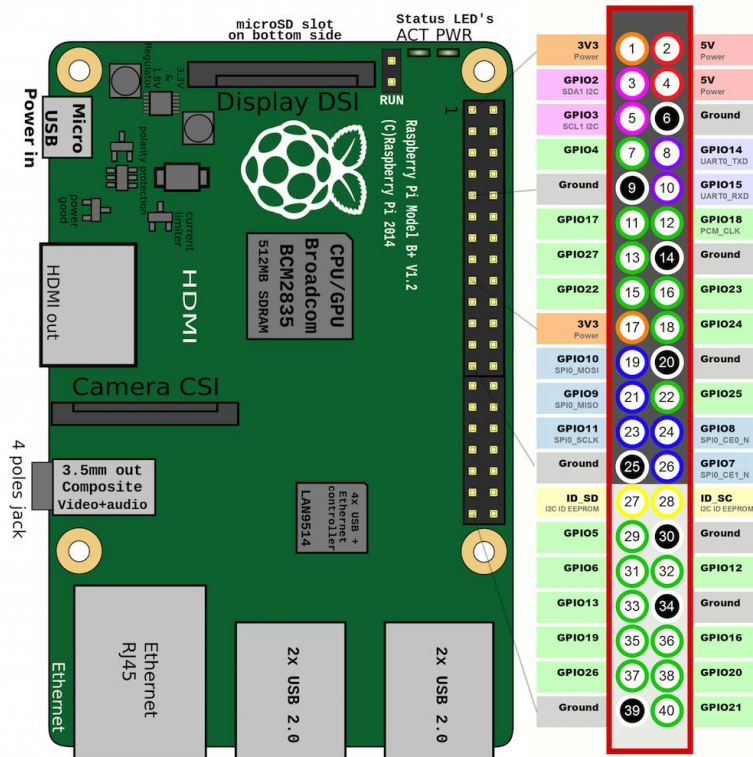
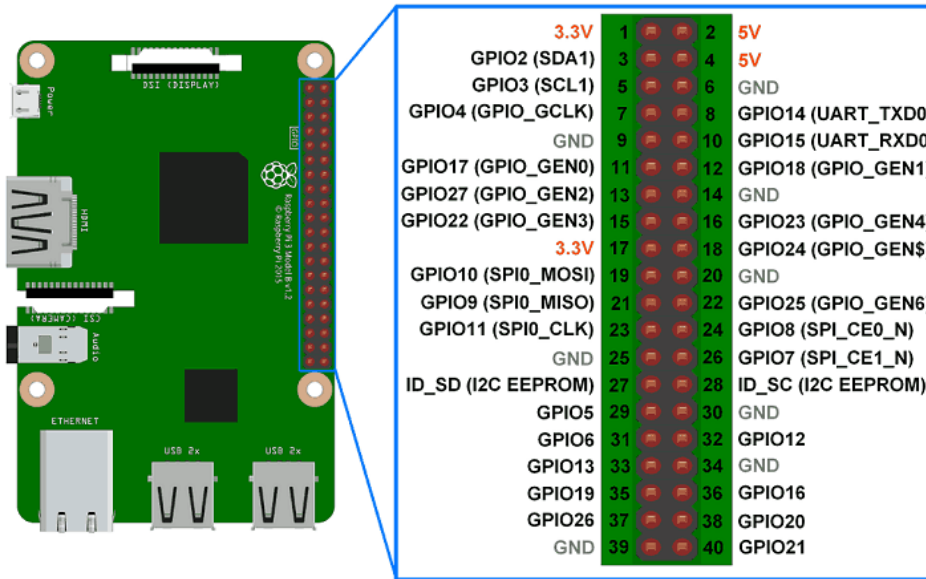


"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

Before writing the software you first need to install the Raspberry Pi GPIO Python module.

This is a library that allows us to access the GPIO port directly from Python. To install the Python library open a terminal and execute the following:

```
$ sudo apt-get install python-rpi.gpio python3-rpi.gpio
```



Writing the Python Software to blink the LED:

"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

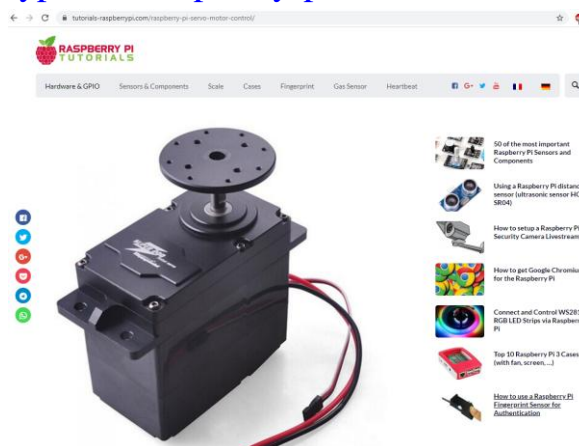
```

import RPi.GPIO as GPIO # Import Raspberry Pi GPIO library
from time import sleep # Import the sleep function from the time module
GPIO.setwarnings(False) # Ignore warning for now
GPIO.setmode(GPIO.BOARD) # Use physical pin numbering
GPIO.setup(8, GPIO.OUT, initial=GPIO.LOW) # Set pin 8 to be an output pin and set
initial value to low (off)
while True: # Run forever
GPIO.output(8, GPIO.HIGH) # Turn on
sleep(1) # Sleep for 1 second
GPIO.output(8, GPIO.LOW) # Turn off
sleep(1) # Sleep for 1 second

```

6.6.3.Raspberry PI – Servo Motor Control

For the application our students followed the explanations from the address:
<https://tutorials-raspberrypi.com/raspberry-pi-servo-motor-control/>

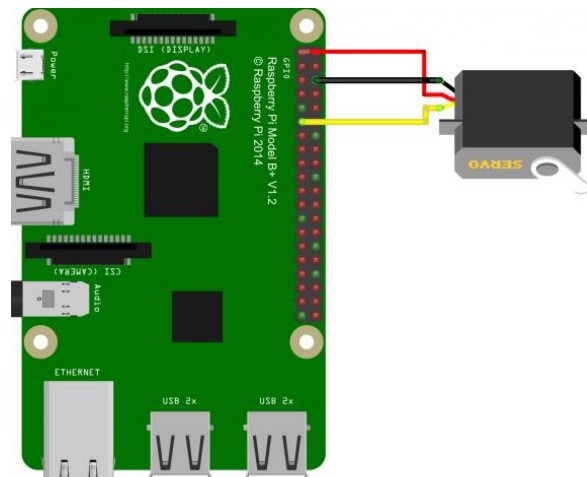


Required components:

