



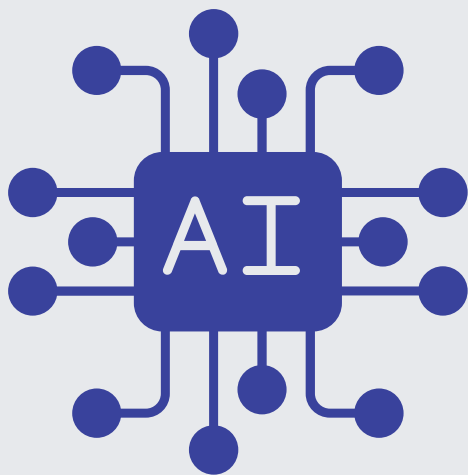
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The CodER Physical Scenarios Handbook

Instruction for youth workers

Title: Help Lilian Balatsou



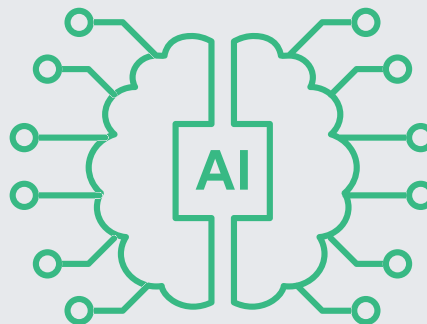
1. Introduction

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 (website) www.citizensinpower.org
RITE (website) <https://ritecy.org/>
Challedu (website) <https://challedu.com/>
Kalimera (website) www.kalimera.hr
AKMI (website) <https://iek-akmi.edu.gr/>



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

c. Learning goals of the ER

- Be observant and discover clues: any object in the rooms is a potential key to victory.
- Solve puzzles using your knowledges and information given from the environment as also from the “ER Assistant”
- Learn the academic disciplines of STEM through a series of Jigsaws

d. Targeted Audience

- Age: 17 - 24
- Level: Moderate
- Group size: 1 - 4 people
- Type of target group: Students



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2. The ER Scenario

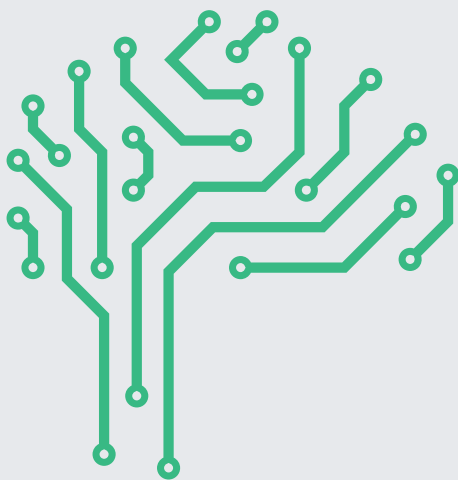
a. Storyline

On a stormy evening Evangelia (Lilian) Balatsou, a cognitive neuroscientist and conversational AI expert, founder of the Greek Girls Code, is living in her “Smart Mansion” a State of the Art “IoT” House, where everything is connected and monitored by an AI processor. “The Internet of things (IoT) describes physical objects (or groups of such objects) with sensors, processing ability, software and other technologies that connect and exchange data with other devices and systems over the Internet or other communications networks” ~ Gillis, Alexander (2021). “What is internet of things (IoT).

Doors, Electrical Appliances, Windows, all can be operated by voice with the help of the Super - Intelligent Home AI. Along with it, “AB-E”, her Digital Assistant and “Caesar” her loyal dog, a white Jack Russel Terrier, one of the smartest breeds of canine.

Today, it’s her “Book Club” gathering at her house. She is enjoying a cup of freshly brewed coffee with her friends and reading her favourite Book the “The Cryptography in Roman Times”. Cryptography is the study of secure communications techniques that allow only the sender and intended recipient of a message to view its contents. The term is derived from the Greek word cryptos, which means hidden.” ~ www.kaspersky.com

Suddenly a lightning hit the house causing a Power failure. Everything went off and silent. Caesar starts barking. AB-E is informing us about the situation. The Back-Up Generator begins to solve this power outage bringing back everything on line as they used to be. Unfortunately, not all!



