GUIDE ACTIVITY INTELLECTUAL OUTPUTS

INNOVATIVE SCHOOLS ADAPTED TO THE DIGITAL SOCIETY FOR IMPROVING TECHNOLOGICAL EDUCATIONAL SKILLS

Project no. 2020-1-ES01-KA201-082648

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

OUTPUT 2
DRONES AT SCHOOL

IN EDUCATION, DRONES PROVIDE A NEW TOOL TO GENERATE IDEAS AND INNOVATION BOTH AMONG EDUCATORS AND STUDENTS.

2

output

ACTIVITY 1

TITLE Drones and law-Fun and rules

ABSTRACT

School subject: Law
Web-quest on Italian and European laws about the use of the drone

AUTHOR/S

I.P.S. MAFFEO PANTALEONI

DATE 19/05/2022
VERSION 1

DIDACTIC OBJECTIVES

The objectives to be achieved are the following:

- To promote interdisciplinary learning and teamwork
- To improve interests and enhance motivation
- To stimulate creativity
- To improve problem-solving skills
- To stimulate knowledge of electronics
- To improve the civic aspect of individuals
- To increase the skills of research and selection of information
- To know the Italian and European laws
- To respect the rules
- To have fun in a conscious way
- To reflect on their own behaviors
- To know the differences between European laws, regulations and directives

ACTIVITY 1

- [ ] SCIENCE
- [x] TECHNOLOGY
- [ ] MATHEMATICS
- [ ] GEOGRAPHY/HISTORY
- [ ] LANGUAGES
- [ ] LITERATURE
- [ ] MUSIC
- [x] OTHERS: LAW

EDUCATION LEVEL

This activity is prepared to be completed by...

- [ ] 12 - 14 YEARS
- [x] 14 - 16 YEARS
- [ ] OTHERS .....

TOOLS NEEDED

- Computer
- Smartphone
- Web
- Google drive
- Google docx
- iMovie

DEVELOP ACTIVITY

- Division into groups;
- Assignment of tasks to each group
- Webquest: search and selection of information on the web regarding Italian and European laws on the use of drones, with smartphones and computers
- Creation of a list with information regarding the most important Italian and European laws
- Creation of a summary map on the prevailing laws
- Study of the drone, assembly of the pieces
- Study of the operations of the drone following the instruction booklet
- Research and selection of the space in which to carry out the flight activity of the drone, making sure of the requisites required by the laws
- Realisation of the flight outdoors with the use of the camera

ACTIVITY 1

RESOURCES

English-litalian and european law

ACTIVITY 1

STUDENT'S EVALUATION

Pupils were evaluated on observation during teamwork in terms of skills, socialisation and help of peers and on the basis of a test of Italian and European laws on the use of the drone.

BIBLIOGRAPHY

https://www.dday.it/redazione/35075/sei-in-regola-con-il-tuo-drone-guida-al-nuovo-regolamento-europeo#:~:text=Non%20%C3%A8%20permesso%20operare%20il,ottenuto%20l'attestato%20di%20competenza.

https://www.winscuola.com/index.php/formazione/corsi-online-istituti/educazione-volo-uso-droni

ACTIVITY 1

BIBLIOGRAPHY

https://www.informarea.it/ecco-cosa-dice-la-legge-sui-droni/

http://www.enac.gov.it/sicurezza-aerea/droni/normativa-droni

https://www.hdblog.it/droni/speciali/n520133/regolamento-europeo-droni-guida/

https://www.dji-store.it/leggi-e-regolamentazioni-dei-droni-cosa-devi-sapere/

SCALABILITY

The activity can be used in other education levels because all children of all ages must know and respect the rules before thinking about fun.

MORE INFORMATION

The user have to do a web quest of the legal regulations of his country and those of Europe.

ACTIVITY 2

TITLE ENVIRONMENTAL INVESTIGATION WITH DRONES

ABSTRACT

Environmental science is critical to preventing the degradation of our planet. Human behavior has led to disasters, such as flash floods, storms, droughts, and climate change. If we do not research and mitigate these events, there is a significant risk of mass extinction.
Drones can easily fly over large amounts of land to aid mapping and environmental monitoring. They can complete these duties far more swiftly and cost-effectively than conventional techniques, making them suitable for distant or difficult-to-reach sites.
Drones are effectively employed to monitor environmental catastrophes in unsafe locations, such as during floods or after storms. Drones may be used in cameras, thermometers, humidity and pressure sensors, wind gauges, and other sensors, allowing them to collect vital environmental data. A drone can collect this data regularly, eliminating the need to send people out into the field.

Through the activity we carried out, we wanted to make possible a live transmission within the zoom program in which we could connect a class of students from science class and exemplify the different vegetation stages of the trees in a certain area, presenting them from the spot. This transmission was made using the Zoom platform and the connections between the students' phones and the drone connected through the computer.

AUTHOR/S

SCOALA GIMNAZIALA MARIA ROSETTI

DATE 02/03/2023

VERSION 1

ACTIVITY 2

DIDACTIC OBJECTIVES

Objection
- improving students' knowledge about using the Zoom platform
- improving students' knowledge about the use of phone applications in direct communication
- improving the students' ICT knowledge regarding programming the drone and connecting it to the computer
- improving knowledge about the environment

- [x] **SCIENCE**
- [x] **TECHNOLOGY**
- [ ] **MATHEMATICS**
- [ ] **GEOGRAPHY/HISTORY**
- [ ] **LANGUAGES**
- [ ] **LITERATURE**
- [ ] **MUSIC**
- [ ] **OTHERS .....**

EDUCATION LEVEL

This activity is prepared to be completed by...

- [x] **12 - 14 YEARS**
- [ ] **14 - 16 YEARS**
- [ ] **OTHERS .....**

TOOLS NEEDED

- Drone
- Mobile device (Tablet, Phone) for drone control
- Computer/ laptop
- The Zoom platform must be downloaded

ACTIVITY 2

DEVELOP ACTIVITY

The students are divided into a team that goes to the school yard (we consider it to be a remote ecosystem that the students cannot see directly) and that transmits via Zoom what the drone sees

- Another group of students will be in school at the computer and will generate a link on Zoom for all participants to connect
- Other students will be included and will watch what is being filmed through the monitor and will be able to communicate with the students outside, possibly asking for certain explanations or they can ask to see certain images
- The students in the class, where the Zoom link was generated, will record the transmission.

The connection between the drone and the computer is made like this:
These are the steps to be able to see what the drone is filming on zoom:

1. We enter on a laptop on the website https://onestream.live (a new account must be created at the beginning)
2. Press the start stream button and choose rtmp - third party source.
3. Open the drone, connect your phone to the controller and open the Dji Fly app. From the application, when the drone is connected, press fly now and after that enter the settings. From settings go to transmission and select rtmp source. There you enter the link generated by the site followed by a / and the password generated by the site.
4. You should see what the drone sees on the laptop screen. Now you have to go to zoom and give share screen to the site where the drone is seen.

https://onestream.live/

ACTIVITY 2

RESOURCES

Hedera helix

Tilia

ACTIVITY 2

Conifers

STUDENT'S EVALUATION

Areas in which our students will evaluate themselves:

1. Can I assemble the drone from its parts?
2. Can I use the project materials locally and create a suitable track?
3. Convenient navigation in drone movement;
   - Can I remove it?
   - Can I fly in the air?
   - Can I download to the specified point?

ACTIVITY 2

BIBLIOGRAPHY

https://onestream.live/

SCALABILITY

This project can be considered as a beginner level for fifth and sixth grade students.

MORE INFORMATION

Project's video in youtube:
https://www.youtube.com/watch?v=V2PCu6akS0E

ACTIVITY 3

TITLE Slalom

ABSTRACT

When we examine the most important elements in learning, the concept of "motive" comes first. The motive compels the organism to make certain reactions and, as a result, to learn something. Accordingly, motivation is essential for learning. A sufficiently motivated student means that he is not ready to learn, and an interest in learning does not develop unless there is an important reason for learning. People generally learn more quickly about topics that they are curious about and find interesting. However, it cannot be expected that all the subjects in the school will attract the attention of the students. So we need to examine ways to motivate the student.

When a certain examination is made and the age level is examined, it seems that one of the most important motivational behaviors is “entertainment”. Another motivational behavior is the “reward”.

In this event, where we will work with the student with a drone, we especially highlighted these two elements.

AUTHOR/S

Sultantepe Prof. Dr. Cemil Taşçıoğlu Ortaokulu

DATE 21/12/2022

VERSION 1

DIDACTIC OBJECTIVES

Beginner student:

-What is a drone, how does it work, knows

-Knows the Tello Edu software we will use for the drone

-Can assemble the drone from disassembled to run smoothly.

-Can edit the working area where the drone will work.

-Hand-motor muscles develop in the use of materials

ACTIVITY 3

Note: As this is the first project with drone, only beginner tutorial targets have been created in this area.

- [ ] SCIENCE
- [x] TECHNOLOGY
- [ ] MATHEMATICS
- [ ] GEOGRAPHY/HISTORY
- [ ] LANGUAGES
- [ ] LITERATURE
- [ ] MUSIC
- [ ] OTHERS .....

EDUCATION LEVEL

This activity is prepared to be completed by...

- [x] 12 - 14 YEARS
- [ ] 14 - 16 YEARS
- [ ] OTHERS .....

