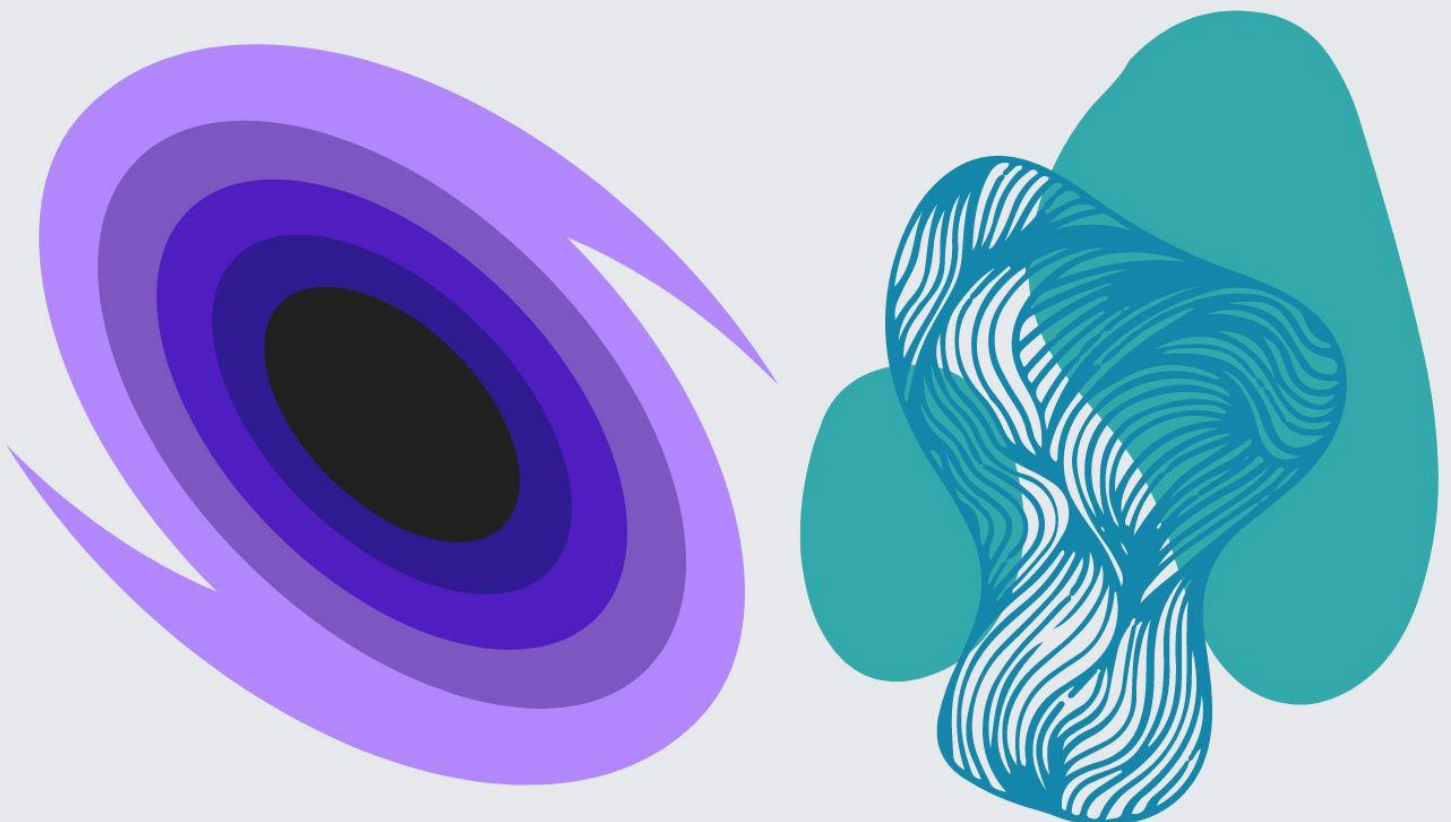




The CodER Scenarios Handbook

Instruction for youth workers

**Title: Stop a Black-hole
catastrophe in the Adriatic sea**





Stop a black-hole catastrophe in the Adriatic sea

Instruction guide for youth workers/ teachers

1. Introduction

a. Context

The CodER project seeks to enable youth workers to gain basic knowledge in programming and microcontrollers so they can transfer this knowledge to young people through non-formal education and using innovative methods like escape room creation. CodER also aims to address youth unemployment by giving them access to training relevant to the labour market's needs. Basic programming knowledge is a skill needed in every field discipline nowadays, from social sciences to business and entrepreneurship. The objective is to use escape rooms appropriately to positively impact young people's engagement and learning in programming and microcontrollers. The aim is ERs to be converted into effective and efficient educational tools, which take into consideration the validated results of the already existing research, and which simultaneously employ various synchronous digital tools, such as online courses and interactive platforms, digital gamified processes, digital media, VR Elements, apps, QR codes, etc.

b. Partners

Digijeunes www.digijeunes.com/

CIP www.citizensinpower.org

RITE <https://ritecy.org/>

Challedu <https://challedu.com/>

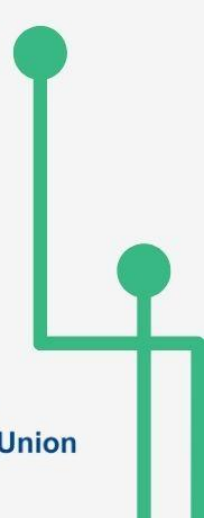
Kalimera www.kalimera.hr

AKMI <https://iek-akmi.edu.gr/>

To know more about the project: <https://coderproject.eu/>

c. Learning goals of the ER

- To raise awareness among youth on gender equality in STEM by promoting historical female scientists as role models
- To introduce the basics of coding to young people
- To share knowledge on microcontrollers among young people
- To teach young people to develop a simple code that turns on a LED light on an Arduino device





d. Targeted audience

- i. Age: 13 - 30
- ii. Level: Beginners in Coding and robotics
- iii. Group size: Single-player
- iv. Type of target group: Persons interested in coding and robotics with basic knowledge of microcontrollers

2. The ER scenario

a. Storyline

