

# DRONE



# STEAM

## DRONES@STEAM

Fostering digital Transformation in VET schools  
and creating new job prospects in the labour market

**Project Result No: 2**

**Activity 4: DRONES@STEAM JOB-SPECIFIC SCENARIOS  
FOR CODING A DRONE**

Scenario 2: Measuring noise and air pollution

Lead partner(s): PIT, RDPSEA



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## CONTEXT

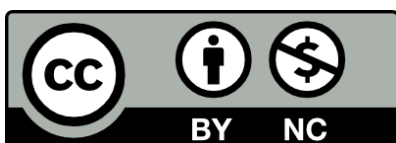
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<https://dronesteam.eu/>

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- Cyprus Computer Society (CCS) - Cyprus
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# Cross-Curricular Scenario 2: Measuring noise and air pollution

## 1 Introduction

Using drones for environmental research has multiple benefits. They can assist in collecting data in remote or hard-to-reach areas, enhance efficiency by quickly analysing and mapping environmental conditions and save costs by reducing the need for expensive and labour-intensive fieldwork. Drones can also provide precise and high-resolution data, detect environmental changes and issues early on and be equipped with various sensors to measure air quality, temperature, water quality and more.



## 2 The need

Recently, a heavy vehicle logistics company has moved to a warehouse near the neighbourhood where our school is located. The constant flow of heavy trucks is starting to have an impact on the environment: dirt, dust, exhaust gases, heat, etc.

The noise and commotion caused by the heavy trucks passing through the streets of the neighbourhood have become a nuisance for the local residents, especially for those living closest to the warehouse. Some residents have reported feeling anxious and stressed due to the constant noise and vibration caused by the trucks.

The neighbourhood associations have taken notice of the situation and have started to collect signatures for a petition to be presented to the city council. They argue that redirecting the trucks' access route through the bypass road would not only reduce the environmental impact but also improve the quality of life of the residents.

Meanwhile, the school sees an opportunity to involve the students in a practical project that combines technology, education and environmental awareness. The idea of using a drone to measure the environmental impact of the truck traffic is received with enthusiasm by both teachers and students.

The students will have to work together to equip the drone with sensors to measure the levels of dust, noise and air pollution caused by the trucks. They also plan to create a report of the data collected, which will be presented to the city council along with the petition.

## 2.1 Key terms

| Environmental Impact | Environmental Awareness | Drone Technology | VET Students | Community Service |

## 3 Objectives and Expected Learning outcomes

- Stimulate the interest of students in drone technology.
- Identification and description of the environmental impact of heavy truck traffic on a residential area
- Provide students with a practical opportunity to combine technology, education and environmental awareness through the use of a drone.
- Knowledge of drone technology and its potential applications in environmental research
- Development of skills in data collection, analysis and interpretation using various sensors and tools
- Increased confidence in applying knowledge and skills to real-world problems
- Promotion of civic engagement by involving students in a community initiative
- Encourage students to develop critical thinking and problem-solving skills by designing and implementing a plan to measure the environmental impact of truck traffic in a residential area

## 4 Prerequisites

- Knowledge of the pre-mentioned guided lesson plans in Drones
- Basic knowledge on environmental quality indicators
- Basic IT knowledge

## 5 Cross-curricular interactions

This challenge-based scenario provides the opportunity for teachers and students from different areas of vocational education to get involved. For example, areas such as **Environmental Science** have a direct connection, since students can use their knowledge of environmental science to identify the types of pollutants emitted by heavy vehicles and their effects on the environment and human health.

The **IT** sector can also be involved in the script, helping with the processing of the data collected through the various inputs from the drone. They could even design a software application to act as a human-drone interface.

Students from different sectors of vocational education can work in groups of 2 - 4 persons. The way of interaction in this scenario is direct, promoting cooperation and exchange of information between the involved groups.

## 6 Implementation steps

To help you in this process, we provide you with some steps you can follow to carry out your project. The parentheses refer to the estimated time that may be required in each implementation phase, focusing on the programming and piloting of the educational drone.