TOOLS NEEDED

- Drone
- Tello Edu Program
- Mobile device (Tablet, Phone) for drone control
- To create a workspace;
  - Plastic bar
  - Rope ,Rope
  - Plastic pontoon
  - White tape
  - Colored instructions

ACTIVITY 3

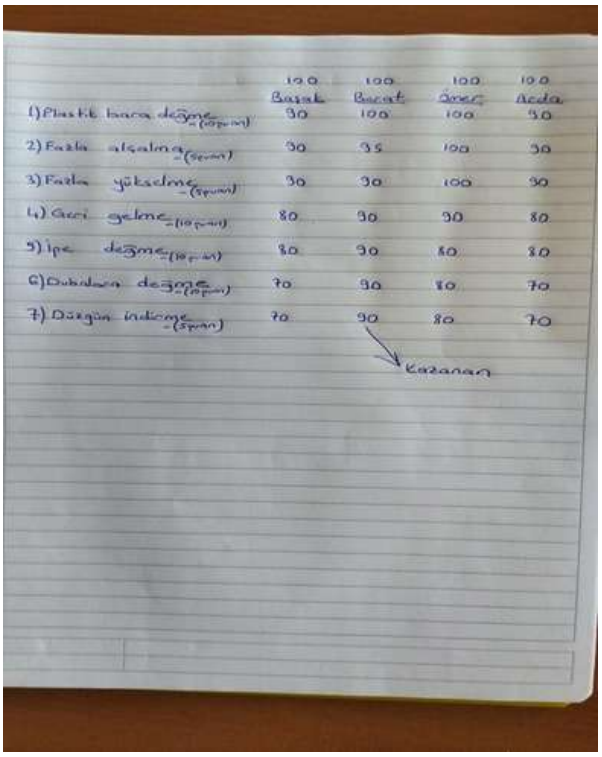
DEVELOP ACTIVITY

The project setup is given below step by step.

1. It is determined how much area the work track will be built in total.
2. Plastic bar rods that will separate the track area from the outside are placed in their places in appropriate ways.
3. The plastic bars are connected with the help of a rope, in this way the path that the drone will follow is determined.
4. With the rope and plastic pontoon, the areas where the drone will descend and rise are determined.
5. A table is prepared to record the positive and negative behaviors of the students who will use the drone.
6. Students try to reach the finish point by moving the drone appropriately on the track with the help of the mobile application.
7. The student who made the fewest mistakes is determined using the table.
8. The students who make the fewest mistakes are rewarded.

RESOURCES

ACTIVITY 3



	100 Başak	100 Bucak	100 Ömer	100 Arda
1) Plastik bacak değme (10puan)	30	100	100	50
2) Fazla alçalma (5puan)	30	35	100	30
3) Fazla yükselme (5puan)	30	30	100	30
4) Geri gelme (10puan)	80	90	90	80
5) İpe değme (10puan)	80	90	80	80
6) Dubadan değme (10puan)	70	90	80	70
7) Düzgün indirme (5puan)	70	90	80	70

Kazanan

ACTIVITY 3

STUDENT'S EVALUATION

Areas in which our students will evaluate themselves:

1. Can I use Tello Edu software for drone?
2. Can I assemble the drone from its parts?
3. Can I use the project materials locally and create a suitable track?
4. Convenient navigation in drone movement;
   - Can I remove it?
   - Can I fly in the air?
   - Can I download to the specified point?

We can sort them like that

Note: In this study, it is aimed to control the drone in the appropriate direction. The specific movements of the drone (Flip-Flop, Cyclic movements, Sensor usage) will be covered in later projects.

BIBLIOGRAPHY

https://play.google.com/store/apps/details?id=com.wistron.telloeduIN&hl=tr&gl=US
https://www.ryzerobotics.com/tello-edu

SCALABILITY

This project can be considered as a beginner level for fifth and sixth grade students.

The project is open to development. Students who want can use a color screen by placing an LCD panel on the drone.
Specifically, the Drone can turn red when it approaches the obstacle and green when it moves away from the obstacle.

ACTIVITY 4

TITLE Drone patrol

ABSTRACT

A solar panel installation must be checked periodically to check its condition. To check their condition, we are going to use a drone to check each one of them and take photographs for a more detailed study.

AUTHOR/S

IES MEDITERRANEO

DATE 25/11/2022

VERSION 1

DIDACTIC OBJECTIVES

The objectives to be achieved are as follows

- To promote interdisciplinary learning and teamwork.
- To improve pupils' motivation and interest.
- To improve spatial vision.
- To increase creativity.
- To plan a project from the beginning.
- To Improve problem-solving skills.
- To program drone.

- [ ] **SCIENCE**
- [x] **TECHNOLOGY**
- [x] **MATHEMATICS**
- [ ] **GEOGRAPHY/HISTORY**
- [ ] **LANGUAGES**
- [ ] **LITERATURE**
- [ ] **MUSIC**
- [ ] **OTHERS .....**

ACTIVITY 4

EDUCATION LEVEL

This activity is prepared to be completed by...

☐ **12 - 14 YEARS** ☑ **14 - 16 YEARS** ☐ **OTHERS .....**

TOOLS NEEDED

The following materials are needed:

- Drones.
- Tape measure
- Paper
- Pen
- Calculator
- Tablet, mobile phone or computer

DEVELOP ACTIVITY

The drone takes off from the base, which is far away from the solar panels, it must inspect the solar panels by taking pictures of them in each of the corners, for a more detailed analysis.finally the drone returns to the base.the students will work in groups of 4 , they will have to find all possible options and choose the best option, explaining the reasons for this.
The activity will be divided into several phases:

- In the first phase only one single plate will be inspected. In this case there are only two options to go around the perimeter, they are the same but the turns are made in opposite directions.

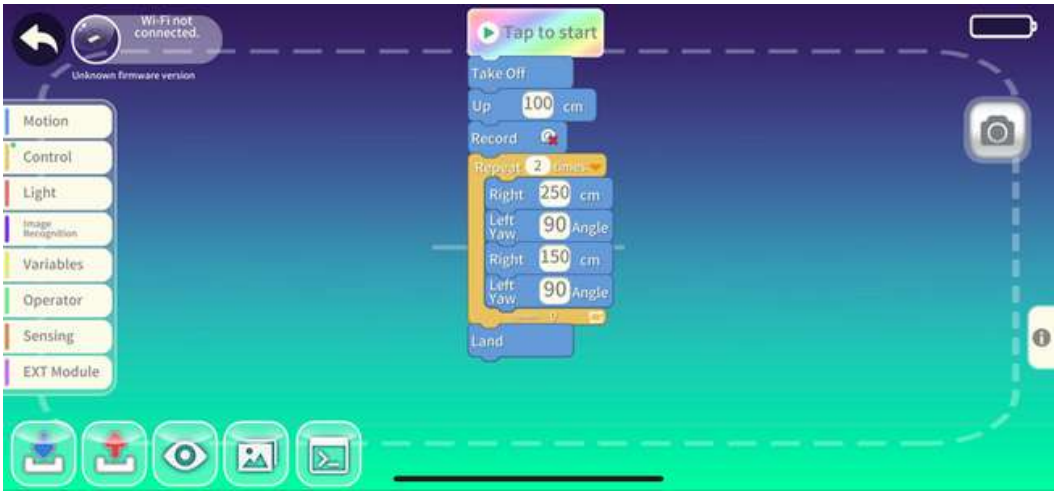
- In the second phase, 4 rectangular plates are to be inspected, adding more plates increases the options to go around the perimeter of the plates. In this case, it is not just a matter of finding a solution to the problem, but of finding the best solution, i.e. the one in which the drone travels the shortest distance and it is feasible to programme the drone.

ACTIVITY 4

- In a third phase, there are 9 rectangular solar panels. The problem becomes more complicated, as the number of different paths around the perimeter of the panels increases. In addition, this option must be programmed.

RESOURCES

ACTIVITY 4


Wi-Fi not connected.
Unknown firmware version
Tap to start
Take Off
Up 100 cm
Record
Repeat 2 times
Right 250 cm
Left Yaw 90 Angle
Right 150 cm
Left Yaw 90 Angle
Land
Motion
Control
Light
Image Recognition
Variables
Operator
Sensing
EXT Module

ACTIVITY 4

STUDENT'S EVALUATION

To be assessed:

1. Applies mathematical concepts.
2. Manages the programme interface.
3. Successfully translates natural language into code.
4. Programs their movement according to plan.
5. Shows individual work habits, effort, responsibility, autonomy, organisation, curiosity and interest in learning.
6. Collaborates with others in teamwork.
7. Is creative in finding solutions to a problem.
8. Easily understands the details of solutions presented by others.
9. Exposes his/her ideas and projects clearly to others.
10. Participates actively in group discussions.

BIBLIOGRAPHY

https://droneblocks.io on this page you can find more information about drone programming.

ACTIVITY 4

SCALABILITY

Depending on the age of the pupils, more plates can be added, even the shape of the plates can be changed, they can be triangular, square or hexagonal.

MORE INFORMATION

Since drones are light in weight and not very accurate in their movements, it is advisable that when they have to move more than one metre, the movement is divided into several.

ACTIVITY 5

TITLE Mapping the territory: to create a real map

ABSTRACT

Plan the drone's path, to photograph the territory and reconstruct the map of what the drone will have photographed, drawing the map manually.

AUTHOR/S

I.P.S. MAFFEO PANTALEONI

DATE 20/09/2022

VERSION 1

DIDACTIC OBJECTIVES

The educational objectives achieved are as follows:

- To promote interdisciplinary learning and teamwork
- To improve interests and enhance motivation
- To stimulate creativity
- To improve problem-solving skills
- To stimulate knowledge of electronics
- Stimulate knowledge of the area
- Learn to use technology in a useful way
- Associate the use of the drone with the study
- Understand a map of the territory
- Learn how to build a map after photographing it with the drone

- [ ] **SCIENCE**
- [x] **TECHNOLOGY**
- [ ] **MATHEMATICS**
- [x] **GEOGRAPHY/HISTORY**
- [ ] **LANGUAGES**
- [ ] **LITERATURE**
- [ ] **MUSIC**
- [ ] **OTHERS .....**

ACTIVITY 5

EDUCATION LEVEL

This activity is prepared to be completed by...