- Raspberry PI 4
- Raspberry Pi Display LCD cu Touchscreen 7"
- USB Mouse
- Keyboard
- Servo Motor
- Jumper cable

"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

Wiring diagram:



fritzing

Black	GND (pin 6)
Red	3V3 (pin 1)
Yellow/Orange	GPIO17(pin 11)

Writing the Python Software:

```
import RPi.GPIO as GPIO
import time

servoPIN = 17
GPIO.setmode(GPIO.BCM)
GPIO.setup(servoPIN, GPIO.OUT)

p = GPIO.PWM(servoPIN, 50) # GPIO 17 for PWM with 50Hz
p.start(2.5) # Initialization
try:
    while True:
        p.ChangeDutyCycle(5)
        time.sleep(0.5)
        p.ChangeDutyCycle(7.5)
        time.sleep(0.5)
        p.ChangeDutyCycle(10)
        time.sleep(0.5)
        p.ChangeDutyCycle(12.5)
        time.sleep(0.5)
        p.ChangeDutyCycle(10)
```

"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

```

time.sleep(0.5)
p.ChangeDutyCycle(7.5)
time.sleep(0.5)
p.ChangeDutyCycle(5)
time.sleep(0.5)
p.ChangeDutyCycle(2.5)
time.sleep(0.5)
except KeyboardInterrupt:
    p.stop()
GPIO.cleanup()

```

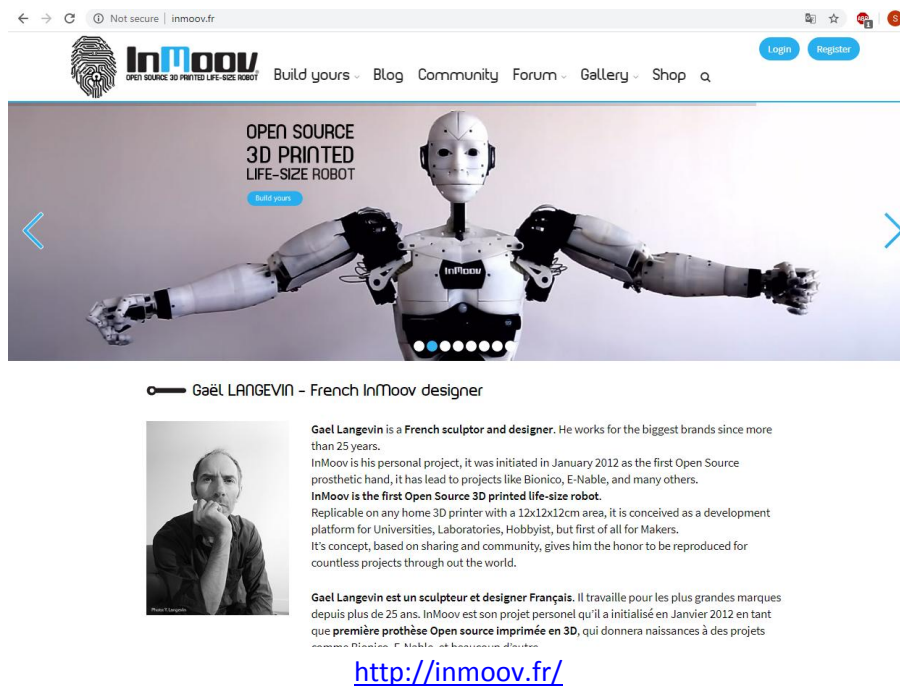
6.6.4. The humanoid robot InMoov -Chappie

Lucian Mihailescu, Student

The InMoov robot was created by Gael Langevin, a French sculptor and designer in 2012 and printed with a 12x12x12 cm 3D printer.

The project is an open source and is thus open to the general public.

It appeared in the years 2016-2017 on the front page of several magazines and online news sites.

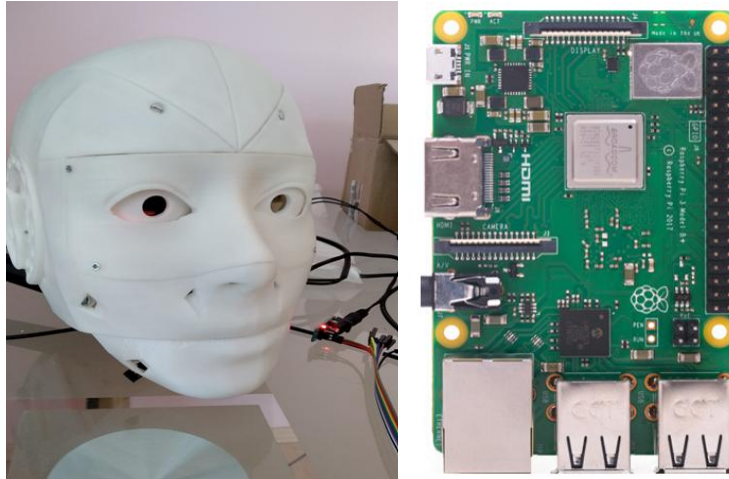


The screenshot shows the InMoov website. At the top, there is a navigation bar with the InMoov logo (a fingerprint icon) and the text "OPEN SOURCE 3D PRINTED LIFE-SIZE ROBOT". To the right of the logo are links for "Build yours", "Blog", "Community", "Forum", "Gallery", and "Shop". There are also "Login" and "Register" buttons. Below the navigation bar is a large banner image of the InMoov robot, a white humanoid figure with articulated joints. The text "OPEN SOURCE 3D PRINTED LIFE-SIZE ROBOT" is overlaid on the banner, along with a "Build yours" button. Below the banner, there is a section titled "Gael LANGEVIN - French InMoov designer". To the left of this section is a small portrait of Gael Langevin. To the right is a bio: "Gael Langevin is a French sculptor and designer. He works for the biggest brands since more than 25 years. InMoov is his personal project, it was initiated in January 2012 as the first Open Source prosthetic hand, it has led to projects like Bionico, E-Nable, and many others. InMoov is the first Open Source 3D printed life-size robot. Replicable on any home 3D printer with a 12x12x12cm area, it is conceived as a development platform for Universities, Laboratories, Hobbyist, but first of all for Makers. It's concept, based on sharing and community, gives him the honor to be reproduced for countless projects through out the world." Below the bio is a link: <http://inmoov.fr/>

"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

Following the InMoov model we built the Chappie robot.

