The CodER Virtual Scenarios Handbook

Instruction for youth workers

Title: Lunar Mission
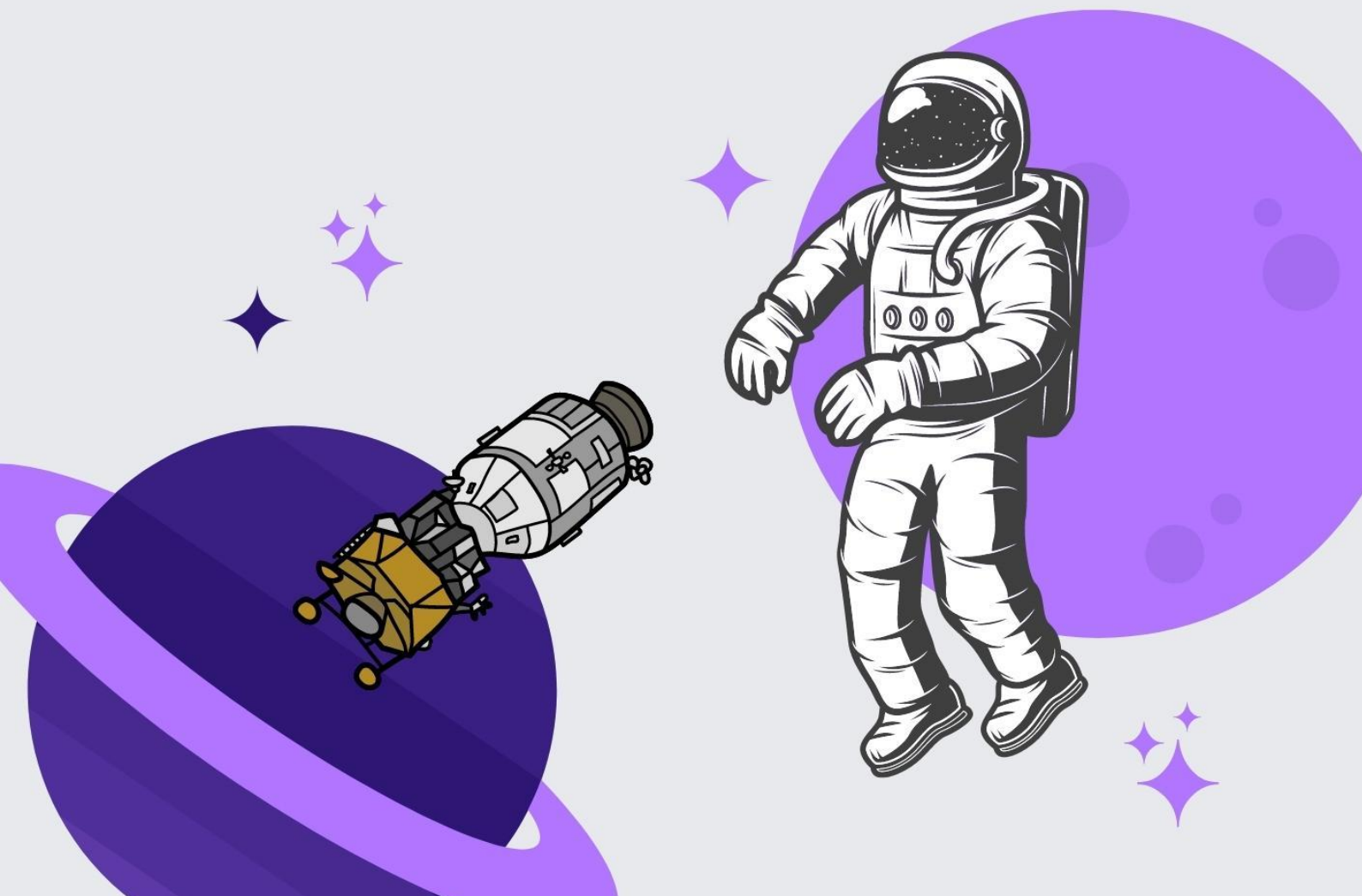
Lunar Mission

Instruction guides 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 labor 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

- 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 learn collaboration in a virtual escape room that is expected in a programming team.

> **a. Targeted audience**
> i. Age: 13 -30
> ii. Level: <mark>Advanced</mark>
> iii. Group size: 3-7 players
> iv. Type of target group: <mark>Player interested in coding with knowledge of microcontrollers and programming.</mark> <mark>A background in STEM will be helpful.</mark>

2. The ER scenario
a. Storyline

> It's July 20th, 1969, the big day your team here at NASA has been waiting for! Your team leader, Margaret Hamilton, has been working on writing Apollo 11 code to land humans on the Moon forever! Everything is ready, the lunar module, Eagle, is approaching the moon's surface when suddenly a life-threatening error occurs, and Mission Control faces a "go/no-go" decision. You have 30 seconds to help Margaret decide on continuing the spacecraft or not. You cannot change the code, but small changes could work miracles! Remember that you only have a few seconds to help Margaret save the day and ensure the astronauts return home safely!