Institute Ruđer Bošković in Croatia is the biggest public STEM institute in the country while it retains its international recognition for being the leading and most competitive public institution participating in local and international research projects in the EU. Their scientists in the physics laboratory have found a way to use a chemical reaction investigated by Croatian scientists in the 1960s that activates a time-traveling device designed by Croatian scientist Nikola Tesla in the early 20th century. However, once they activated the device they somehow also created a black hole in the Adriatic Sea that is slowly reaching the Croatian coast. The only way to stop the catastrophe is to crack the computer code that allows the staff to control the time machine. Specifically, the code will allow the scientists to travel to 1967 and reach scientist Vjera Marjanović-Krajovan who was at the time researching a chemical compound crucial for controlling Tesla's time machine. She might have a way to turn off the time machine and stop the black hole from reaching the coast.

b. Objective of the game

When the scientists activated the time machine a group of young coders that were visiting the institute with their professor were automatically locked with the backup computer that is controlling the machine due to the automatic lock as part of the security measures. As soon as the machine was activated the whole building went into lockdown and scientists were just able to give last-minute clues and hints to the group before the black hole caused the communications to shut down. The group has to follow the clues in order to stop the catastrophe.



3. Creating the setting

a. Needed materials/ equipment

A computer/laptop or a smartphone/tablet and a stable internet connection

b. Setup of the room



c. Installation and reset

Click here to open the game: [Link to be inserted here](#)

To reset the game click “Reset”

d. To have in mind

Make sure the players follow the clues and arrange them in an orderly fashion.

4. The game

a. The game master

The hints from the game master appear as a cloud bubble with valuable information if the player spends too much time in one part of the room.

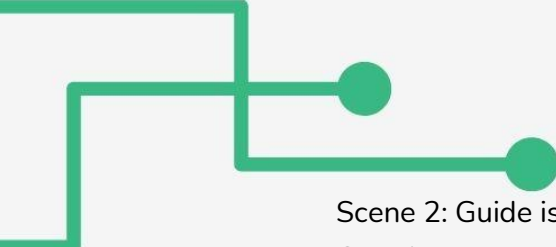
b. Introduction & instructions

Start scene: Click “Start” button to start playing the escape room game

Scene 1: Building manager appears and speaks:

“Welcome to Institute Ruđer Bošković. Please follow your guide and do not leave your group.”