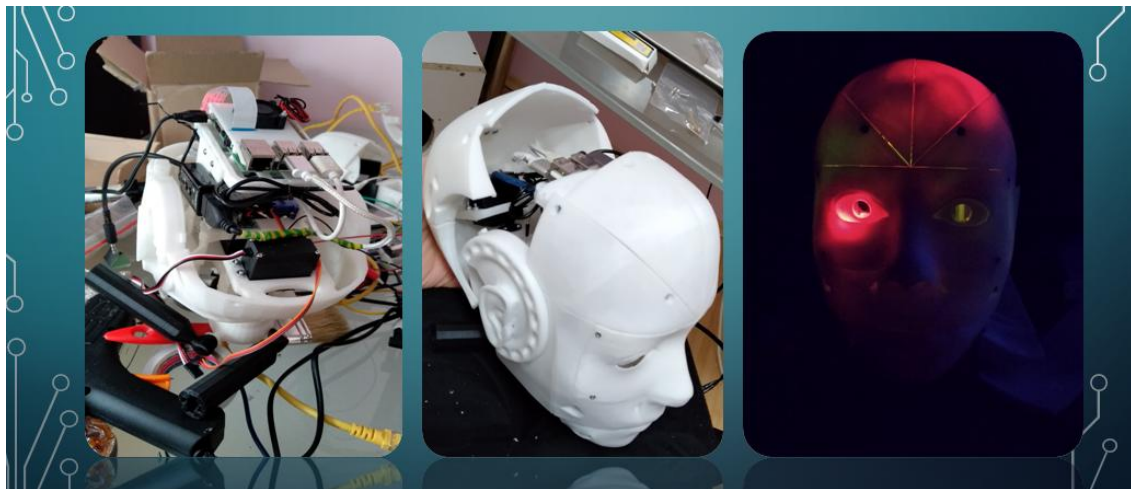
- It was printed by the 3D printer: Creality CR-10.
- It is designed with the purpose of developing artificial intelligence and machine learning.
- It can see, hear and speak.



The entire robot is controlled by the Raspberry Pi3 B + development board, which in turn controls other development boards via the I2C (Inter-Integrated Circuit) digital pins.

The development board has a wide variety of USB, HDMI, 3.5mm Jack, camera, display, micro USB and GPIO ports through which sensors, shields and other electronic components can be connected which makes it widely applicable in such projects.

Photo gallery



"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

6.7. Visiting the Art Museum

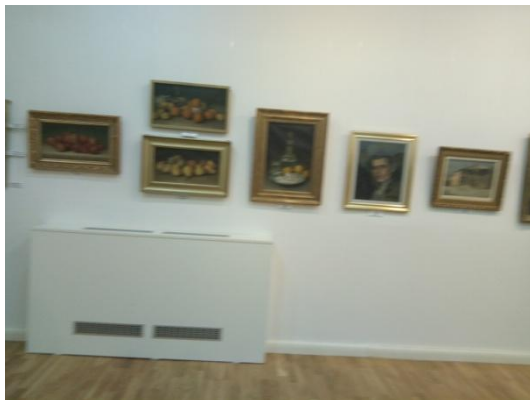
Gabriela-Brândușa Horlescu, teacher

Founded in year 1980, the museum exhibition contains works of Romanian artists that was related with Neamț area.

The exhibition shows a complete image of the evolution of visual art from the end of 19th century and the beginning of 20th century.



<http://mapn.muzeu-neamt.ro/>



"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

6.8. Visiting the Cucuteni Eneolithic Art Museum

Gabriela-Brândușa Horlescu, teacher

Cucuteni culture represents the most important civilisation of "Old Europe" and is the last culture with painted ceramics from Europe.

The museum exhibition contain almost 300 pieces arranged on two levels and three rooms.



<http://maecpn.muzeu-neamt.ro/>



"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

6.9. Festive dinner at "Colibele Haiducilor" Restaurant Magnificent artistic show performed by the Folk Ensemble "Toporaşul"!

Ana-Irina Secară, teacher

On November 28, 2019 we invited our partners to a festive dinner in order to exchange cultural similarities and differences. It was a very enjoyable evening which proved everyone that the cultural spirit offers unforgettable moments that unify nations and bring togetherness. This dinner was in fact a refresh to our personalities, a challenge to take part in different cultures and try to "breathe" a little bit from European customs and traditions. We found ourselves in the middle of little ambassadors from the 5 partner countries as each nationality had its moment of sharing artistic treasures.



"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."



"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

6.9.1. The Folk Ensemble "Toporașul"

Moldavia (the north part of Romania), a legendary realm, with its history kept in wood and songs, represents a treasure of old folk customs and stories. One of the local treasures is the legend of "toporașul" (violet, a local spring flower which inspired us to name our folk ensemble after it).

The Folk Ensemble "Toporașul" was founded in 1994 at the "Gheorghe Cartianu" Technical High School Piatra-Neamț, Neamț county and soon became famous among schools and high schools in our town and in the area around.

Along time, it has represented not only our school but also our region and country participating at various folklore festivals and competitions in Romania and abroad. The ensemble stands for an important source of promoting folk traditions especially in the educational environment, among children, teenagers and young people.

The activities are coordinated by the English teacher, Ana-Irina Secară while the dancing rehearsals are done under the guidance of our school choreographer, Adrian Gheorghiu and the singing lessons are done by vocal coaches. All of these take place in an especially-arranged room in our school.

Students join our ensemble at the beginning of each school year and they are guided afterwards according to the talent they possess, either to dancing or singing or generally to both of them.

Through joint hard work of the coordinator teacher, choreographer and the students, we have all managed to give the ensemble a touch of accuracy and authenticity rarely found in other school ensembles.

The group has now 28 members, aged between 14-19 years old and over time they have enjoyed not only local appreciation coming from our teachers, mates and parents attending the various events organized by our school but also that of the specialists while participating at folk festivals and competitions.

The artistic value of this small but very enthusiastic ensemble has been awarded with many distinctions at domestic and international festivals in France, Italy and Turkey.

However, the international performances took place some years ago and since then our ensemble has not had the chance to participate at any European cultural events. It would be a great opportunity for us to interact with other cultures again, to make new friends and to share our cultural traditions and customs. You can find us on our facebook account <https://www.facebook.com/ansamblul.toporasul>.

"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."