> **b. Objective of the game**
> The Participants must solve the four clues and gain access to the reaching the lunar module, Eagle. As soon as you enter, you need to take the crucial "go/no-go" decision in 30 seconds and help Margaret ensure the astronauts return home safely.

3. Creating the setting
a. Needed materials/ equipment

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

> **b. Setup of room**
> Virtual Room Map

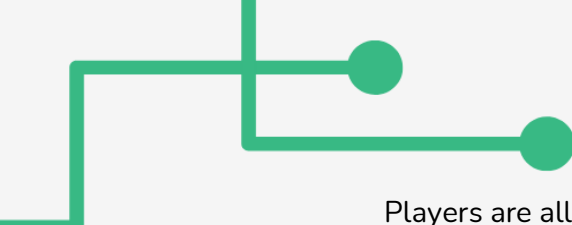> **c. Installation and reset**
> Direct Link to the game

> **d. To have in mind**
> It is a linear escape room therefore; players need to follow the sequence of the riddles to find the final answer.

4. The game
a. The game master

Players are allowed to click the 'hints' button once in each riddle. An automated response to help for each riddle is given, the game master does not need to be live in order to provide a response. However, an additional feature would be the live chat, where a game master can provide feedback anytime if available. The aim for this ER is to run without the supervision of a game master.

b. **Introduction & instructions**

Start scene: Read Instructions, Start, and Home would be the three buttons available. In the instructions brief details will be given about the buttons and the common chat room for communication. If possible, they will be able to hear each other in common spaces and collaborate.

Room 1: Welcome to Nasa's headquarters. The players enter the room and explore the items. After 10 sec, a notification alarm bells, and a note appears on the screen "It's an emergency!" "We need to decide!". Four buttons on the room turn red, and the sign disappears. The aim here is for the player to contact the spacecraft.

Room 2: Red button 1 enters the first clue to solve.

Room 3: Red button 2 enters the second clue to solve.

Room 4: Red button 3 enters the third clue to solve.

Room 5: Red button 4 enters the fourth clue to solve.

Room 6: You enter the video call room, and you can see Margaret Hamilton! But you can't hear properly and must solve a riddle to enter the chat room to communicate with her.

Each room contains 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
- An object you have to find – to continue the game

While the player progresses, there are additional screens that will appear:

-Game master bubble – if the player spends more than 1 minute in each room, a game master bubble appears with a hint that helps the participant solve the riddle.

-Margaret Hamilton's character appears to warn when the time is half, saying: "Hurry Up! Only half an hour is left!"

In the end, she also congratulates you for helping her, and her team decides.
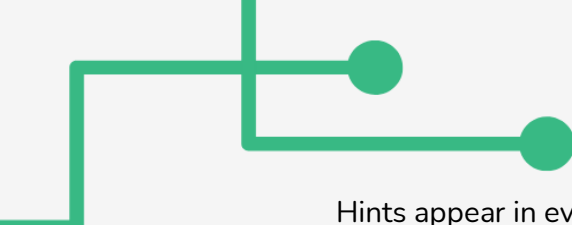
"Congratulations! Without your help, it wouldn't be possible to decide. This crucial decision has saved us from landing safely on the Moon! We are officially here!!!"

Picture of Lunar Mission Completed.

-In case of failure, a screen label will appear saying: "Oh no, signal lost! You can try again from the start."

c. **Hints**

Hints appear in every room after the estimated time of the solution. In some rooms maybe an additional hint could be requested after another 3-5 mins. *hints will be developed as the ER is more visually ready, and we are sure of the main challenges and difficulties the player will possibly face.

Hint 1: For Red Button with the Solar System Match - "Jupiter is huge, Earth has atmosphere, Neptune & Uranus are tiny, Saturn contains rings"
Hint 2: Second Red Button "162"
Hint 3: Third Red Button "Keep going"
Hint for Clue 3 : Ignore the gaps. Answer might be longer
Extra Hint for Clue 3: You may use more than a digit in each underscore symbol
Hint 4: Fourth Red Button - Define one of the shapes number to help
Hint 5: Direct the players where to go if they find it hard to continue

The main challenge for the players is to enter the lunar module and find objects that will help them discover the life-threatening error that occurred. Anything can and will be a potential piece of the solution to open Mission Control and communicate with Margaret. As time passes, the digital assistant will try to help the team move on with an extra hint in each room. Remember that as soon as the team enters Mission Control; they only have 30 seconds to decide whether the spacecraft should continue.

d. Game stages
i.The beginning

The player enters the first room, which is NASA's headquarters. The player will be able to click on various objects and read the story behind the situation of the Lunar Mission. After 2-3 minutes, the warning alarms start, four buttons turn red, and the escape room challenges begin.

ii. The course of the game & solutions
1. Challenge #1: Clues Game
The aim of these challenges is to unlock all the red buttons in order to communicate with Margaret in the spacecraft.