☐ **12 - 14 YEARS** ☑ **14 - 16 YEARS** ☐ **OTHERS .....**

TOOLS NEEDED

- Drone
- Computer
- Software Scratch
- Printer
- Drawing sheets
- Pencils and eraser
- Google Earth

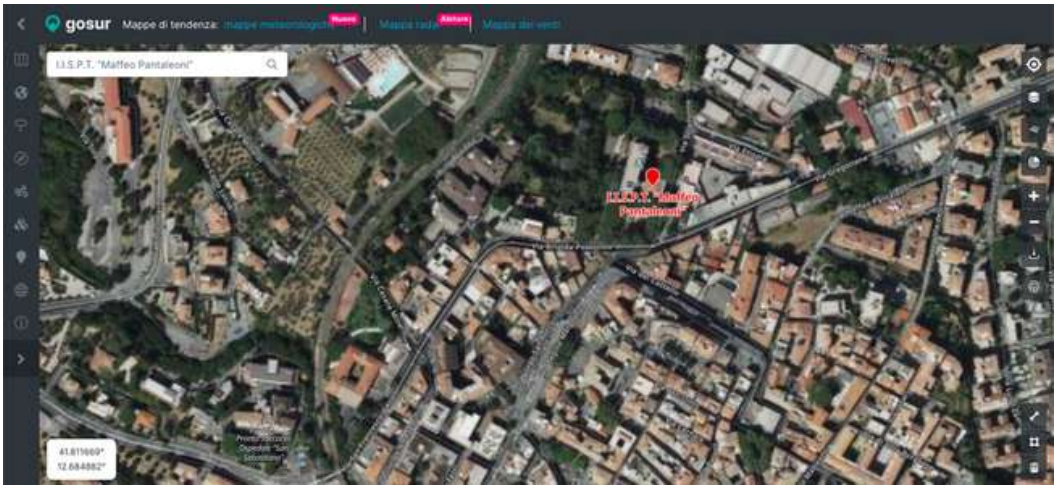
DEVELOP ACTIVITY

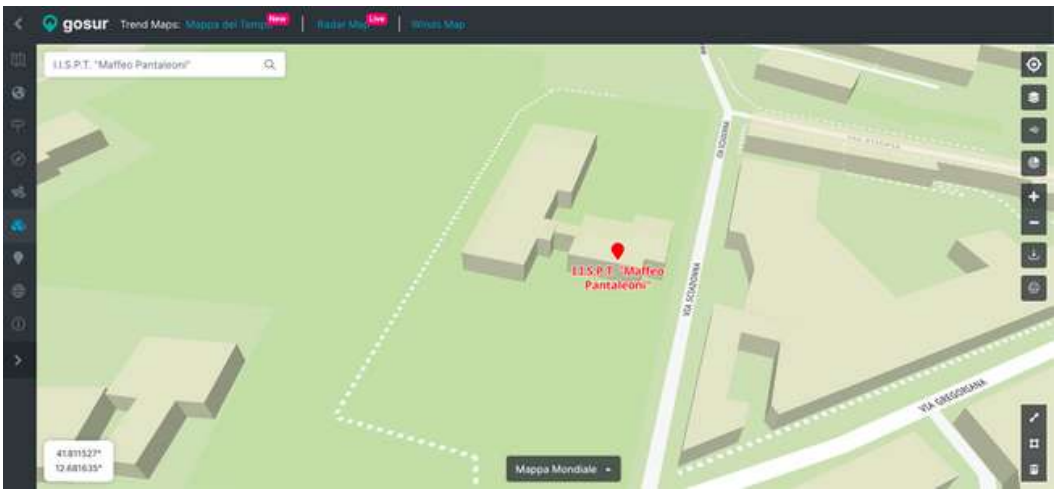
The pupils will carry out the activity by completing the following phases:

- Subdivision into groups
- Knowledge of the drone
- Programming tests
- Flight tests in the classroom
- Search for the map of the territory on which the drone will fly, on Google Earth
- Photograph the map
- Mark the path of the drone on the photo
- Program the drone with Scratch
- Outdoor flight tests
- Flight of the drone
- Photograph the portion of the territory to be mapped
- Work in the classroom
- Draw the map on a sheet to reconstruct the drone's path

ACTIVITY 5

RESOURCES





ACTIVITY 5


I.I.S.P.T. "Maffeo Pantaleoni"
Via Gregoriana


gosur
path of the drone
RECTANGLE
Mappa Mondiale

ACTIVITY 5

STUDENT'S EVALUATION

The activity enriched and enhanced the computer skills of the pupils, especially those who had never programmed with Scratch and used a drone.
In addition, IT has improved relations between pupils, enhancing the inclusion of pupils with disabilities and has created new friendships even outside of school for some of them.
The evaluation of each pupil was based on their active participation and commitment, but also the ability to plan and collaborate and problem solving.

BIBLIOGRAPHY

https://google-earth.gosur.com/?gclid=CjwKCAjw7cGUBhA9EiwArBAvohe6iKUZj9vqdrQ157yQH1eEzbHnJGEJms_emD6D59VBxY5j2zlJlxoC5A4QAvD_BwE&ll=41.81042971300738,12.678965547080224&z=16.331669633941257&t=satellite

https://www.gosur.com/3d-map/italy/?ll=41.81108020138214,12.6800181500000024&z=18.525589065329 72&t=3d

https://satellite-map.gosur.com/it/

SCALABILITY

It will be possible to apply the same activity even for younger students with the same drone or others that are easier to configure and program.

MORE INFORMATION

The activity was very meaningful and motivating for the pupils and gave the teacher the opportunity to learn about other aspects of the pupils that cannot emerge and therefore appreciate in their daily work.

ACTIVITY 6

TITLE We Water Plants with Drone

ABSTRACT

By 2022, it is better understood how important green nature is for living life. Humanity, who could not appreciate the green nature, has upset the balance of nature over time and life has become difficult for both humans and other living things.
Humanity trying to find a solution to this situation;

- Searching for life on other planets as an alternative to our world,
- The genetics of the plants are changed, enabling them to be produced in difficult conditions,
- Reducing petroleum products that damage the green,
- Researching the ways of using sea water both in daily life and in nature,

Such studies have been done. Of course, what has been done above should be supported, but from time to time we miss the element that we need to pay attention to. The world, which has served living things for millions of years, can continue to serve if we take care of it.
The basic element mentioned above is the effort to protect nature. Every green is very important to us. That's why we should try to beautify our nature instead of looking for the solution outside.
We have taken this factor into consideration in this project. In terms of applicability, we have worked on flowers for now; but what we really want to draw attention to is the green nature itself.

AUTHOR/S

Sultantepe Prof Dr. Cemil Taşçıoğlu Ortaokulu

DATE 21/12/2022
VERSION 1

ACTIVITY 6

DIDACTIC OBJECTIVES

With this project, the student;

-Knows the importance of green nature for living life,

-Drone technology may not be used for the benefit of humanity both in daily life and in critical times.

-Can use the software to control the drone.

-Can use Tinkercad program.

-Can be printed from a 3D printer without the help of adults

- [x] **SCIENCE**
- [x] **TECHNOLOGY**
- [ ] **MATHEMATICS**
- [ ] **GEOGRAPHY/HISTORY**
- [ ] **LANGUAGES**
- [ ] **LITERATURE**
- [ ] **MUSIC**
- [ ] **OTHERS .....**

EDUCATION LEVEL

This activity is prepared to be completed by...

- [ ] **12 - 14 YEARS**
- [x] **14 - 16 YEARS**
- [ ] **OTHERS .....**

TOOLS NEEDED

- Drone
- Soil, Water, Two flower pots
- Computer
- Ardiuno board, Humidity sensor
- 3D Printer
- Tinkercad Software, Arduino Software
- Tello Edu Drone software

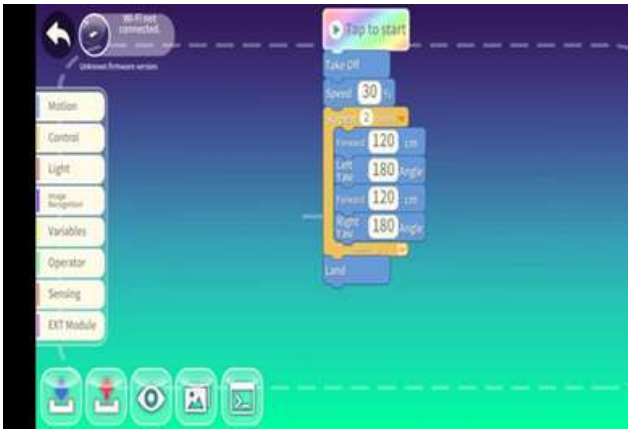
ACTIVITY 6

DEVELOP ACTIVITY

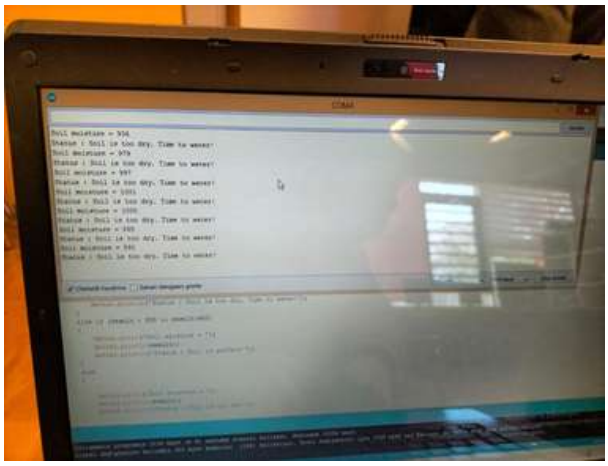
1. The carrying capacity of the drone needs to be determined. According to our project, the drone will carry water to the plants. We will transport the waters to two capillaries that we will produce in a 3D printer. First, the drone carrying capacity was measured with simple tools. Afterwards, we will print water containers that can hold up to 100 ml of water. In order to reduce the weight, we slightly reduce the printing frequency in the 3D printer. We also design the thickness of the water containers as thin as possible. We also add small holes to our design so that the water passes through the bottom of the container in drops.
2. We create an environment for the flowers to be watered. We place soil on the ground, soil and flowers in pots. If desired, artificial flowers can also be used here.
3. We mount the printed water containers on the drone. Wire, rope can be used here. However, while doing this, we pay attention to situations such as the containers do not fall while moving, do not prevent the drone motors from turning, or water does not come to the electronic part of the drone.
4. We write the drone code with the Tello Edu program. The drone must first take off from the ground, hover over the flowers, and zigzag there a certain distance in a loop. In this way, it will have watered different parts of the flowers until the water runs out.
5. We should measure the amount of moisture in the soil by connecting our Arduino board to the humidity sensor. Thus, the irrigation process will not occur at a random time, but when the soil really needs water. In accordance with our project, we observed the humidity value on our computer.