Scene 2: Guide is speaking to the group: “This is the biggest STEM institute in Croatia.

It retains its international recognition for being the leading and most competitive public institution participating in local and international research projects in the EU. The institute employs hundreds of staff, including various STEM professionals doing research and development in the field.

According to Nikola Tesla's writings, the physics team recently used the 3D printing technology to build a time machine. Exciting, right?

We are permitted to view the model from the observatory room. Please follow me to the elevator. We are going to the 13th floor.”

Scene 3: The elevator scene appears briefly

Scene 4: Click the correct elevator button

Scene 5: Inside the observatory room the guide continues “Below us is an amazing team of top EU scientists in the fields of physics, informational technology, engineering and chemistry. They have found a way to use a chemical reaction investigated by Croatian scientists Vera Marjanović Krajočan in the 1960-s that activates a time-traveling device”

Scene 6: Image of the science lab.

Scene 7: Alarm starts blaring and the room is automatically locked.

Scene 8: Only one of the computer screens is working and you can see the crew below holding a paper. You come closer to the screen and read what’s written on the paper: “We have activated it and it’s out of control. The black hole is growing! Please help us, you are the only ones with access. Look around the room, there are clues and elements of the code necessary to turn off the time machine. Hurry up!!”

Scenes 9-X: Players are supposed to look around the room and find hidden objects in order to collect all the elements of the code to type in the computer program in order to stop the catastrophe.

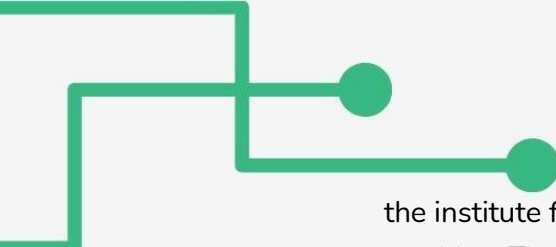
Each following scene contains one or few of the following buttons:

- BACK – to go back to the previous step
- NEXT – to continue to next scene
- RESET – to reset the game and start again

Depending on the progress of the game there are additional scenes:

- Game master bubble – if the player spent more than 1 minute on a scene a gamemaster bubble appears with a hint that helps the participant solve the scene.
- Vera Marjanović Krajočan scene saying Congratulations! – if the player succeeds and wins the game a congratulations scene appears
“Congratulations team! You have cracked the code that allowed me to visit





the institute from the past and help my fellow colleagues to stop the machine. The black hole in the Adriatic is gone and I can go back to my timeline! Thank you for your service!”

- Oh no, the end is here! – scene appears with a black hole in earth as seen from space

Last scene contains 2 buttons

- PLAY AGAIN – starts the game from the beginning
- Learn more – redirects to the homepage of the project website

c. Hints

Hints appear as cloud bubbles with writing or as sounds and buttons

Hint 1: Looks like those lockers are all locked, perhaps someone dropped a key somewhere...

Hint 2: There are a lot of computers here. You should check them out closely.

Hint 3: A sound of a phone vibrating.

Hint 4: Think carefully! One mistake and the world ends.

Hint 5: perhaps you should use the stick to try to control the time machine...

Hint 6:

d. Game stages

i. The beginning

Gameplay starts with an introductory part to introduce the player to the topic and the context of the story behind it. Once the players enter the observatory the building shuts down and the escape room challenges begin.

ii. The course of the game & solutions

1. Challenge #1

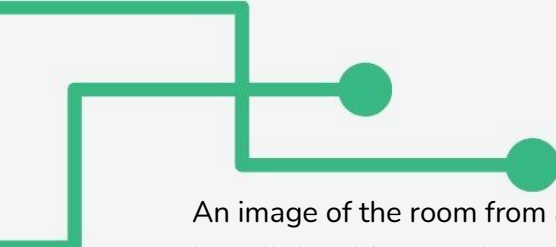
An image of the control room appears. Players are supposed to find a key on the floor that opens one of the staff lockers. Once the players find and click the key a staff locker is opened and inside is an Arduino device, a USB cable and a note that says “Find the code that activates the Arduino device”. All the objects are also described for the player to understand their purpose.