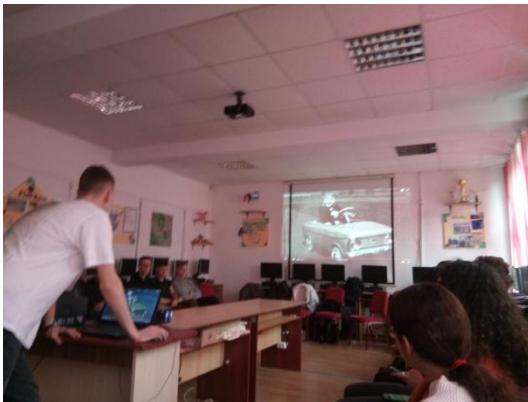
"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

6.10. Educational Activities

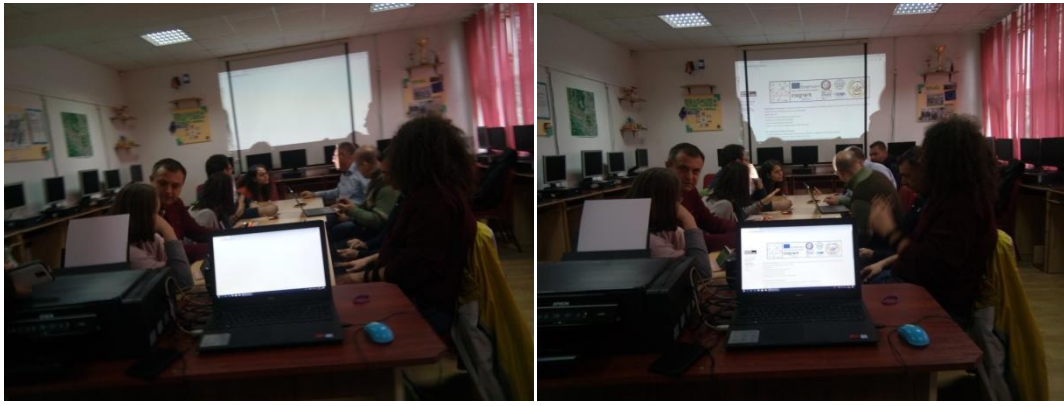
Gabriela-Brândușa Horlescu, teacher

While students from partner countries presented some of the traditional games, teachers attended classes.

After the festivity of handing out the participation certificates teachers discussed the next mobility that would take place in Macedonia and re-analyzed the project for an improved implementation.



"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."



"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

7. Python Programming Language

Şalaru Constanţa, teacher

Introduction

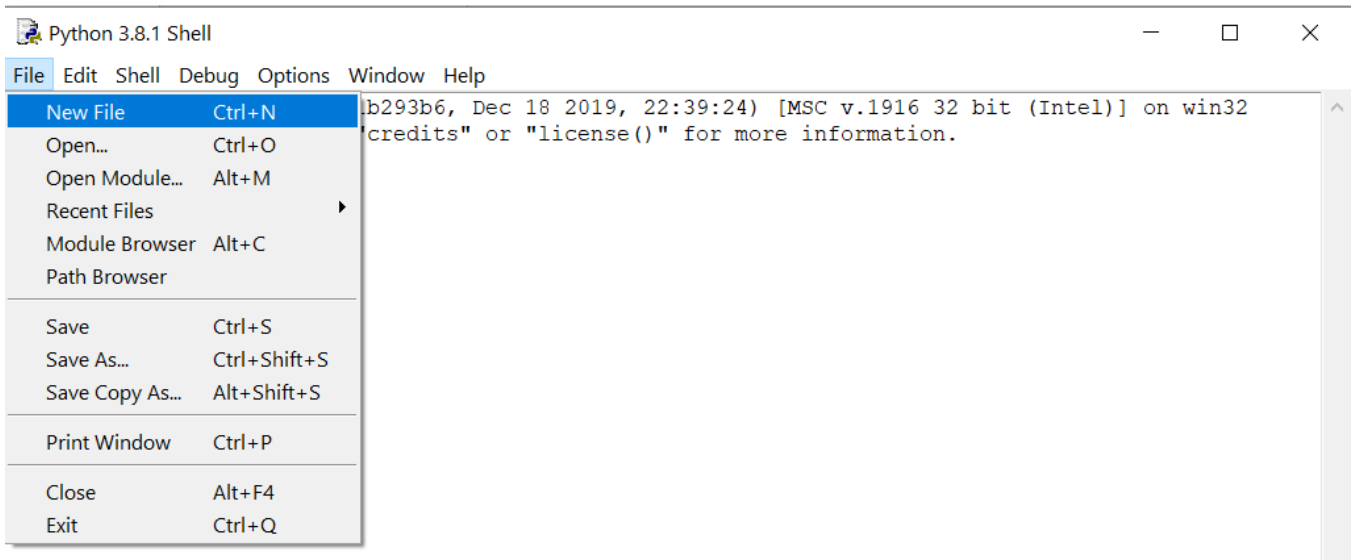
Python language it's used everywhere. From the usual applications that we use daily to the brain of a robot, this programming language is applicable in all kinds of situations and is the language preferred by many people.

Some advantages of Python:

- It is actually an open source project, it's free;
- combines skills with complexity;
- it's has been designed to be as easy to read – it's easily to understand what lines of code are doing;
- can be used for developing desktop, web, and recently mobile applications;
- requires less code and the syntax it's very simple;
- it is one of the most popular and modern programming languages.

Lesson 1. Creating First Program

- After we downloaded the language from <https://www.python.org/>, we will create the first file with .py extention.



Example

```
print("Hello, dear friends. We start to learn Python.")
```

"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

Output:

Hello, dear friends. We start to learn Python.

Data read and write

```
a=(input("Type a number, a="))  
b=(input("Type another number, b="))  
print("a=",a,"b=",b)
```

Output:

Type a number, a=2
Type another number, b=3
a= 2 b= 3

Lesson 2.Comments. Variables. Data Types.

Comments starts with a #.

For multiline comments it's use ''' comments '''.

Example 1

```
print("Hello, dear friends. ")  
print("We start to learn Python.")
```

Output:

Hello, dear friends.
We start to learn Python.

Example 2

```
print("Hello, dear friends. ")  
#print("We start to learn Python.")
```

Output:

"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

Hello, dear friends.