ACTIVITY 6

RESOURCES



ACTIVITY 6



sketch_jan3a.ino

```
const int prob = A0;

int result ;


void setup() {

  Serial.begin(9600);

}

void loop() {
  result = analogRead(prob);

  if (result>850){
    Serial.print("Soil moisture = ");
    Serial.println(result);
    Serial.println("Status : Soil is too dry. Time to water!");
  }
  else if (result<850 && result>450){
    Serial.print("Soil moisture = ");
    Serial.println(result);
    Serial.println("Status : Soil is perfect!");
  }
  else{
    Serial.print("Soil moisture = ");
    Serial.println(result);
    Serial.println("Status : Soil is too wet!");
  }


}

```

STUDENT'S EVALUATION

Areas of self-assessment of student:

1. Can I Design using Tinkercad?
2. Can I write the desired code using the Tello Edu program?
3. Can I print the design from a 3D printer?
4. Can I keep the drone in the air as I want even though there is water in the containers and water it?

BIBLIOGRAPHY

https://play.google.com/store/apps/details?id=com.wistron.telloeduIN&hl=tr&gl=US&pli=1 (Tello Edu)
www.tinkercad.com

SCALABILITY

Our project is an “Awareness raising” project. This prototype project can also be used for different purposes by using larger Drone and larger containers. Here's what we did on the flower;
For irrigation of agricultural areas that need water in dry seasons,
In order to carry water to places where people cannot reach in forest fires,
For more efficient irrigation of vegetables and fruits in gardens (There is water loss with classical methods) available.

ACTIVITY 7

TITLE Teaching Numbers to Special Need Students by Drone

ABSTRACT

What is Special Needs Education?
Person in need of special education: It is an individual who differs from his peers in terms of individual characteristics and educational qualifications for various reasons.
Incompetence: It is the state of preventing or limiting a normal activity or structure for a person as a result of injury or some deviation.
Disability: It is the state of not being able to play the roles that should be played properly, depending on age, gender, social and cultural differences, as long as the individual lives, due to his/her incapacity.
Special Needs Education; It is the education that is carried out in an environment suitable for the special education needs of individuals with specially trained personnel, developed education programs and methods and their characteristics.

- Offered to children who are different from the majority and need special education,
- Enabling the gifted to reach the highest level in line with their abilities.
- Preventing inability to turn into a disability,
- By making the disabled individual self-sufficient
- It is the education equipped with the skills that will support the integration into the society and being independent and productive individuals.

What does it teach?
Special education differs from general education in terms of content. Normal children have skills that they acquire spontaneously. It is necessary to teach children with special education needs intensively and systematically. For example, children learn dressing, undressing and eating skills by observing and imitating adults.

ACTIVITY 7

Another point where special education differs from general education is the regulation of the content. While the content in general education is determined by central programs for the children around the average, the content of the program in special education determines the needs of the child.
Special Education in Our Project:
A message from Special Education Teacher Ms. Yasemin: “We are in life, out of time”
A message from Special Education Teacher Ms. Gülay: “We are beautiful again”

Our project consists of three phases. Special education teachers and project manager teachers decided on these stages. In the first stage, special education students were given training on the determined subject by special needs education teachers. After the training was over, in the second stage, our students were told what the drone is, its place in the project and how to evaluate what was learned in the first stage. (Assessment process is based on the principle of asking the student the number that appears on the drone screen, green screen color in case the student gives a correct answer, and a red screen color in case of wrong answer.) In the third stage, the evaluation was made and feedbacks were received.

ACTIVITY 7

AUTHOR/S

Sultantepe Prof. Dr. Cemil Taşçıoğlu Ortaokulu

DATE 13/11/2022

VERSION 1

DIDACTIC OBJECTIVES

In this activity, the student;

Knows the difference between numbers and numbers in mathematics.
Student knows what the number written on the drone screen is.
Knows the rules of counting rhythmic with 2 and 3 pieces.
According to the color that appears on the drone screen, he knows that student answered the number correctly or incorrectly.
In case of incorrectly guessing the number that appears randomly on the drone screen, student knows how to reach the correct answer by trying again without losing motivation.
Student knows that student will answer the questions prepared for his/her friends when student is given the right to speak.

- [ ] **SCIENCE**
- [x] **TECHNOLOGY**
- [x] **MATHEMATICS**
- [ ] **GEOGRAPHY/HISTORY**
- [ ] **LANGUAGES**
- [ ] **LITERATURE**
- [ ] **MUSIC**
- [ ] **OTHERS .....**

EDUCATION LEVEL

This activity is prepared to be completed by...

- [x] **12 - 14 YEARS**
- [ ] **14 - 16 YEARS**
- [ ] **OTHERS .....**

ACTIVITY 7

TOOLS NEEDED

- Drone
- Tello Edu Program
- Mobile device (Tablet, Phone) for drone control
- Desk,chairs

DEVELOP ACTIVITY

1) Preparatory work is done with special education teachers. In these studies;
-The subject of gain that can be given to the students is determined.
-The methods and techniques to be used while giving the outcome are determined.
-The issues that need to be treated sensitively about students are determined.
- How to use the drone is determined during the control of whether the gains are learned or not.
2) Transferring the rules to be considered during the project implementation to our students
3) Project implementation (Question and Answer)

RESOURCES

ACTIVITY 7

ACTIVITY 7

STUDENT'S EVALUATION

Topics that our students will evaluate themselves:
1. Do I know the number that appears on the drone screen?
2. Do I know that I gave a correct or incorrect answer according to the color that appears on the drone screen by looking at my answer?
3. 3. Can I answer correctly when my friends ask questions?
4. Can I learn the correct answer to the questions I gave wrong answers?

BIBLIOGRAPHY

https://play.google.com/store/apps/details?id=com.wistron.telloeduIN&hl=tr&gl=US
https://www.ryzerobotics.com/tello-edu

SCALABILITY

This project is specially designed for special education students. Each stage in the project has progressed under the control and knowledge of special education teachers.

The project is also used outside of special education groups. But as it stands, it is suitable for primary school and for children who are just learning numbers.

ACTIVITY 8

TITLE Geometric paths

ABSTRACT

At the ISTEDU drone school, students who want to obtain a licence to fly drones have to pass several tests. In all of them, the drones have to fly along the edges of geometric figures. To programme the drones correctly, students need to recognise the type of geometric figure and calculate unknown elements such as angles and sides.

AUTHOR/S

IES MEDITERRANEO

DATE 25/05/2022

VERSION 1

DIDACTIC OBJECTIVES

The objectives to be achieved are as follows

- To promote interdisciplinary learning and teamwork.
- To improve pupils' motivation and interest.
- To improve spatial vision.
- To increase creativity.
- To plan a project from the beginning.
- Improve problem-solving skills.
- Knowing and calculating the elements of plane geometric figures.
- Pythagorean theorem.
- Complementary and supplementary angles.
- Solving right-angled triangles.
- Programming drones.

ACTIVITY 8

- [ ] SCIENCE
- [x] TECHNOLOGY
- [x] MATHEMATICS
- [ ] GEOGRAPHY/HISTORY
- [ ] LANGUAGES
- [ ] LITERATURE
- [ ] MUSIC
- [ ] OTHERS .....

EDUCATION LEVEL

This activity is prepared to be completed by...

- [ ] 12 - 14 YEARS
- [x] 14 - 16 YEARS
- [ ] OTHERS .....

TOOLS NEEDED

The following materials are needed:

- Dron TELLO EDU
- Tape measure
- Paper
- Pen
- Calculator
- Tablet or mobile phone
- App for programming drones (TELLO EDU)

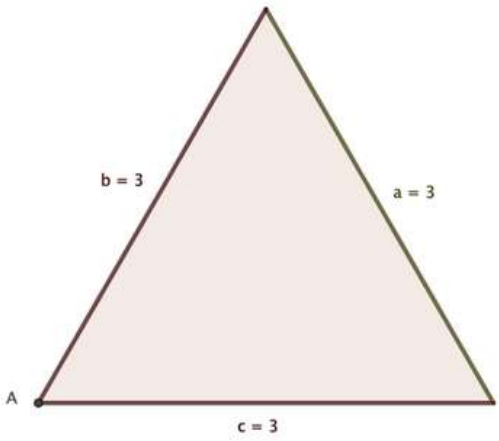
ACTIVITY 8

DEVELOP ACTIVITY

Students must pass several challenges:

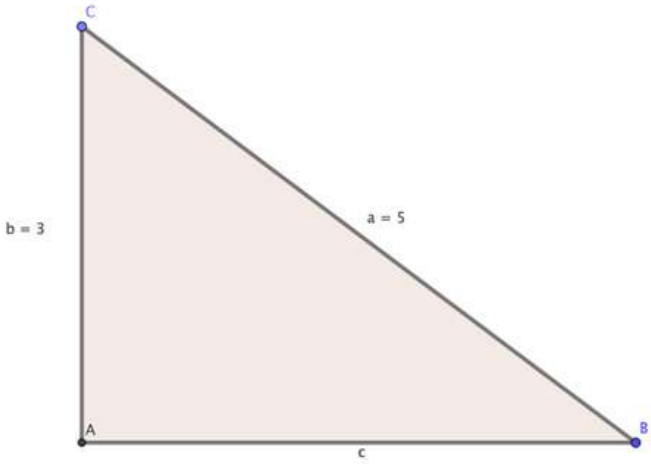
- Challenge 1

In this case, the drone must traverse the edges of an equilateral triangle, like the one in the figure. The student must find out the angle of rotation in each block and use as few programming blocks as possible.



- Challenge 2

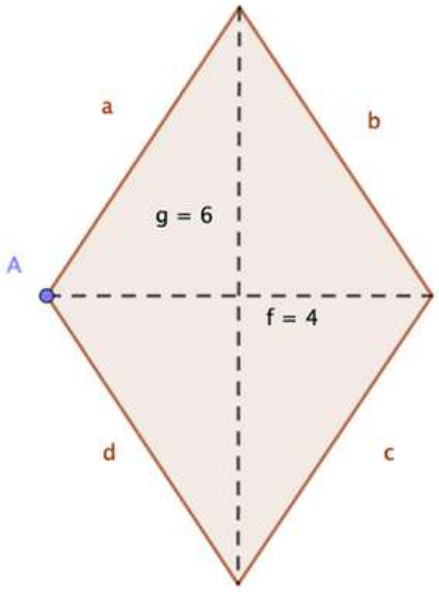
You have to go around this right triangle, starting from any of the vertices. To do this, you have to find out: the cathetus, the three interior angles of the triangle and the angles of rotation at each vertex in order to be able to program the drone correctly.