2. Challenge #2

An image of the room from another corner appears and the Arduino device and USB cable are visible at the top screen of the game. Players must observe the scene and find which object is keeping the next clue. Upon observing the room players should notice a post-it note stuck on one of the computer screens with “*int led = 13;*” written on it. Once they click the note it appears on top of the screen and the player can go to next scene.

3. Challenge #3





An image of the room from another part of the viewpoint can be observed. The player now has all the objects gathered at the top of the screen. A microcontroller, a USB cable, and a post-it note with part of the code. Upon closer inspection of the room the player should notice a mobile phone on one of the desks. Once the player clicks the phone a close-up image of the phone screen appears and it is written

```
“void setup() {
```

```
pinMode(led, OUTPUT); // Declare the LED as an output
```

```
}”.
```

Player then clicks next and the next scene appears showing all the clues the player has gathered so far at the top of the screen. These are A microcontroller, a USB cable, a post it note and a mobile phone.

4. Challenge #4

An image of the observatory is shown once again. There is a painting on the wall with 3424 written on it. This painting can be seen at all the stages of the game but it is only relevant now. There is also a safe box in the corner of the room. Player has to click on the safe box to go to the next scene. Upon clicking on the safe a lock screen appears and the player must select the right code in order to open the safe. Once the player selects 3424 a USB stick appears on the top of the screen. If the player fails the game ends then the planet is destroyed.

iii. Ending

Player should click on the USB. When the player clicks on the USB stick he has managed to reach Vera Marjanović Krajočan and get the last part of the code. A screen of Vera Marjanović Krajočan appears and there is a whiteboard with the following code

```
{  
digitalWrite(13, HIGH); // turn on digital pin 13  
delay(1000); // pause for one second  
digitalWrite(13, LOW); // turn off digital pin 13  
delay(5000); // pause for 5 seconds  
}
```

After that player clicks next and can see the entire code being put in the computer program. Player then clicks next and the last scene of success appears.

1. In case of success

Player succeeds by reaching the ending point with all the objects gathered:

A microcontroller

A USB cable

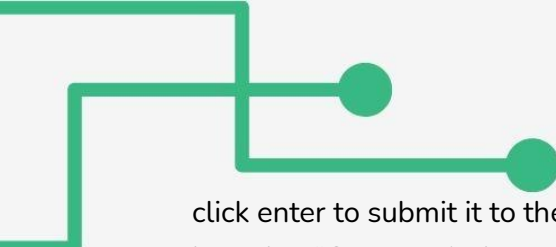
A post-it note

A mobile phone

A USB stick

An image of a computer screen appears with the entire code written on it. Player should





click enter to submit it to the program. After this Vera Marjanović Krajočan appears and she is saying “Congratulations team! You have cracked the code that allowed me to visit the institute from the past and help my fellow colleagues to stop the machine. The black hole in the Adriatic is gone and I can go back to my timeline! Thank you for your service!” There are also Play Again and Learn More buttons at the bottom.

2. In case of failure

Oh no, the end is here! – scene appears with a black hole in earth as seen from space. Player has 2 options. To end game, reset or learn more.

e. Debriefing phase and feedback

The youth practitioner can opt out between 2 debriefing options. One is to send a questionnaire to the players in case the game was played at home or there is not enough time for a live debriefing. The second option is oral debriefing either live or online. The following questions are suggested to be used:

- Did you enjoy playing the game?
- Has the game achieved your expectations?
- What did you learn about Croatian STEM community?
- Which difficulties did you encounter?
- Please share 3 new things you learned by playing this game.
- Is it possible for you to reuse the code you discovered in the escape room?
- What would happen if you use the code on your Arduino device?
- Please have 3 minutes to share your experience of playing this game.

OPTIONAL TASK

Use the below materials and the knowledge gained in this escape room to turn on the LED diode with a microcontroller.

Materials:

x1 -LED

x1 –Breadboard

x1 –Arduino UNO

x1 –Resistor (220ohm)

x4 –Jumper cables(M-M)

x1 –Computer or laptop

Arduino IDE software





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