It's not necessary to explicitly mention the type of the *variable*. Python sets the type according to the value we are assigning.

```
a=10 #number
b="Erasmus" #string
print(a)
print(b)
```

Output:

```
10
Erasmus
```

Python default data types are:

Numeric Types:	<i>int, float, complex</i>
Text Type:	<i>str</i>
Sequence Types:	<i>list, tuple, range</i>
Mapping Type:	<i>dict</i>
Set Types:	<i>set, frozenset</i>
Boolean Type:	<i>bool</i>
Binary Types:	<i>bytes, bytearray, memoryview</i>

Example 1

```
a, b, c=10, 20, 30 #assign values
print(a, b, c)
print(type(a))
print(type(b))
print(type(c))
print("a+b+c=",a+b+c)
```

"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

Output:

```
10 20 30
<class 'int'>
<class 'int'>
<class 'int'>
a+b+c= 60
```

Example 2

```
a=2.5
print(type(a))
print(a)
b=2
print(type(b))
print(b)
c=a+b
print(type(c))
print(c)
```

Output:

```
<class 'float'>
2.5
<class 'int'>
2
<class 'float'>
4.5
```

Example 3

```
c=("Hello, dear friends. ")
print(type(c))
print(c)
```

"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

Output:

```
<class 'str'>  
Hello, dear friends.
```

Example 4

```
a=True  
print(type(a))  
print("a=",a)  
b=False  
print(type(b))  
print("b=",b)  
c=a&b # a AND B  
print(type(c))  
print("a AND B=",c)  
d=a|b # a or B  
print("a OR B=",d)
```

Output:

```
<class 'bool'>  
a= True  
<class 'bool'>  
b= False  
<class 'bool'>  
a AND B= False  
a OR B= True
```

We can specify the data type, using constructor functions: `int()` - constructs an integer number, `float()` - constructs a float number, `str()` - constructs a string.

"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

Lesson 3. Operators

- Arithmetic

Operator	Name	Example
+	Addition	$a + b$
-	Subtraction	$a - b$
*	Multiplication	$a * b$
/	Division	a / b
%	Modulus	$a \% b$
**	Exponentiation	$a ** b$
//	Floor division	$a // b$

- Assignment

Operator	Example
=	$a = 1$
+=	$a += 7$ $a = a + 7$
-=	$a -= 7$ $a = a - 7$
*=	$a *= 7$ $a = a * 7$
/=	$a /= 7$ $a = a / 7$
%=	$a \% = 7$ $a = a \% 7$
//=	$a //= 7$ $a = a // 7$
**=	$a ** = 7$ $a = a ** 7$
&=	$a \& = 7$ $a = a \& 7$
=	$a = 7$ $a = a 7$
^=	$a ^= 7$ $a = a ^ 7$
>>=	$a >> = 7$ $a = a >> 7$
<<=	$a << = 7$ $a = a << 7$

- Comparison

Operator	Name	Example
==	Equal	$a == b$
!=	Not equal	$a != b$
>	Greater than	$a > b$
<	Less than	$a < b$
>=	Greater than or equal to	$a >= b$
<=	Less than or equal to	$a <= b$

"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

- *Logical*

Operator	Description	Example
and	Returns True if both statements are true	a > 7 and a < 10
or	Returns True if one of the statements is true	a < 7 or a < 10
not	Reverse the result, returns False if the result is true	not(a > 7 and a < 10)

- *Identity*

Operator	Description	Example
is	Returns true if both variables are the same object	x is y
is not	Returns true if both variables are not the same object	x is not y

- *Membership*

Operator	Description	Example
in	Returns True if a sequence with the specified value is present in the object	x in y
not in	Returns True if a sequence with the specified value is not present in the object	x not in y

- *Bitwise*

Operator	Name	Description
&	AND	Sets each bit to 1 if both bits are 1
 	OR	Sets each bit to 1 if one of two bits is 1
^	XOR	Sets each bit to 1 if only one of two bits is 1
~	NOT	Inverts all the bits
<<	Zero fill left shift	Shift left by pushing zeros in from the right and let the leftmost bits fall off
>>	Signed right shift	Shift right by pushing copies of the leftmost bit in from the left, and let the rightmost bits fall off

"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

Lesson 4. If .. else, if elif else, Nested if..else statements

IF .. ELSE statement

if condition:

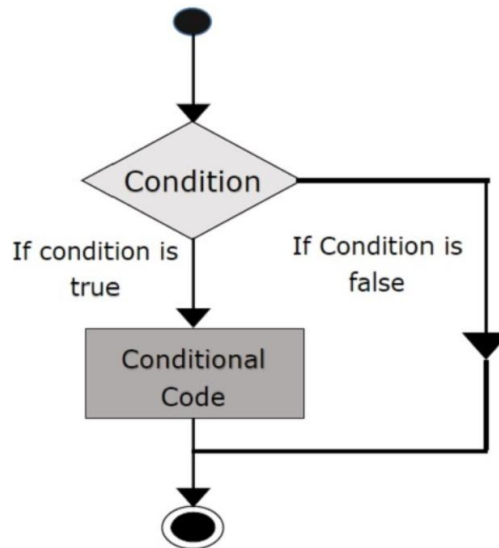
block_of_code_1

else:

block_of_code_2

block_of_code_1: Would execute if condition give true

block_of_code_2: This would execute if condition give false



Example 1

```
a=int(input("Type a number, a="))
if(a%2==0):
    print("Even number")
else:
    print("Odd number")
```

Outputs:

```
Type a number, a=8
Even number
```

```
Type a number, a=11
Odd number
```

"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

Example 2

```
a=int(input("Type a number,a="))
b=int(input("Type a number,b="))
if(a > b):
    max=a
else:
    max=b
print("The greater number=", max)
```

Outputs:

```
Type a number,a=7
Type a number,b=3
The greater number= 7
```

```
Type a number,a=7
Type a number,b=9
The greater number= 9
```

IF ELIF ELSE statement

```
if condition:
    block_of_code_1
elif condition_2:
    block_of_code_2
elif condition_3:
    block_of_code_3
..
..
..
else:
    block_of_code_n
```

"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

Example 1

```
a=int(input("Type a number,a="))
if(a > 0):
    print("Positive number")
elif (a < 0):
    print("Negative number")
else:
    print("The number is zero")
```

Outputs:

```
Type a number,a=8
Positive number
```

```
Type a number,a=-8
Negative number
```

```
Type a number,a=0
The number is zero
```

Example 2

```
a=int(input("Type a number,a="))
b=int(input("Type a number,b="))
if(a > b):
    print("The greater number=", a)
elif (a < b):
    print("The greater number=", b)
else:
    print("The numbers are equals")
```

"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

Outputs:

Type a number, a=7
Type a number, b=8
The greater number= 8

Type a number, a=7
Type a number, b=5
The greater number= 7

Type a number,a=7
Type a number,b=7
The numbers are equals

Example 3

```
if(a < 10):  
    print("The number has one digit")  
elif (a < 100):  
    print("The number has two digits")  
elif (a < 1000):  
    print("The number has three digits")  
else:  
    print("A big number. It has at least four digits ")
```

Outputs:

Type a number,a=433376
A big number. It has at least four digits

Type a number,a=32
The number has two digits

"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

NESTED IF..ELSE statement

It's have a if statement inside another if..else statement block.