ACTIVITY 8

- Challenge 3

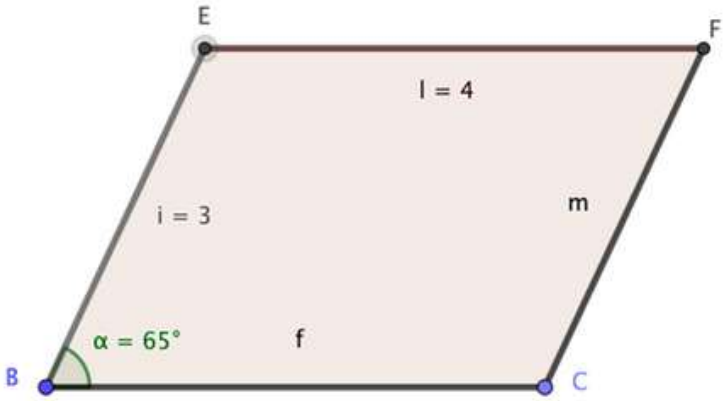
Starting from point A, they must go around the rest of the edges and return to the same vertex in a counterclockwise direction.



Students should find out the measures of the sides of the rhombus, as well as the interior angles and the angles of rotation at each vertex.

- Challenge 4

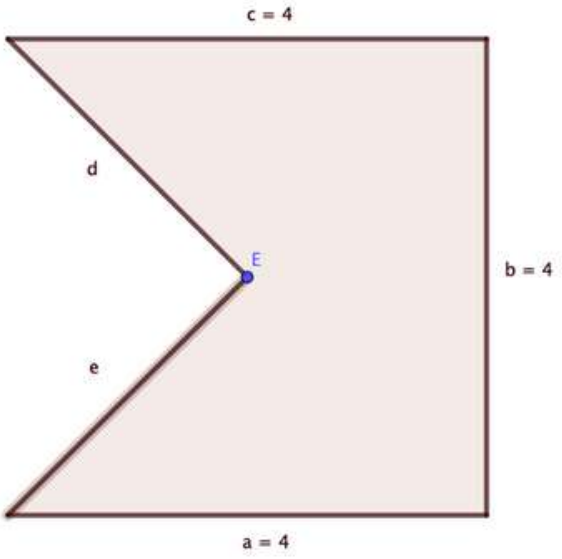
Given the following rhomboid, starting from vertex B, they have to go around its perimeter and return to the same point, going in a counterclockwise direction. The students must find out: the measure of the sides of the rhomboid, the internal angles and the angles of rotation at each vertex.



ACTIVITY 8

- Challenge 5

Starting from vertex E, it must traverse the edges of this pentagon and return to the same point, traversing the figure in a clockwise direction.



The students have to find out the data needed to programme the drone, in this case: the sides e and d, the interior angles and the rotation angles.

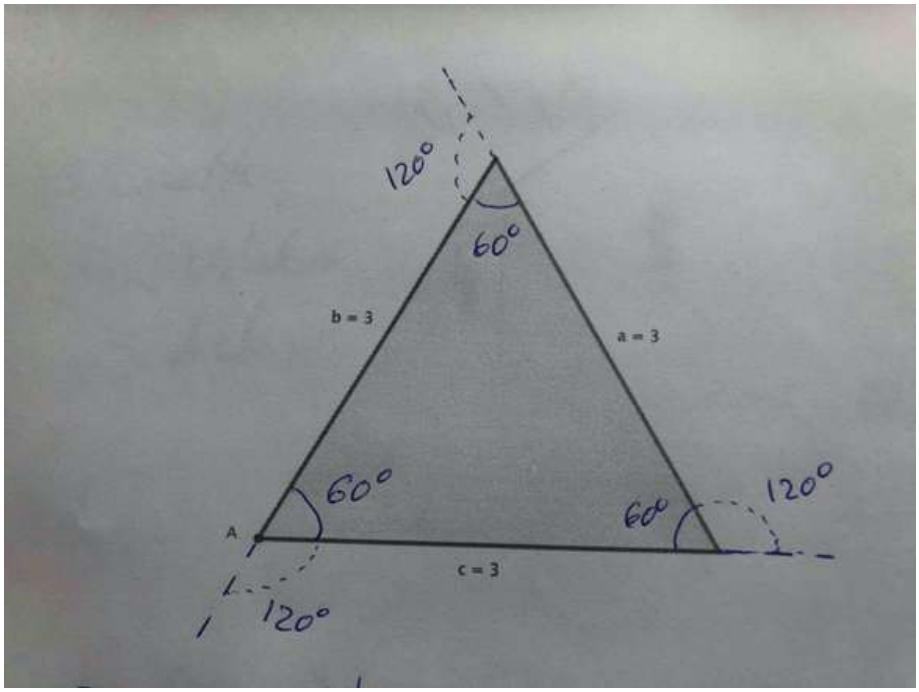
Development of the activity:

For each challenge, students will have to:

1.Find out the data they need to programme the drones, for this they can make a drawing of the figure and simulate the flight, to find out which blocks they need and therefore what data they need to calculate.
2.Programming the drone.
3.Improve the programming, simplifying the programme by introducing repetition.