### 6.1 Time distribution

The duration of this open-ended challenge-based scenario can vary depending on the depth of approach by students and teachers. Taking 2-4 hours per week, it will probably take 4-6 weeks before the presentation takes place.

### 6.2 Step 1: Familiarization with the Problem (1 hour)

- Through group discussion, develop an in-depth understanding of environmental sustainability and the consequences of human activities on the environment.
- Foster awareness and critical thinking skills among students regarding the environmental impact of the truck traffic.

### 6.3 Step 2: Research and Design (3 hours)

- Research about the existing environmental regulations and standards.
- Identify the streets in the neighbourhood that are more affected by heavy traffic.
- Select specific locations within the area and on the bypass road for measurement of noise, air pollution and dust levels.
- Conduct a thorough review of available sensor technologies and associated components to determine the feasibility of building sensors within the school premises.
- Evaluate the functionality and suitability of different sensors for the drone project, and select the appropriate sensors for the measurements.

### 6.4 Step 3: Build and Test (4 hours)

- Assemble and equip the drone with sensors for measuring dust, noise and air pollution levels.
- Develop and program the drone for efficient data collection and analysis, including camera, sensor routes, and flight paths.
- Test the drone and sensors to ensure optimal functionality.
- Conduct multiple tests over a period of time, including peak and non-peak traffic hours and weekends.

### 6.5 Step 4: Data Analysis (2 hours)

- Process and analyse the collected data to quantify the impact of heavy truck traffic on the environment.
- Compare and contrast the measurements obtained on workdays, non-workdays and weekends to investigate the direct effects of the truck traffic.
- Evaluate the collected data against existing environmental regulations and standards to determine compliance.

### 6.6 Step 6: Presentation of Findings and Recommendations (2 hours)

- Compile and present a comprehensive report to the city council highlighting the adverse effects of heavy truck traffic on the environment and the resident’s quality of life.
- Develop flyers and educational materials for distribution to the neighbourhood associations and community, raising awareness about the environmental impacts of heavy truck traffic.
- Propose recommendations to address the issue, such as redirecting the truck route, implementing more stringent regulations for heavy vehicle traffic, or incentivizing the use of cleaner and quieter trucks.
- Collaborate with local authorities, neighbourhood associations, and other stakeholders to promote environmental sustainability and reduce the impact of heavy truck traffic on the community.

## 7 Reflection, Feedback and scenario evaluation

To get valuable feedback on this scenario, we can implement a brief questionnaire, the answers to which will be a topic of discussion with students. The final evaluation must be correlated to the degree of students' satisfaction with the results of the project, in combination with their initial assessments.

### Indicative Questionnaire

1. In which team did you participate?  
 Team-1                       Team-2                       Team-3                       Team-4
2. Do you think that this scenario enhanced your knowledge and skills?  
 Definitely                       In most cases                       Not sure                       Not at all
3. Do you think that this scenario met your personal motivations/criteria?  
 Definitely                       In most cases                       Not sure                       Not at all
4. Was there enough time to fulfill your goals?  
 Yes                       No, I needed more time

5. What problems did you face and how did you overcome them?  
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6. What did you like most?

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7. What did you like least?

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8. What would you suggest for the optimisation of the scenario and the process of its implementation?

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9. What would you like to be your next goal?

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## 8 Scenario expansion

This educational scenario can easily be the basis for expanding the educational process, as it is oriented towards principles and techniques that promote the dynamic development of the students.

**Collaborate with the heavy vehicle logistics company:** The school could reach out to the logistics company and propose a collaboration to reduce the environmental impact of their operations. This could include working together developing a plan to reduce the number of heavy trucks passing through the neighbourhood or supporting the logistics company to comply with environmental regulations.



**Develop an educational program on environmental awareness:** for the students and local residents on the impact of human activity on the environment, the importance of reducing pollution, and ways to reduce their environmental footprint. This could include workshops, seminars, and field trips to raise awareness and encourage people to take action.

**Create an online platform for data sharing:** the data collected with the drone could be shared with other schools, researchers, and environmental organizations. This could help to raise awareness about the impact of heavy truck traffic on the environment and encourage other communities to take action.