Example

```
a=float(input("What grade did you get? "))
if(a >= 9):
    print("Great!")
if (a < 9.) & (a >= 8.):
    print("That is OK")
if (a < 8.) & (a >= 7.):
    print("Is not a good result")
elif a < 7:
    print("You have to learn more! ")
```

Outputs

```
What grade did you get? 9
Great!
```

```
What grade did you get? 7.4
Is not a good result
```

```
What grade did you get? 5
You have to learn more!
```

"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

Lesson 5. FOR loop

FOR loop execute a set of statements, once for each item, in a list, tuple, set.

```
for <variable> in <sequence>:  
    set of statements
```

<variable> is used for iterating. On every iteration it takes the **next value** from <sequence> until the end of sequence.

Function range()

- **range(stop)**: generates a set of whole numbers starting from 0 to (stop-1)
- **range(start, stop)**: generates a set of whole numbers starting from start to stop-1.
- **range(start, stop, step_size)**

Example 1

```
n=int(input("n= "))  
for i in range(n):  
    print(i,end=" ")  
print()  
for i in range(3, n):  
    print(i,end=" ")  
print()  
for i in range(0, n, 2):  
    print(i,end=" ")  
print()  
for i in range(1, n, 2):  
    print(i,end=" ")
```

Output:

```
n= 20  
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19  
3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19  
0 2 4 6 8 10 12 14 16 18  
1 3 5 7 9 11 13 15 17 19
```

"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

Example 2

```
s=0
for i in range(5):
    s=s+i
    print(i,"+",end=" ")
print()
print("s=",s)
```

Output:

```
0 + 1 + 2 + 3 + 4 +
s= 10
```

Example 3

```
for i in range(5):
    print(i)
    for j in range(i+1, 6):
        print(j,"",end=" ")
    print()
```

Output:

```
0
1 , 2 , 3 , 4 , 5 , 1
2 , 3 , 4 , 5 , 2
3 , 4 , 5 ,
3
4 , 5 ,
4
5
```

"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

Lesson 6. WHILE loop

While loop iterate over a set of statements, repeatedly until condition returns false.

```
while condition:  
    set of statements  
    [break]  
    [continue]  
else:  
    set of statements
```

Infinite while loop:

```
while True:  
    print("Hello friends! ")  
Example 1
```

```
n=int(input("n= "))  
s=0  
i=1  
while i <=n:  
    s=s+i  
    j=i  
    if j<n:  
        print(i,"+",end=" ")  
    else:  
        print(i,end=" ")  
    i=i+1  
print()  
print("s=",s)
```

Output:

```
n= 6  
1 + 2 + 3 + 4 + 5 + 6  
s= 21
```

"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

Example 2

```
i = 1
j = 1
while i <= 4 :
    while j < 8 :
        print("i=",i, ", ", "j=",j)
        j=j+1
        i=i+1
```

Output:

```
i= 1 , j= 1
i= 2 , j= 2
i= 3 , j= 3
i= 4 , j= 4
i= 5 , j= 5
i= 6 , j= 6
i= 7 , j= 7
```

Example 3

```
i = 1
j = 1
while i <= 4 :
    while j < 8 :
        print("i=",i, ", ", "j=",j)
        j=j+1
    i=i+1
```

Output:

```
i= 1 , j= 1  
i= 1 , j= 2  
i= 1 , j= 3  
i= 1 , j= 4  
i= 1 , j= 5  
i= 1 , j= 6  
i= 1 , j= 7
```

Example 4

```
i = 1  
while i < 4:  
    print("i=",i)  
    j = 1  
    while j < 8:  
        print("i=",i,"j=",j,";",end="")  
        j=j+1  
    i=i+1  
    print()
```

Output:

```
i= 1  
i= 1 j= 1 ;i= 1 j= 2 ;i= 1 j= 3 ;i= 1 j=4 ;i= 1 j= 5 ;i= 1 j= 6 ;i= 1 j= 7 ;  
i= 2  
i= 2 j= 1 ;i= 2 j= 2 ;i= 2 j= 3 ;i= 2 j=4 ;i= 2 j= 5 ;i= 2 j= 6 ;i= 2 j= 7 ;  
i= 3  
i= 3 j= 1 ;i= 3 j= 2 ;i= 3 j= 3 ;i= 3 j=4 ;i= 3 j= 5 ;i= 3 j= 6 ;i= 3 j= 7 ;
```

"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

Lesson 7. Strings

A string sequence of characters. In Python strings are arrays of bytes representing unicode characters.

Create Strings:

```
print()
s1 = 'Hello'
print(s1)
s2 = "We learn Python"
print(s2)
```

Output:

```
Hello
We learn Python
```

Access strings:

```
s = 'love'
print(s)
print(s[1],s[2],s[-1],s[-2])
print()

s1 = 'l o v e'
print(s1)
print(s1[1],s1[2],s1[-1],s1[-2])
```

Output:

```
love
o v e v
l o v e
o e
```

Slicing a string

"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

```
s = "Hello, friends!"
print("The string is: ", s)
print()
print("str[0:5]: ", s[0:5])
print()
print("str[7:13]: ",s[7:13])
print()
print("str[-5:-2]: ",s[-5:-2])
```

Output

```
The string is: Hello, friends!
str[0:5]: Hello
str[7:13]: friend
str[-5:-2]: end
```

Concatenation of strings

```
s1 = "Adina"
s2 = " Constanta"
s3 = " Salaru"
print(s1 + s2 + s3)
```

Output:

```
Adina Constanta Salaru
```

Replication

```
s = "Hello! "
print(s*3)
```

"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

Output:

Hello! Hello! Hello!

Some of strings functions/ method

- **len()** function return the length of string
- **lower()** return the string in lower case
- **upper()** return the string in upper case:
- **replace()** replaces a string with another string
- **split()** splits the string into substrings

Example

```
s = "We learn Python"  
print(s)  
print("The length of string=",len(s))  
print()  
print(s.lower())  
print(s)  
print()  
print(s.upper())  
print(s)  
print()  
print(s.replace("We", "You"))  
print(s)  
print()  
print(s.split(" "))
```

"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

Output:

```
We learn Python
The length of string= 15
we learn python
We learn Python
WE LEARN PYTHON
We learn Python
You learn Python
We learn Python
['We', 'learn', 'Python']
```

Lesson 8. Lists -One-dimensional arrays

List is an array, a collection, ordered and changeable. A list allows to store items with different types data in it.

To create a list, we will place the items inside a square bracket.