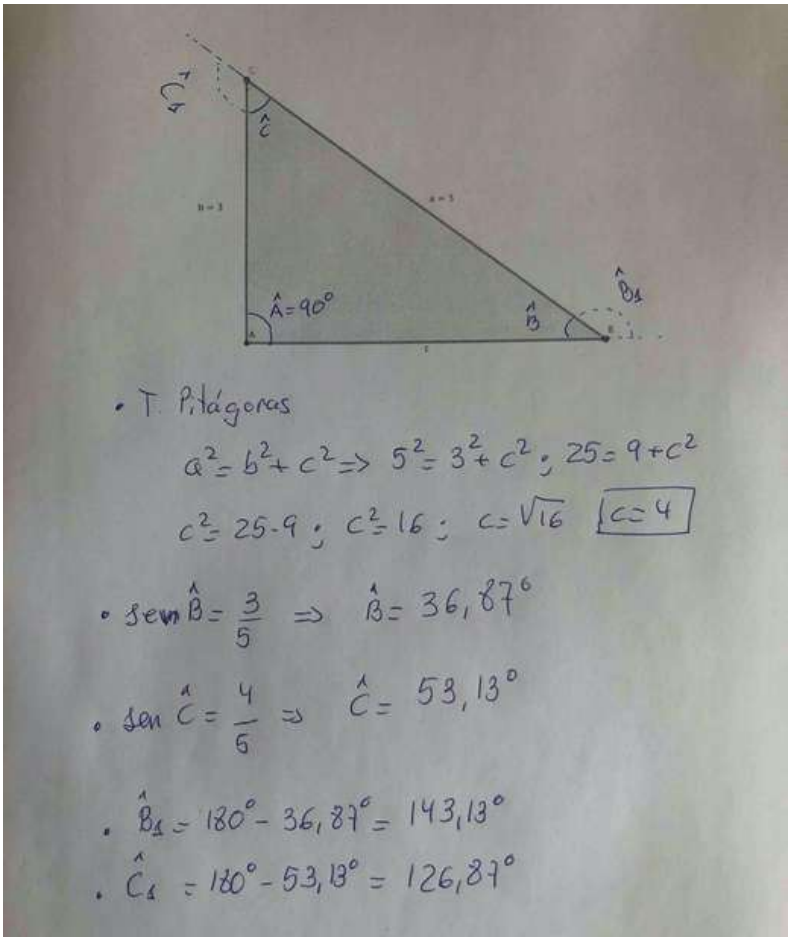
ACTIVITY 8

- Challenge 1



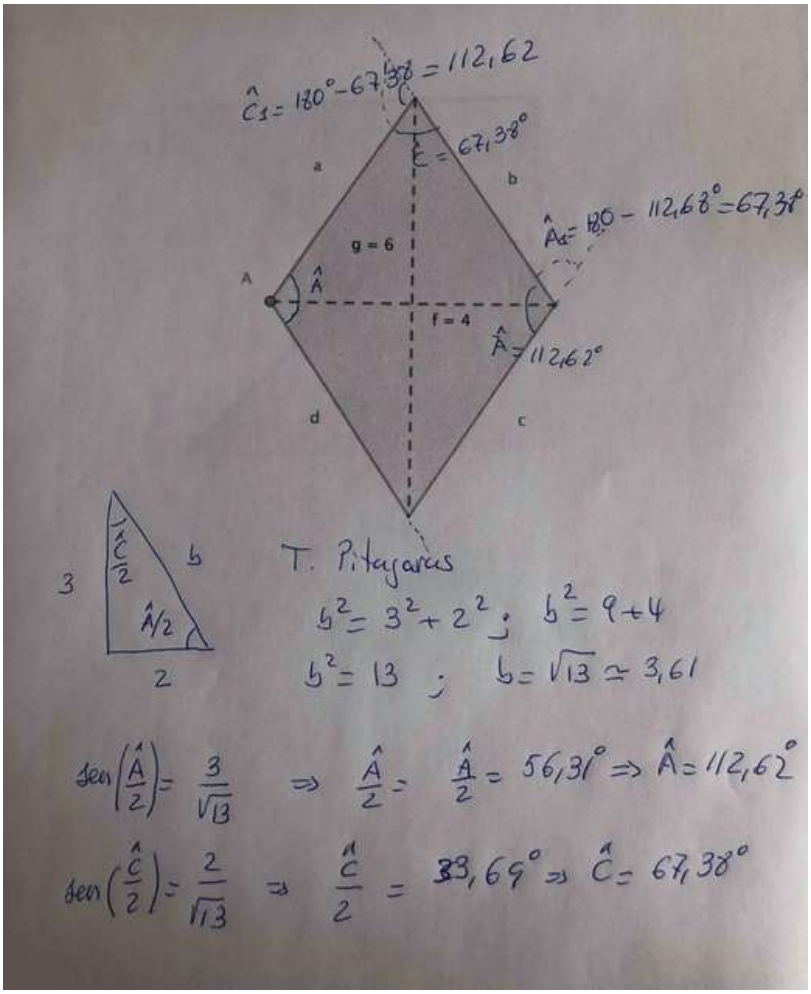
ACTIVITY 8

- Challenge 2



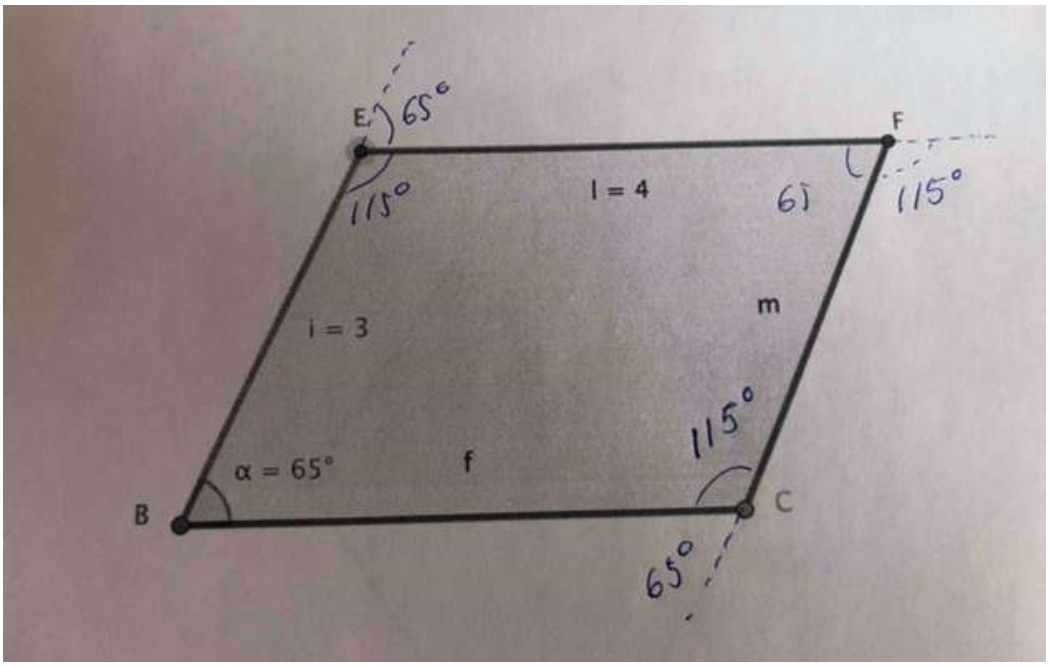
ACTIVITY 8

- Challenge 3



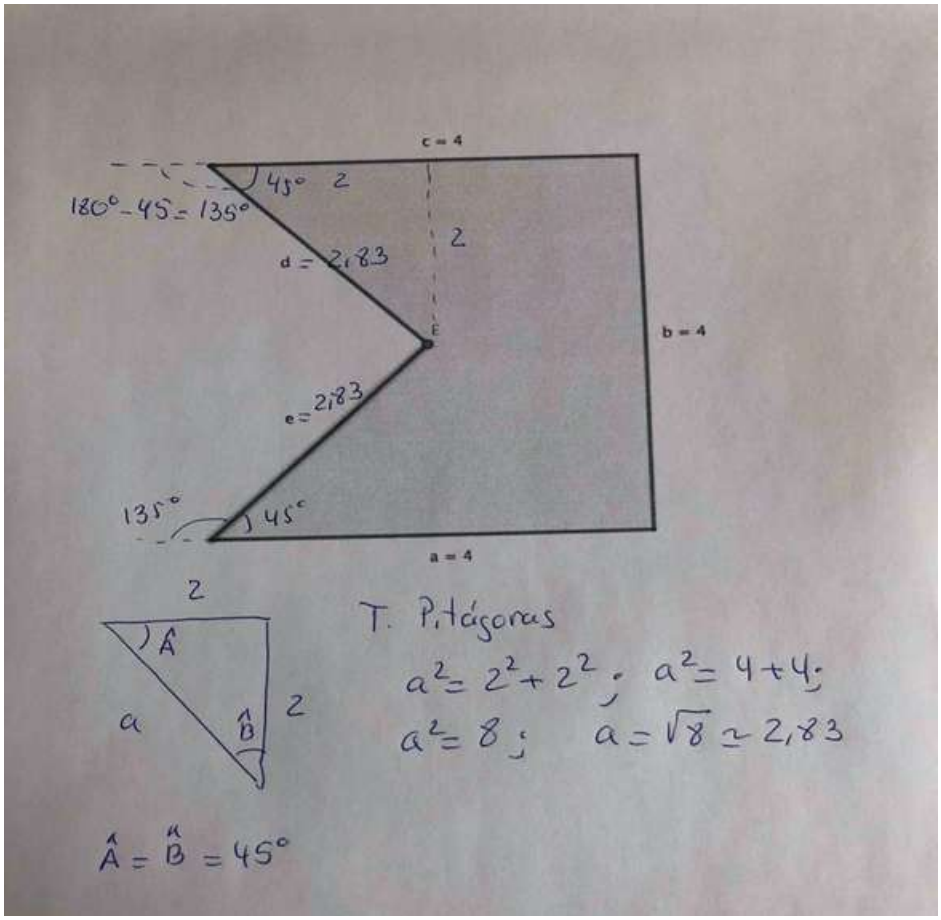
ACTIVITY 8

- Challenge 4



ACTIVITY 8

- Challenge 5



ACTIVITY 8

RESOURCES

STUDENT'S EVALUATION

It will be assessed:

- Collaborative work.
- Resolution of geometric figures.
- Resolution of the challenges.

BIBLIOGRAPHY

https://www.mathsisfun.com/triangle.html
https://www.mathsisfun.com/geometry/supplementary-angles.html
https://www.mathsisfun.com/pythagoras.html
https://www.mathsisfun.com/algebra/trigonometry.html

ACTIVITY 8

SCALABILITY

For lower grades, simpler geometrical figures can be used, and conversely, for higher grades, more computational figures such as solving non-rectangular triangles or other geometrical figures can be introduced.

ACTIVITY 9

TITLE Resquing people from battle zone

ABSTRACT

Our aim in this project; To create a perception of helping innocent people who have been injured in war, who need help or who have to flee the battlefield, by using drones. The drones we will use in the project are mini drones. But we know that rescue Drones, which are mini today, can be developed and scaled up to save people's lives.

AUTHOR/S

Sultantepe Prof. Dr. Cemil Taşçıoğlu Ortaokulu

DATE 27/05/2022

VERSION 1

DIDACTIC OBJECTIVES

- The student knows the social harm of war,
- The student knows the physical and psychological damage of war on people,
- The student knows how to help civilians with the use of technology during the war,
- Equip the drone with materials that can save people in the war environment,
- Knows the required block-based software to remotely control the drone,
- Knows the software to control the Mbot, which represents the vehicle that will bring the human to be rescued to the drone,
- Knows how to print the material to be used in the transport of the people to be rescued with a drone with a 3D printer,
- Knows the necessary magnetization system to establish a connection between the rescue apparatus and the drone

ACTIVITY 9

- [x] SCIENCE
- [x] TECHNOLOGY
- [ ] MATHEMATICS
- [ ] GEOGRAPHY/HISTORY
- [ ] LANGUAGES
- [ ] LITERATURE
- [ ] MUSIC
- [ ] OTHERS .....

EDUCATION LEVEL

This activity is prepared to be completed by...

- [x] 12 - 14 YEARS
- [ ] 14 - 16 YEARS
- [ ] OTHERS .....

TOOLS NEEDED

- 3D printer and filament
- Mbot
- Drone
- Mbot and Drone Software
- Magnetization system
- Mobile device (Tablet or phone)
- Cardboard, Scissors, Glue
- Model soldiers, fences etc.

ACTIVITY 9

DEVELOP ACTIVITY

Part 1: This was perhaps the most difficult point in our study. What is done at the sight is simple, but creating an atmosphere of war, even if it is representative, is something that upsets people.

At this stage, model buildings, roads, fences, etc. are made from cardboard.

Part 2: A sheltered environment is required in which people rescued from war will be transported using Drone. In our project, we solved the problem by printing a cube-shaped structure with a 3D printer.

Part 3: A pole is magnetized on the drone, and the opposite pole on the structure where the people to be rescued will be placed. In this way, when the magnet in the drone is hung down with the help of a rope, it will stick to the structure where the people to be rescued are located.

Part 4: Our Mbot and Drones are managed remotely. Block-based programs are used for this. (Mblok and Tello Edu Applications)

ACTIVITY 9

RESOURCES

ACTIVITY 9

STUDENT'S EVALUATION

Briefly, the areas in which the students will be evaluated;

- To understand the sensitivity of the project theme
- Approach to electronic devices to be used
- Kinetic proficiency when preparing materials to be used
- Contribution to the project while preparing the project environment
- Proficiency in using the applications in the project
- Sufficiency in transferring the project theme to lower level students
- Contribution to the announcement of the project on web pages and social media platforms

ACTIVITY 9

BIBLIOGRAPHY

https://play.google.com/store/apps/details?id=com.wistron.telloeduIN&hl=tr&gl=US (Tello Edu)
https://mblock.makeblock.com/en-us/ (Mblock)
https://drive.google.com/drive/u/0/folders/1s0rEOie6rxTRMDDysogDl1lxuBhqeg5K (Proje Videosu)

https://www.youtube.com/watch?v=L_r2d_hvcz8

SCALABILITY

Our project topic is a universal issue. The key phrase we use is "Peace at home, peace in the world". In this context, it is a subject that can be covered in every age category, from kindergarten to university projects.

If this subject is handled at higher levels, code is written with block or text-based programs, and autonomous control of electronic devices can be achieved.

In our project, we focused on the damage caused by war to people and society. In the advanced version of the study, the damage caused by the war to the historical culture, biodiversity and climate of that region can also be processed.

MORE INFORMATION

The video of the project is available on the youtube channel and google drive. Projects were also shared on social media. You can access it from the links above.

