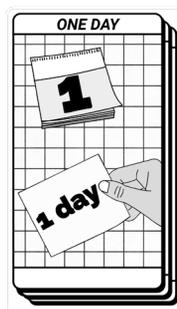


SCRIPT 8

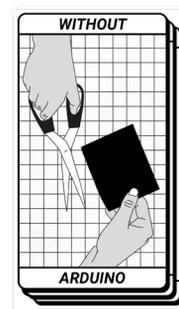
Constraints:



Spies

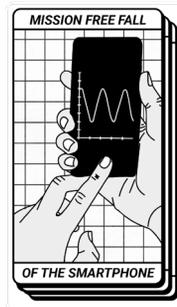
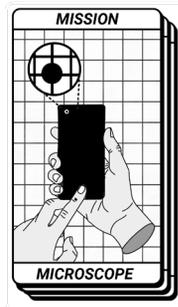


1 day



without Arduino

Tasks:



1 The story in two words

The students embody a group of engineers in support of operations carried out in the field. They discover that they must assist a secret agent who has recovered North Korean leader Kim Jong Un's smartphone.

2 Preparations

You need a place where students can work in groups, and craft together. Ideally, a place that is unknown to them, so as to get them out of their habits. A TD room may be suitable, if it is not too full of tables (and if the tables are installed in an island). You also need a place for the ultimate test, with a height difference of about 5m: window, footbridge. Obvious safety conditions must be taken when throwing objects out the window. For hardware, see below.

3 INTRODUCTION

Show students the video "KJU I8": an Agent in South Korea indicates that he is assisting a spy in North Korea who recovered a micro sample from Kim Jong Un where he was invited, this seems to indicate a code but he can't decipher it. He is there. You have to send him a way to make a microscope with the tools on board, he suggests that they follow the MM27 protocol.



optional: The supervisor gives them a way to communicate with the spy (ex: via minnit.chat or a whatsapp channel or a discord that the supervisor will use in secret to play the spy). Then let the participants possibly ask questions to clarify the mission.

4 TASK : SMARTPHONE AS A MICROSCOPE

The morning

Students must design and characterize a microscope with a drop of water on their smartphone. They follow the MM27 protocol.

[MM27 protocol \(pptx\)](#)

[MM27 protocol \(pdf\)](#)

The protocol requires several actions, which can be more or less advanced depending on the objectives of the session and the level of the students:

- measure the magnification due to the drop (by finding the same way to measure it on the different smartphones, for example by magnifying a calibrated object like a ruler)
- measure the effect of the size of the drop of water calibrated as precisely as possible: we will see that the magnification varies inversely to the size.
- develop the most efficient sample holder possible with frugal means
- make an illustrated manual

For the final test, you have to choose an object to photograph. Banknotes are good objects, there are many small details hidden in them (especially in the arches of the bridges, we find the word EURO in the different alphabets of the EU).

Alternative: each team photographs a mystery object and the other teams have to guess which object it is.

After the final tests, the team must agree together (or on quantitative criteria) which is the best prototype and the supervisor announces that he will send the plan and photos to the spy immediately.



5 TRANSITION

Show the student the video "KJU T8": the agent in South Korea indicates that the spy told him that he managed to make the microscope, and deciphered the code of a safe. He spotted the safe in a bedroom of the house, opened it and retrieved a smartphone. He'll send them from a wall in the DMZ. There is a security camera. It indicates that the GH12 protocol will have to be followed.



6 TASK : SMARTPHONE FALL

The afternoon

The test consists of making a protection to be able to drop a fragile object from above by following the GH12 protocol. Frugal materials are provided, and students work in groups.

Choose from 2 versions of the GH12 protocol to give to students:

- a simple version, the only instruction is that the egg resists the fall.
- a more advanced version, which requires students to do a video analysis of the fall to assess the frictional forces of the air.

[GH12 protocol \(pptx\)](#)

[GH12 protocol \(pdf\)](#)

[advanced GH12 protocol \(pptx\)](#)

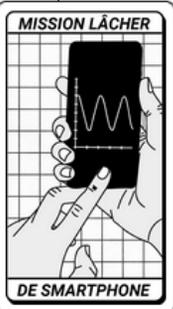
[advanced GH12 protocol \(pdf\)](#)

Do not hesitate to adjust the constraints according to your students and your objectives, for example:

- the camera must be able to film the fall, which forces the students to slow down the fall (set a minimum duration)
- once the device is on the ground, you have to be sure that the camera has a precise orientation (to film in the right direction).

This activity can be more or less advanced depending on the constraints you impose:

- tracking of the fall by video analysis (use the Fizziq application for example)
- impose a minimum time and orientation constraint during the fall in order to film it.



Typical process :

Device manufacturing time: 1h30 – The students design a device in groups, test it, improve it.

Final test: 20 to 30 mn : all the groups, one after the other (or all at the same time if time is short), test their device in real size (drop it from a height of about 5 m) and check whether the conditions emitted by the protocol are verified. For this test, the smartphone is replaced by an egg: the egg must be intact at the end of the fall. All the students must then agree on the device to be sent to the astronauts (take a photo of the plan and the device that is sent to the spacecraft).

Optional: if we want to avoid having to choose between the different devices (to avoid competitive tensions), we send the plans of all the devices to the astronauts as well as their test results, and we say that they will be the ones who will choose according to their constraints local (equipment, space suits, etc.)

If you have many students: groups of 3/4 students work well. If the groups are larger, we can provide tutorial writer functions: some students take charge of writing instructions for making the device. We can insist on the important nature of this document and its duty of clarity. Otherwise, photos are enough to communicate with the astronauts. If the groups are larger, plan a trajectory analysis activity that is supported by a few students

Equipment: The C2309 kit

These are what the spy has. It can be modified according to your stocks. This is small DIY material, the list offered (in pdf and pptx format) has been tested and works but can be changed easily. Ideally, each group should have a C2309 kit at their disposal, but in practice the easiest way is to make the equipment available in the room. The quantities available are then greater than what is indicated in the kit (you can have 100 straws, even if the kit indicates that the spy only has 10): the groups must be careful not to exceed the quantities in their device (but several groups can use 10 straws).

DIY equipment: in addition to the kit, provide cutters, scissors, glue guns, pliers, protective and cleaning equipment: cutting mat, plastic sheeting, garbage bags, brooms... Eggs must also be provided for the final test.

- C2309 kit (pptx)
- C2309 kit (pdf)
- labels (pptx)
- labels (pdf)

7 EPILOGUE

They receive a message indicating that a video from the spy services will arrive after a certain time (good time for a short break or tidying up):

final video KJU E6: an agent in South Korea tells them that the services have recovered the smartphone – it allowed them to access the codes of the last missiles then end credits (you can add the names of the participants, students and teachers to the credits).