Example

```
v=[3, 8, 2, 11]
a=[]
list=[4, 2.3, "Python", -10, "Friends"]
```

We can access the items of list by referring to the index number.

Also, we can access list items by using a loop.

Example 1

```
list=[4, 2.3, "Python", -10, "Friends"]
print("The list is:",end=" ")
for i in list:
    print(i, end=" ")
```

Output:

```
The list is: 4 2.3 Python -10 Friends
```

"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

Example 2

```
v=[3,8,2,11,-7,10,45,-23]
n=8
for i in range(n):
    print("v[" + str(i) + "]= " + str(v[i]))
print("The fourth element: " + str(v[3]))
print("Return the fourth and the fifth " + str(v[3:5]))
print("The items from the fourth item to the end " + str(v[3:]))
```

Output:

```
v[ 0 ]= 3
v[ 1 ]= 8
v[ 2 ]= 2
v[ 3 ]= 11
v[ 4 ]= -7
v[ 5 ]= 10
v[ 6 ]= 45
v[ 7 ]= -23
The fourth element: 11
Return the fourth and the fifth [11, -7]
The items from the fourth item to the end [11, -7, 10, 45, -23]
```

Example 3

```
n=int(input("Type the number of array items, n="))
print(" Give the array items")
print()
v=[int(input("v[" + str(i) + "]=")) for i in range(n)]
print("The array is:")
for i in range(n):
    print(v[i],end=" ")
print()
```

"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

Output:

Type the number of array items, n=6

Give the array items

v[0]=3

v[1]=2

v[2]=-5

v[3]=32

v[4]=6

v[5]=-23

The array is:

3 2 -5 32 6 -23

Example 4

```
n=int(input("Type the number of array items, n="))
print(" Give the array items")
v=[int(input("v["+str(i)+"]=")) for i in range(n)]
print("The array is:")
for i in range(n):
    print(v[i],end=" ")
print()
x=int(input("Type the number what you check, x="))
if x in v:
    print("Yes, is in the list")
else:
    print("No, is not in the list")
```

"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

Outputs:

Type the number of array items, n=4

Give the array items

v[0]=2

v[1]=5

v[2]=9

v[3]=4

The array is:

2 5 9 4

Type the number what you check, x=5

Yes, is in the list

Type the number of array items, n=4

Give the array items

v[0]=4

v[1]=7

v[2]=2

v[3]=9

The array is:

4 7 2 9

Type the number what you check, x=5

No, is not in the list

Some of lists functions/ method

- **len()** function return the number of items from list
- **append()** add an item to the end of the list
- **insert()** add an item at the specified index
- **remove()** remove a specified item
- **pop()** removes the specified index, or the last item if index is not specified
- **del** keyword can also delete the list completely
- **clear()** method empties the list
- **copy()** copy a list
- **sort()** sort a list

"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

Example

```
n=int(input("Type the number of array items, n="))
v=[]
for i in range(n):
    v.append(i)
print("The list is:",v)
print("The list has",len(v),"items")
v.insert(2,78)
print("The new list (after insert) is:",v)
v.sort()
print("The ordered list is:", v)
```

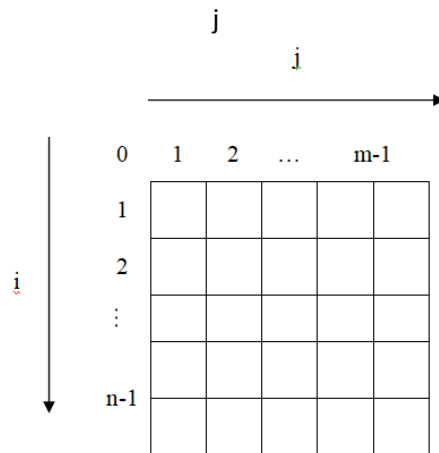
Output:

```
Type the number of array items, n=6
The list is: [0, 1, 2, 3, 4, 5]
The list has 6 items
The new list (after insert) is: [0, 1, 78, 2, 3, 4, 5]
The ordered list is: [0, 1, 2, 3, 4, 5, 78]
```

Lesson 9. Lists- Two-dimensional arrays

Two dimensional array represents a table with rows and columns of data, is an array within an array.

The position of an element is indicated by two indices, i (for row) and j (for columns).



Example 1

```
n = 5
a = [[0] * n for i in range(n)]
print ("The matrix is:")
for i in range(n):
    print(a[i])
```

Output:

Afisare matrice pe linii:

```
[0, 0, 0, 0, 0]
[0, 0, 0, 0, 0]
[0, 0, 0, 0, 0]
[0, 0, 0, 0, 0]
[0, 0, 0, 0, 0]
```

"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

Example 2

```
n = 4
a = [[0] * n for i in range(n)]
for i in range(n):
    for j in range(n):
        if i < j:
            a[i][j] = 1
        elif i > j:
            a[i][j] = 3
        else:
            a[i][j] = 2
print ("The matrix is:")
for i in range(n):
    print(a[i])
```

Output:

```
The matrix is:
[2, 1, 1, 1]
[3, 2, 1, 1]
[3, 3, 2, 1]
[3, 3, 3, 2]
```

Example 3

```
n=int(input(" n="))
m=int(input(" m="))
a=[[0 for j in range(m)] for i in range(n)]

for i in range(n):
    for j in range(m):
        a[i][j] = int(input(" elem "))
print("The matrix is:")
for i in range(n):
    print(a[i])
```

"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

Output

```
n=2
m=3
elem 1
elem 2
elem 3
elem 4
elem 5
elem 6
```

The matrix is:

```
[1, 2, 3]
[4, 5, 6]
```

Lesson 10. Sets

A set is a collection of items unordered. The elements in the set cannot be duplicates.

Because the set list is unordered, the items will appear in a random order.

Creating

```
week=set(["Monday","Tuesday","Wednesday","Thursday","Friday","Saturday","Sunday"])
print(week)
```

Output:

```
{'Sunday', 'Wednesday', 'Saturday', 'Thursday', 'Friday', 'Monday', 'Tuesday'}
```

Accessing

```
week=set(["Monday","Tuesday","Wednesday","Thursday","Friday","Saturday","Sunday"])
for day in week:
    print(day)
```

"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

Output

```
Thursday  
Tuesday  
Monday  
Friday  
Saturday  
Wednesday  
Sunday
```

Some set methods

- **add()** add one item to a set
- **update()** add more than one item to a set
- **len()** determine how many items are in the set
- **remove()**, **discard()** remove an item in a set, use the
- **clear()** empties the set:
- **del** delete the set
- **union()** returns a new set containing all items from both sets
- **update()** inserts the items from a set into another set.