ACTIVITY 10

TITLE Detecting air pollution with drones

ABSTRACT

Ambient air quality is a complex issue that depends on multiple interacting factors related
to emissions coming from energy production and use, transportation, industrial processes, agriculture, and waste and wastewater treatment sectors. It is also impacted by adverse meteorological conditions, pollutants concentrations, their transport and dispersion in the atmosphere, and topographic constraints. Therefore, air pollutants distribution is not uniform and their monitoring at proper temporal and spatial resolution is necessary. The purpose of our activity is to make it possible for a drone to signal the presence of smoke (polluted air) by lighting a light bulb.

AUTHOR/S

Secondary School Maria Rosetti

DATE 20/02/2023

VERSION 1

DIDACTIC OBJECTIVES

In the end of the activity the students will know:
-What is a drone, how does it works
- They will know how to program the drone by seeing the program https://www.youtube.com/watch?v=xifj4KIwuqQ&ab_channel=BenKernohan
- Can edit the working area where the drone

ACTIVITY 10

- [ ] SCIENCE
- [x] TECHNOLOGY
- [ ] MATHEMATICS
- [ ] GEOGRAPHY/HISTORY
- [ ] LANGUAGES
- [ ] LITERATURE
- [ ] MUSIC
- [ ] OTHERS .....

EDUCATION LEVEL

This activity is prepared to be completed by...

- [x] 12 - 14 YEARS
- [ ] 14 - 16 YEARS
- [ ] OTHERS .....

TOOLS NEEDED

- Hearths and bowls of fire
- Fire wood
- Drone
- Bulb attached to a smoke sensor
- Computer

DEVELOP ACTIVITY

We programmed the drone (with Mind+ program) - Download “Mind+“ at http://mindplus.cc.

Flow:

1. The drone initializes and takes off vertically
2. Go forward 5 m - every 50 cm is operated
3. When it detects gas / smoke, the purple light turns on
4. Stop for 10 seconds and rotate 180 degrees
5. Goes back and stops the sensor 50 cm from detection
6. It returns to the base
7. It lands

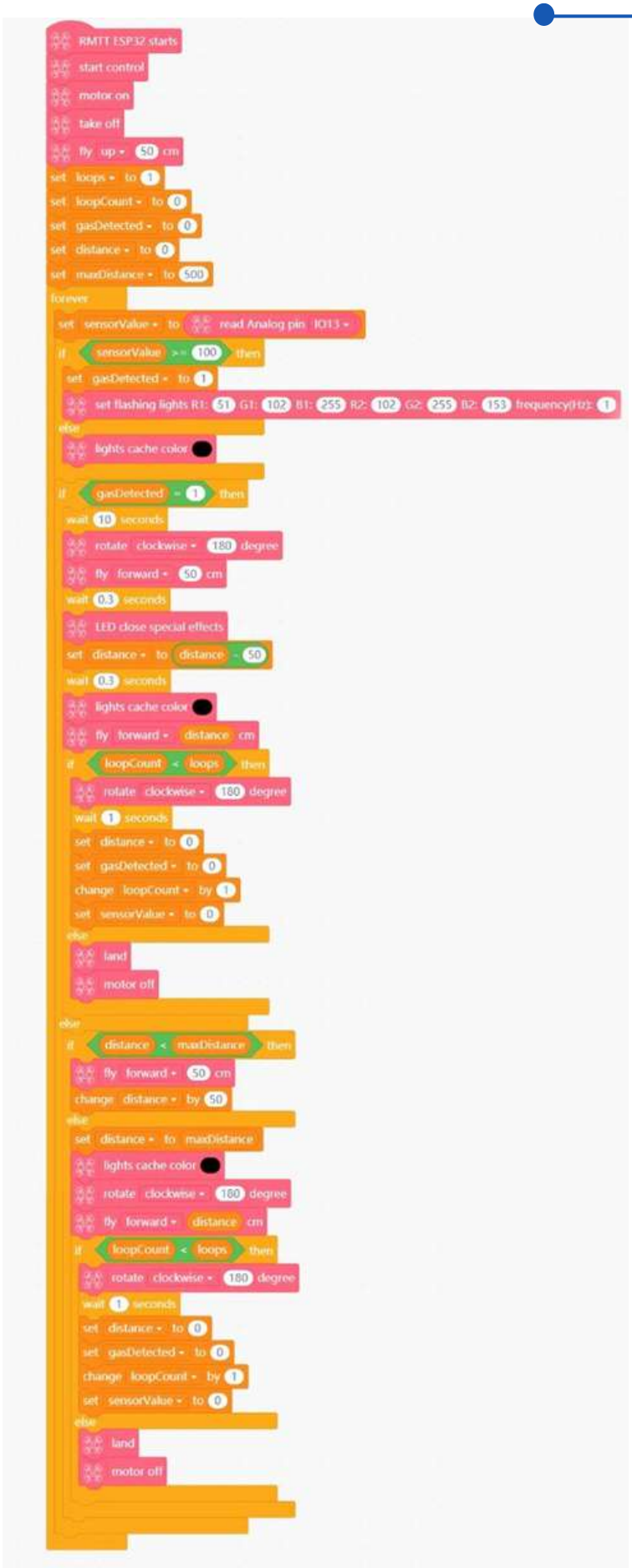
ACTIVITY 10

```
/*!
 * MindPlus
 * telloesp32
 *
 */
#include <RMTT_Libs.h>

// Dynamic variables
volatile float mind_n_loops, mind_n_loopCount, mind_n_gasDetected,
mind_n_distance,
               mind_n_maxDistance, mind_n_sensorValue;
// Create an object
RMTT_Protocol protocol;
RMTT_RGB      tt_rgb;


// Main program start
void setup() {
      Serial1.begin(1000000, 23, 18, SERIAL_8N1);
      tt_rgb.Init();
      led_effect_init();
      protocol.startUntilControl();
      protocol.sendTelloCtrlMsg("motoron");
      protocol.sendTelloCtrlMsg("takeoff");
      protocol.sendTelloCtrlMsg((char *)String(String("up ")+int(50)).c_str());
      mind_n_loops = 0;
      mind_n_loopCount = 0;
      mind_n_gasDetected = 0;
      mind_n_distance = 0;
      mind_n_maxDistance = 500;
}
void loop() {
      mind_n_sensorValue = (analogRead(13));
      if ((mind_n_sensorValue>=200)) {
            mind_n_gasDetected = 1;
            led_effect_blink(51, 102, 255, 102, 255, 153, 1);
      }
      else {
            tt_rgb.SetRGB(0,0,0);
      }
      if ((mind_n_gasDetected==1)) {
            delay(10000);
            protocol.sendTelloCtrlMsg((char *)String(String("cw ")
+int(180)).c_str());
            protocol.sendTelloCtrlMsg((char *)String(String("forward ")
+int(50)).c_str());
            delay(300);
            led_effect_deinit();
            mind_n_distance = (mind_n_distance - 50);
            delay(300);
            tt_rgb.SetRGB(0,0,0);
            protocol.sendTelloCtrlMsg((char *)String(String("forward ")
+int(mind_n_distance)).c_str());
            if ((mind_n_loopCount<mind_n_loops)) {
                  protocol.sendTelloCtrlMsg((char *)String(String("cw ")
+int(180)).c_str());
                  delay(1000);
                  mind_n_distance = 0;
                  mind_n_gasDetected = 0;
                  mind_n_loopCount += 1;
                  mind_n_sensorValue = 0;
```

ACTIVITY 10

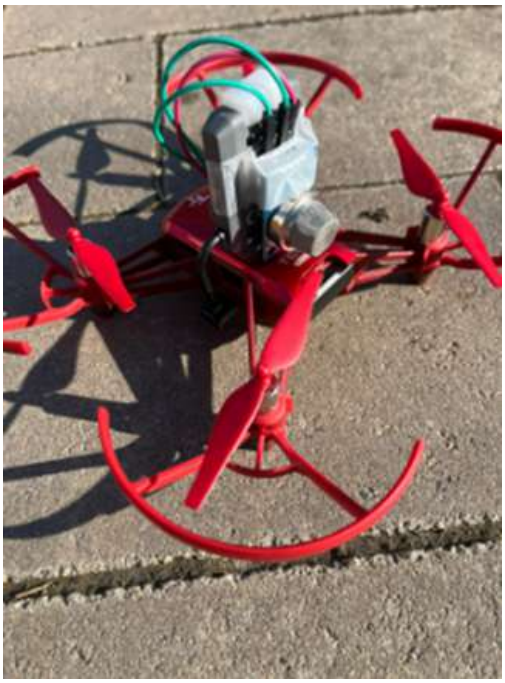
```
	}
	else {
		protocol.sendTelloCtrlMsg("land");

			protocol.sendTelloCtrlMsg("motoroff");
		}
	}
	else {
		if ((mind_n_distance<mind_n_maxDistance)) {
			protocol.sendTelloCtrlMsg((char *)String(String("forward ")
+int(50)).c_str());
			mind_n_distance += 50;
		}
		else {
			mind_n_distance = mind_n_maxDistance;
			tt_rgb.SetRGB(0,0,0);
			protocol.sendTelloCtrlMsg((char *)String(String("cw ")
+int(180)).c_str());
			protocol.sendTelloCtrlMsg((char *)String(String("forward ")
+int(mind_n_distance)).c_str());
			if ((mind_n_loopCount<mind_n_loops)) {
				protocol.sendTelloCtrlMsg((char *)String(String("cw ")
+int(180)).c_str());
				delay(1000);
				mind_n_distance = 0;
				mind_n_gasDetected = 0;
				mind_n_loopCount += 1;
				mind_n_sensorValue = 0;
			}
			else {
				protocol.sendTelloCtrlMsg("land");
				protocol.sendTelloCtrlMsg("motoroff");
			}
		}
	}
}
```