2. The ER Scenario

a. Storyline

Red lights start to flashing and from the speakers a voice can be heard calling “Intruders, Intruders, Alert! Initializing Defensive Mechanisms. Locking exits, shutdown services. Intruders must be confined. Permanent Lockdown State. ETA 1 hour” Every Possible way out is being shielded.

“Oh No” said AB-E. “The Home AI is been malfunctioning. The Lighting must overcharge its circuit leading to fault results on its sensors. We are the Intruders. You have to reach the Main Control Panel located in the Computer Room and re Boot its systems.” To do so you have to cross four rooms. You have to hurry. In 1 hour, the situation will be unreversible”

Suddenly a strange noise came from AB-E. “AI... Hacking me... trying to shut me down... actuate countermeasures... going periodically offline” AB-E is no longer with us as it tries to defends itself from the AI Home’s malevolent reach.

b. Objective of the game

Your goal is to pass through 4 rooms of the Mansion and Reach the Computer Room as to Reset that Home AI System and restore the functionality of the House.

Each Room has a locked door that can be by-passed using STEM Education elements. Collect clues from objects around the rooms and apply your possible answer to the Control Panel of each Door. You have around 25 minutes to each room. If you drop down to 5 remaining minutes AB-E will give you an extra “hint” as to solve the puzzle. Good Luck!



3. Creating the setting

a. Needed materials/ equipment

This is a reference for the non-digital version of the ER.

b. Setup of the room

We need 4 Rooms:

- **The library:** A typical Library Room with a lot of shelves full of books, a huge long table with some small light lamps on them and 8 wooden chairs. Paints and decorations perfectly match for study. The right book is already open.
- **The living Room:** A huge Fireplace with 2 armchairs in front of it. Next brown a corner sofa with a small table at its end. Painting around the room with the most bizarre on the Fireplace.
- **The Open Kitchen Room:** A almost Professional fully equipped kitchen with a huge double door fridge. The fridge has a lot o magnet souvenirs from the hostess trips around the world. One of them is the answer
- **The Corridor:** The “last mile” to freedom is just a plain corridor with no clues or object except 2 symbols (+, –)



c. Installation and reset

This is a reference for the non-digital version of the ER.

d. To have in mind

The clues and gpieces of the puzzles must be blended with other objects as to be a part of the discovery process. The rooms are typical rooms of a mansion with some “tech” objects (digital clocks, Led Lighting, monitor signs etc) as to define the hostess background.

4. The game

a. The game masters

The GM will be the AI Home itself where, after the overcharge malfunction, will warn the “players” about the situation and initiate the begin of the “game”. Furthermore, it will prologue each room as to give the first clue and it will announce the Solve or not of the Puzzle. Its voice should be totally Digital, Senseless and Hostile like a Technological “Terror” of some Movie.

b. Introduction & instructions

The Game will begin at the “Library Room” where it will introduce the “player/s” as they enjoy a cup of coffee along with some reading on Scientific Books. Short after, a Power Failure will occur and the “malfunctioned” Home AI will inform the “player/s” that the Defensive Mechanisms have been activated, and they are considered “Thief Intruders”. The house will be locked down (Doors, Windows, Passages etc) as to contained the situation.

The only solution to this is to By-Pass 4 Digital locked doors that the Home AI locked, by inserting the by pass code. The code will be a “word” or “number” or a “structure” from the STEM range of topics. Inside each room there will be a variety of objects, some not relating to the puzzle but few will. Combining these clues and entering the password to the Door Panel will open the door and let you proceed to the next Room. Extra Instructions will be given by the “resistant” Digital Assistant AB-E.

c.Hints

Players will have **2 sources of hints:**

- Specific objects like (books, pictures, notes etc) that have the solution or part of it.
- The Digital Assistant AB-E that it will give you a “where to look at” after 20 minutes of game in each room



4. The game

d. Game stages

i. The beginning

After the Intro you are in the 1st room (Library), with a Digital Countdown clock over each Door (01:00:00). You may begin the collection of clues as to open the door. Each Door on its right has a by-pass panel.

ii. The course of the game & solutions

1. Challenge #1

The Cryptography Challenge: The 1st by-pass panel has a digital keyboard and engraved the face of the Jack Racial Terrier, Caesar and under it the word “FRIEND”. On the table there’s an opened handbook about the “Cryptography in the Roman Times”. That was the book you had at the time of Power Failure. Encryption is the method by which information is converted into secret code that hides the information's true meaning. The science of encrypting and decrypting information is called cryptography. In computing, unencrypted data is also known as plaintext, and encrypted data is called cyphertext. At the opened pages you can read “The Romans used the Caesar Shift Cipher method to encrypt their messages. In this method, the sender and the receiver agreed on a number and used it to shift letters, thus writing a message using the letter-shift. To decrypt the message, the receiver would be required to shift the letters back using the same number. Usually, Julius Caesar used 3 letters to shift his messages across the Empire.”