Inside the room, items might help the players to find the solution. Multiple-choice questions will appear on the screen every time they click on the red buttons, and they need to answer. Each red button will have 1-2 exercises and only if they unlock one, they will be able to move to the next button. After they unlock all four red buttons they will collect a 6-digit code, which will then give them access to the video call room.
Clue 1: 14532
Clue 2: 162

Με τη συγχρηματοδότηση
της Ευρωπαϊκής Ένωσης

2.   **Challenge #2: Piano Keys**

In challenge 2 after entering the room they will be able to see Margaret in the spacecraft but they will be unable to hear. They need to solve a riddle to enter the chat room. Every time they press the piano keys, players will hear a noise. They need to insert the number 15 by solving the Clock Angle Problem to enter the spacecraft's video call.

Clock Angle Problem:

Clock Angle Problem: Given time in hh:mm format in 24-hour notation, calculate the shorter angle between the hour and minute hand in an

```
Input:  5:30
Output: 15°


Input:   21:00
Output: 90°


Input:   12:00
Output: 0°


Please note that hh:60 should be considered
as (hh+1):0
```

analog clock.For example:

The Problem: The idea is to consider the rate of change of the angle in degrees per minute.

The hour hand of a 12–hour analog clock turns 360° in 12 hours, and the minute hand

rotates through 360° in 60 minutes. So, we can calculate the angle in degrees of the hour

hand minute hand separately and return their difference using the following formula:

$$\text{Degree}_{(hh)} = H\times(360/12) + (M\times360)/(12\times60)$$

$$\text{Degree}_{(mm)} = M\times(360/60)$$

Here, H is the hour, and M is the minutes past the hour. The angle should be in degrees and measured clockwise from the 12 o'clock position of the clock. If the angle is greater than 180°, take its difference with 360.

C++   Java   **Python**

```python
# Function to compute the angle between the hour and minute hand
def findAngle(hh, mm):

    # handle 24-hour notation
    hh = hh % 12

    # find the position of the hour's hand
    h = (hh * 360) // 12 + (mm * 360) // (12 * 60)

    # find the position of the minute's hand
    m = (mm * 360) // (60)

    # calculate the angle difference
    angle = abs(h - m)

    # consider the shorter angle and return it
    if angle > 180:
        angle = 360 - angle

    return angle


# Clock Angle Problem
if __name__ == '__main__':

    hh = 5
    mm = 30

    print(findAngle(hh, mm))
```

Download Run Code

Output:

15

==Clue 5: 15==

3.   Challenge #3: Padlock

An automated response from Margaret will appear in the chat room. This response will guide the players to use the material they collected in the initial stage to help Margaret decide whether she should allow the spacecraft to land on Moon or not. After unlocking the padlock the answer will appear and players need to type it on the chat, and win the game.

Clue 6: 1177

iii. Ending

1. In case of success

Player succeeds by reaching the point with all the clues solved that help Margaret save the spacecraft and land on the Moon.

2. In case of failure

The player will be given a second chance to restart the game and try to help Margaret. If he/she decides not to play again, they will be asked to give online feedback (Link to be provided here). This will let the chance also explain the solutions to all riddles step by step and let the player recognize what went wrong.

e. Debriefing phase and feedback

In the end, the players will have the chance to leave comments about the ER and the main challenges faced. The following questions are suggested to be used:

- Did you enjoy playing the game?
- Has the game achieved your expectations?
- How was the communication between the players?
- Which difficulties did you encounter?
- Please share three new things you learned by playing this game.
- Please share your experience playing this game in the comment section below.

Source: https://medium.com/techie-delight/top-25-programming-puzzles-and-brain-teasers-dac17b41e94a

Με τη συγχρηματοδότηση της Ευρωπαϊκής Ένωσης

The #CodER project is co-financed by the ERASMUS+ programe of the European Union and is implemented from December 2021 to November 2023. This publication reflects the views of the authors and the European Commission cannot be held responsible for any use which may be made of the information contained therein

Project Number: 2021-1-FR02-KA220-YOU-000028696