ACTIVITY 10


RMTT ESP32 starts
start control
motor on
take off
fly up 50 cm
set loops to 1
set loopCount to 0
set gasDetected to 0
set distance to 0
set maxDistance to 500
forever
set sensorValue to read Analog pin IO13
if sensorValue >= 100 then
set gasDetected to 1
set flashing lights R1: 51 G1: 102 B1: 255 R2: 102 G2: 255 B2: 153 frequency(Hz): 1
else
lights cache color
if gasDetected = 1 then
wait 10 seconds
rotate clockwise 180 degree
fly forward 50 cm
wait 0.3 seconds
LED close special effects
set distance to distance - 50
wait 0.3 seconds
lights cache color
fly forward distance cm
if loopCount < loops then
rotate clockwise 180 degree
wait 1 seconds
set distance to 0
set gasDetected to 0
change loopCount by 1
set sensorValue to 0
else
land
motor off
else
if distance < maxDistance then
fly forward 50 cm
change distance by 50
else
set distance to maxDistance
lights cache color
rotate clockwise 180 degree
fly forward distance cm
if loopCount < loops then
rotate clockwise 180 degree
wait 1 seconds
set distance to 0
set gasDetected to 0
change loopCount by 1
set sensorValue to 0
else
land
motor off

ACTIVITY 10

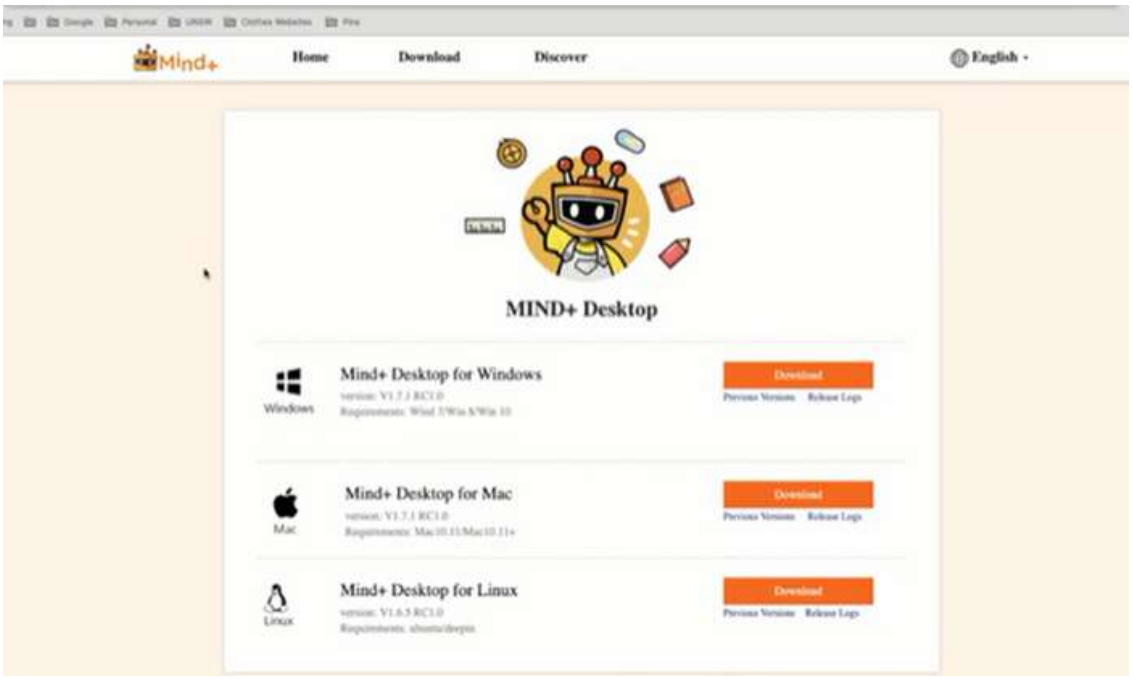
RESOURCES



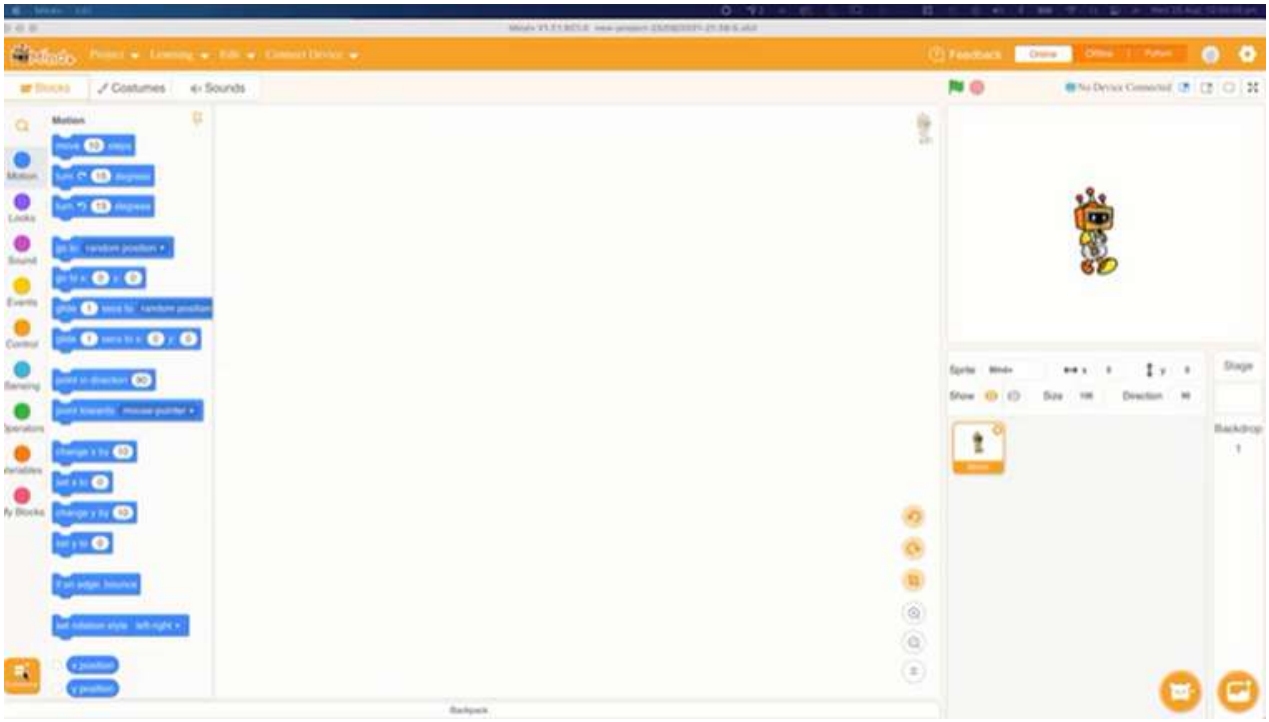
ACTIVITY 10

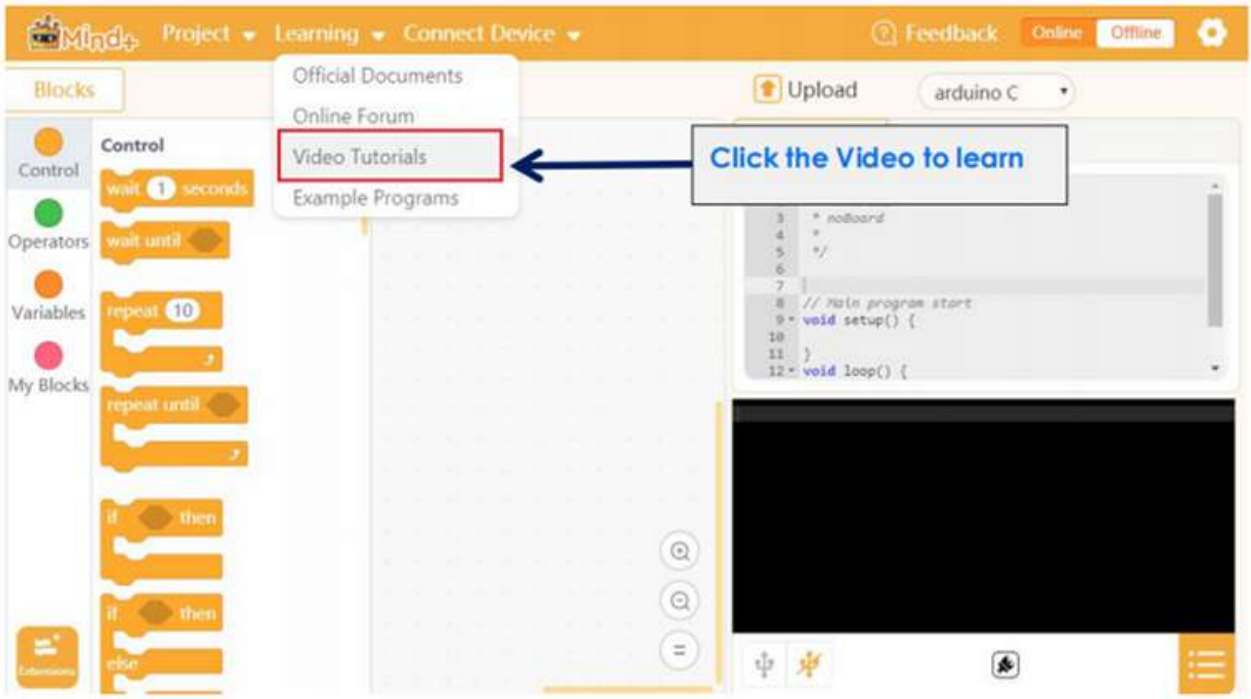

ISTEDV


ISTEDV


Mind+
Home
Download
Discover
English
MIND+ Desktop
Mind+ Desktop for Windows
Windows
Mind+ Desktop for Mac
Mac
Mind+ Desktop for Linux
Linux

ACTIVITY 10




Project
Learning
Connect Device
Feedback
Online
Offline
Official Documents
Online Forum
Video Tutorials
Example Programs
Click the Video to learn
Blocks
Upload
arduino C
Control
Operators
Variables
My Blocks
wait 1 seconds
wait until
repeat 10
repeat until
if then
if then
else

ACTIVITY 10

ACTIVITY 10

STUDENT'S EVALUATION

Theoretical and practical evaluation
1. Can you use Mind+ software for drone?
2. Can you assemble the drone from its parts?
3. Can you do a practical activity?

BIBLIOGRAPHY

https://mindplus.cc/download-en.html
https://edu.dfrobot.com/makelog-308215.html

SCALABILITY

This ACTIVITY can be considered as a beginner level for fifth and sixth grade students.

MORE INFORMATION

https://www.youtube.com/watch?v=xifj4KIwuqQ&ab_channel=BenKernohan