Plain	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
Cipher	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W

After 20 minutes in the Library, AB-E will talk and says “Cryptography”.

Using all the information above, the word “FRIEND” ciphers to “COFBKA” which is the password and the solution of the 1st Door.



4. The game

d. Game stages

ii. The course of the game & solutions

2. Challenge #2

HEX to BINARY Challenge: The 2nd Challenge is in the Living Room. The by-pass panel is a numpad with only 2 buttons; 0 – 1 with the Icon of AB-E on top of it. In mathematics and computing, the hexadecimal (also base-16 or simply hex) numeral system is a positional numeral system that represents numbers using a radix (base) of 16. Unlike the decimal system representing numbers using 10 symbols, hexadecimal uses 16 distinct symbols, most often the symbols "0"–"9" to represent values 0 to 9, and "A"–"F" (or alternatively "a"–"f") to represent values from 10 to 15. Software developers and system designers widely use hexadecimal numbers because they provide a human-friendly representation of binary-coded values. Each hexadecimal digit represents four bits (binary digits), also known as a nibble (or nybble). For example, an 8-bit byte can have values ranging from 00000000 to 11111111 in binary form, which can be conveniently represented as 00 to FF in hexadecimal.

One of the Paintings in the living room is a huge table of numbers and letters showing the Binary systems and its variables (Hexadecimal and Octal).

DECIMAL	BINARY	OCTAL	HEXADECIMAL
0	0	0	0
1	1	1	1
2	10	2	2
3	11	3	3
4	100	4	4
5	101	5	5
6	110	6	6
7	111	7	7
8	1000	10	8
9	1001	11	9
10	1010	12	A
11	1100	13	B
12	1101	14	C
13	1110	15	D
14	1111	16	E
15	10000	17	F

4. The game

d. Game stages

ii. The course of the game & solutions

After 20 minutes in the Living Room, AB-E will talk and says “HEX is my Name”.

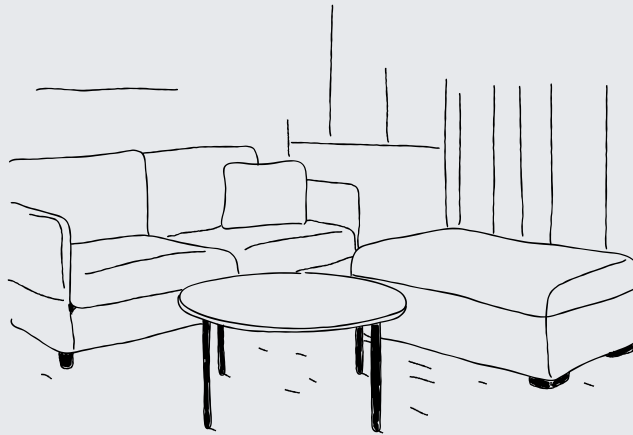
Using all the information above, AB-E can be converted to BINARY as:

A=1010

B=1100

E=1111

So, the correct answer is 101011001111 and the solution of the 2nd Door.



3. Challenge #3

The PYTHON Challenge: Now we are on the Open Kitchen Room. The 3rd by-pass Panel has a digital keyboard again, with a photo of a Giant Snake (anaconda) and the Words: “My First 2 Words” under it.

Python is a high-level, general-purpose programming language. Its design philosophy emphasizes code readability with the use of significant indentation[1]. Its most famous framework is ANACONDA. Each and every programming language first code is to print to the Screen the “Hello World” sentence as a reference to the beginning of the life of this programming language. A cultural habit of every programmer.