Example 1

```
week=set(["Monday","Tuesday","Wednesday","Thursday","Friday","Saturday","Sunday"])  
week.add("Luni")  
print(len(week))  
print(week)
```

Output:

```
8  
{'Wednesday', 'Friday', 'Luni', 'Monday', 'Saturday', 'Tuesday', 'Thursday', 'Sunday'}
```

"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

Example 2

```
week=set(["Monday","Tuesday","Wednesday","Thursday","Friday","Saturday","Sunday"])
week.add("Luni")
print(len(week))
print(week)
week.remove("Luni")
print(len(week))
print(week)
week.clear()
print(week)
```

Output:

```
8
{'Monday', 'Saturday', 'Luni', 'Sunday', 'Friday', 'Wednesday', 'Thursday', 'Tuesday'}
7
{'Monday', 'Saturday', 'Sunday', 'Friday', 'Wednesday', 'Thursday', 'Tuesday'}
set()
```

Bibliography

<https://stackify.com/learn-python-tutorials/>
<https://developers.google.com/edu/python/introduction>
<https://www.learnpython.org/>
http://www.eed.usv.ro/~ionelar/Intro_Python.pdf
<https://www.w3schools.com/python>
<https://beginnersbook.com/2018/03/python-tutorial-learn-programming/>
<https://www.arduino.cc/en/Tutorial-0007/BlinkingLED>
<https://blog.robofun.ro/2014/11/09/tutoriale-arduino-1-ce-este-arduino/>
<https://www.robofun.ro/docs/Arduino%20pentru%20Toti%20pagini%201-30.pdf>
[https://www.arduino.md/wp-content/uploads/books/Lectia03-ProiecteSimple-1_\(www.arduino.md\).pdf](https://www.arduino.md/wp-content/uploads/books/Lectia03-ProiecteSimple-1_(www.arduino.md).pdf)
<https://maker.pro/arduino/projects/arduino-speaker>
<https://www.instructables.com/id/How-to-use-a-Buzzer-Arduino-Tutorial/>
<https://www.deviceplus.com/how-tos/arduino-guide/entry019/>
<https://www.arduino.cc/en/tutorial/blink>
<https://www.robofun.ro/led-brick-albastru>
<https://www.robofun.ro/docs/Arduino%20pentru%20Toti%20pagini%201-30.pdf>
<https://www.robofun.ro/buton-mare-brick>
<http://robofun.eu/?product=light-sensor-brick>
<https://www.robofun.ro/docs/Arduino%20pentru%20Toti%20pagini%201-30.pdf>
<https://www.robofun.ro/minidifuzor-brick>
<https://www.makeuseof.com/tag/diy-smart-lock-arduino-rfid/>
<http://www.hobbytronics.co.uk/mfrc522-reader>
<http://monumenteneamt.ro/muzeu-casa-memoriala-ion-creanga>
<http://monumenteneamt.ro/cetatea-neamtului>
<https://www.hidroelectrica.ro/>
<http://www.montaniarzi.ro/cheile-bicazului-o-zona-unica/>
<https://adevarul.ro/.../laculrosu-singurul-loc-rom.../index.html>
<https://www.raspberrypi.org/help/what-%20is-a-raspberry-pi/>
<https://www.raspberrypi.org/>
<http://inmoov.fr/>
<http://inmoov.fr/hand-and-forarm/>
<http://mapn.muzeu-neamt.ro/>
<https://piatraneamtcity.ro/en/places/art-museum-mnrcdecyo2aqva>

"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

<http://maecpn.muzeu-neamt.ro/>

<https://piatraneamtcity.ro/en/places/cucuteni-neolithic-art-museum-fkw-hzg6txpcug>

<https://repl.it/languages/python3>

"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

Content

1. Europe Code Week, <i>Gabriela-Brândușa Horlescu</i>	1
2. Erasmus Days 2019, <i>Gabriela-Brândușa Horlescu, Ana-Irina Secară</i>	3
3. ZÎN- Non-Formal Learning Day 2019, #ZÎN . Practice of awareness and self-awareness... <i>Nosce te ipsum!</i> , <i>Raluca Orza</i>	5
4. Maker Education – on the eTwinning platform, <i>Gabriela-Brândușa Horlescu</i>	7
5. The First meeting, November 2019, SABA, Macedonia, <i>Natasha Marina</i>	10
6.C1. Robotics and automation. Short-term exchanges of groups of pupil, <i>Gabriela-Brândușa Horlescu</i>	12
6.1. The Festival of Culture, <i>Gabriela-Brândușa Horlescu</i>	15
6.2. Technology Festival, <i>Gabriela-Brândușa Horlescu</i>	16
6.3. Robotics Workshop in Arduino, <i>Gabriela-Brândușa Horlescu</i>	17
6.3.1. Arduino Blink.....	18
6.3.2. Led Brick, ON/OFF.....	18
6.3.3. Led Brick with variable light intensity.....	19
6.3.4. Button Brick.....	20
6.3.5. Brick Light Sensor.....	21
6.3.6. Mini Speaker.....	22
6.3.7. Axial Double Solar Panel, <i>Andrei Azoitei, student</i>	23
6.3.8. DYE Smart Lock with Arduino and RFID, <i>Adrian Azoitei, student</i>	25
6.4. Cultural visit, <i>Gabriela-Brândușa Horlescu</i>	27
6.5. Study visit - Water energy, <i>Gabriela-Brândușa Horlescu</i>	28
6.6. Automation and robotics workshop, <i>Gabriela-Brândușa Horlescu</i>	31
6.6.1. Raspberry PI.....	32
6.6.2. Raspberry PI – LED Blink.....	33
6.6.3. Raspberry PI – Servo Motor Control.....	35
6.6.4. The humanoid robot InMoov –Chappie, <i>Lucian Mihailescu</i>	37
6.7. Visiting the Art Museum, <i>Gabriela-Brândușa Horlescu</i>	39
6.8. Visiting the Cucuteni Eneolithic Art Museum, <i>Gabriela-Brândușa Horlescu</i>	40
6.9. Festive dinner at "Colibele Haiducilor" Restaurant. Magnificent artistic show performed by "Toporașul" Folk Ensemble!, <i>Ana-Irina</i>	

<i>Secară</i>	41
6.9.1.The Folk Ensemble ”Toporaşul”	43
6.10. Educational activities, Gabriela-Brânduşa Horlescu	45
7.Python Programming Language, Şalaru Constanţa, teacher	47
Bibliography	77

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



"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."