On the fridge there’s a magnet attached notepad with some to do list:

1. Go to grocery
2. Bath Caesar
3. Learn Python (it’s really easy...)
4. Do the laundry

4. The game

d. Game stages

ii. The course of the game & solutions

Next to 3 is 2 photos of coding like:



```
script.py  <script.py> output:
1 print("Hello, World!")
Hello, World!
In [1]: |
```



```
script.py  <script.py> output:
1 one = 1
2 two = 2
3 three = one + two
4 print(three)
5
6 hello = "hello"
7 world = "world"
8 helloworld = hello + " " + world
9 print(helloworld)
3
hello world
In [1]: |
```

After 20 minutes in the Living Room, AB-E will talk and says “Hello”.

Using all the information above, the 2 words are Hello Word and the solution to the 3rd Door.

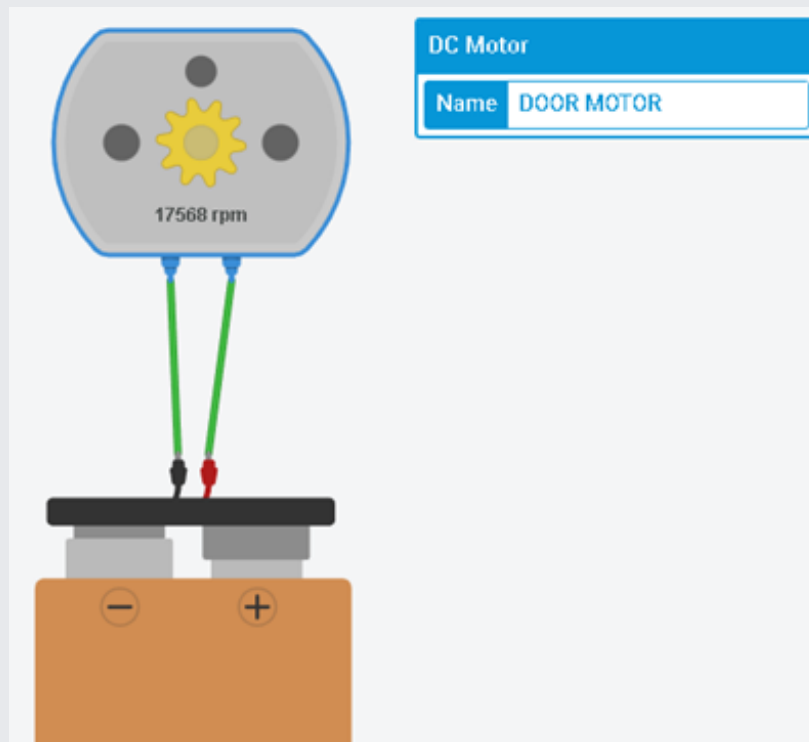
4. The game

d. Game stages

ii. The course of the game & solutions

4. Challenge #4

The Reverse Polarity Challenge: The last challenge is on a long corridor leading to the Computer Room where we can reset HOME AI and bring it to its normal state. As long as we moving forward a **RED +** is flashing on the right corridor wall and a **BLACK -** on the left. If we go back the corridor the symbols are reversed in the walls (**+** to left and to **-**right). It's a plain corridor with no other clues. There is no control panel so AB-E sacrifices itself as it tries to connect to the door and overcurrent it. After a small explosion a square panel pops up and behind there is this circuit:



This is the mechanism that hold the door closed. DC motors with the standard polarity (-+) moves in a certain direction. If we want to change this direction to the exact opposite, we have to reverse the polarity (+-)

4. The game

d. Game stages

iii. Ending

1. In case of success

When our players solve and open all 4 doors, they are in the Computer Room in front of a huge panel with many buttons and switches. One of them has a text on it “HOME AI RESET BUTTON” The players push that button and the House after 5 seconds of idle switch on with green light welcoming all with calm steady voice and waiting our next command. At that moment of victory AB-E wakes up having red eyes, the colour of the malfunctioned HOME AI. To be Continue...



2. In case of failure

If the time is up (1 hour) and you have not reached the Computer Room the HOME AI flashed red lights announcing “Permanent Lockdown State... Bye” You Lose!



3. Debriefing phase & feedback

At the end of the ER, the participants will have the opportunity to leave a comment, share their experience in a SWOT analysis format so as to provide us with the Strengths, Weaknesses, Opportunities and Threats where they can provide feedback about the storyline, the quality of riddles and the content in terms of acquiring new knowledge in basic programming and microcontrollers.



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