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 **MONI.CA**

**Padua and online, December 5, 2024**

# Introduction

The MONI.CA project aims to address air pollution issues in the Adriatic region through innovative air quality monitoring solutions. It involves cross-border collaboration between Italy and Croatia, focusing on urban areas to improve public health and environmental protection.



# Innovative Air Quality Monitoring

Introduction of advanced UAV technology for air quality monitoring.

Utilization of solar glider and drones equipped with sensors.

Measurement of various pollutants over some area.



# UAV used in experiment: Glider

Glider has wingspan of 5m

Solar panels and single motor

Mounted sensor system:

- PM2.5, P10
- UV index
- CO
- H2
- Temperature and Humidity
- Latitude and longitude
- SD card for data logging
- Wifi connection
- Using phone hotspot



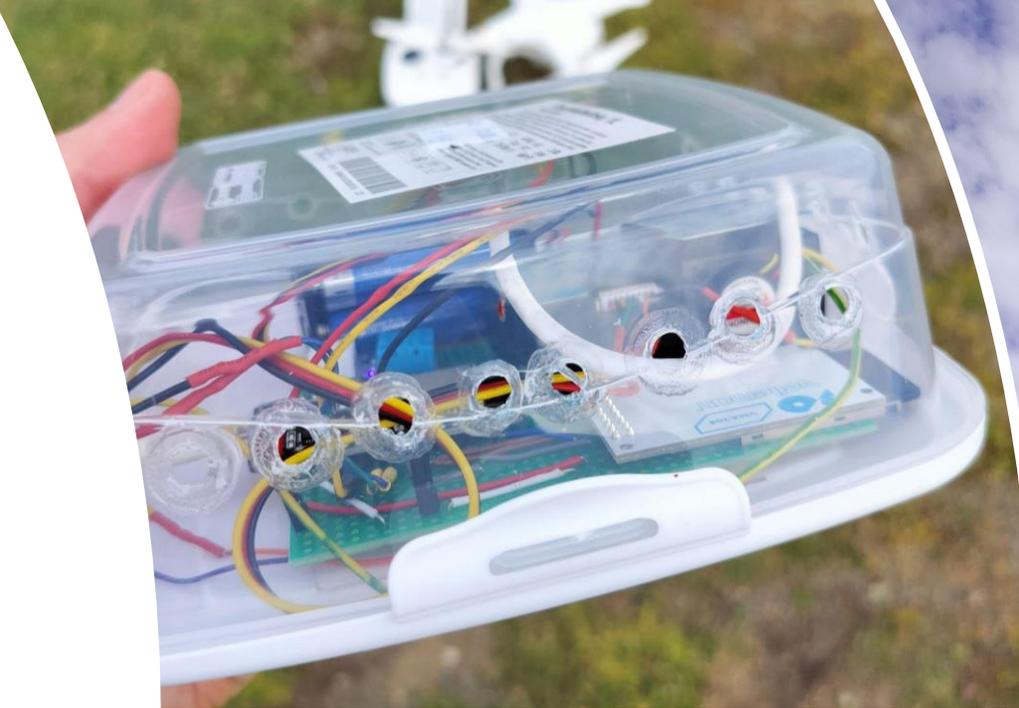
UAV used in  
experiment:  
Quadcopter

Commercial drone: DJI  
Phantom 3 Professional

Removed camera and  
gimbal

Mounted sensor system

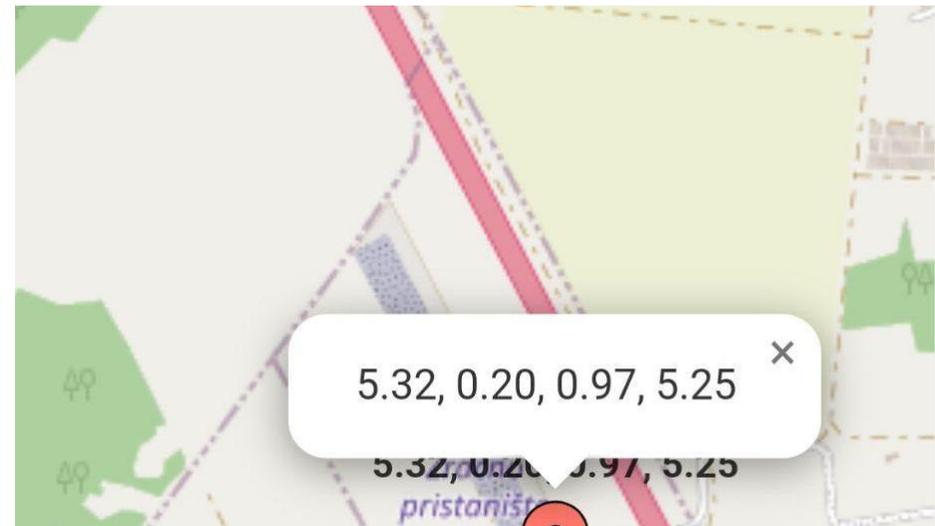
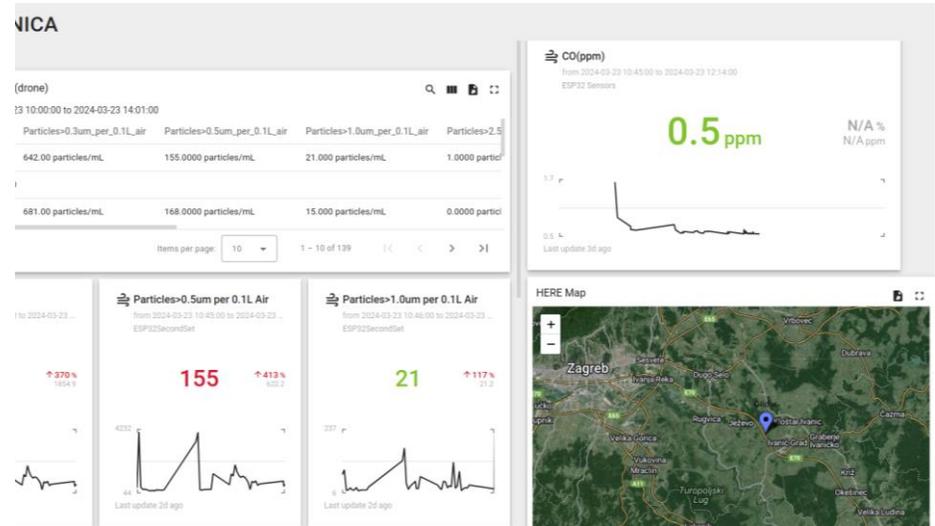
- PM10, PM2.5 and PM1.0  
in PPM
- Humidity and temperature
- SD card for data logging
- Wifi connection
- Using phone hotspot

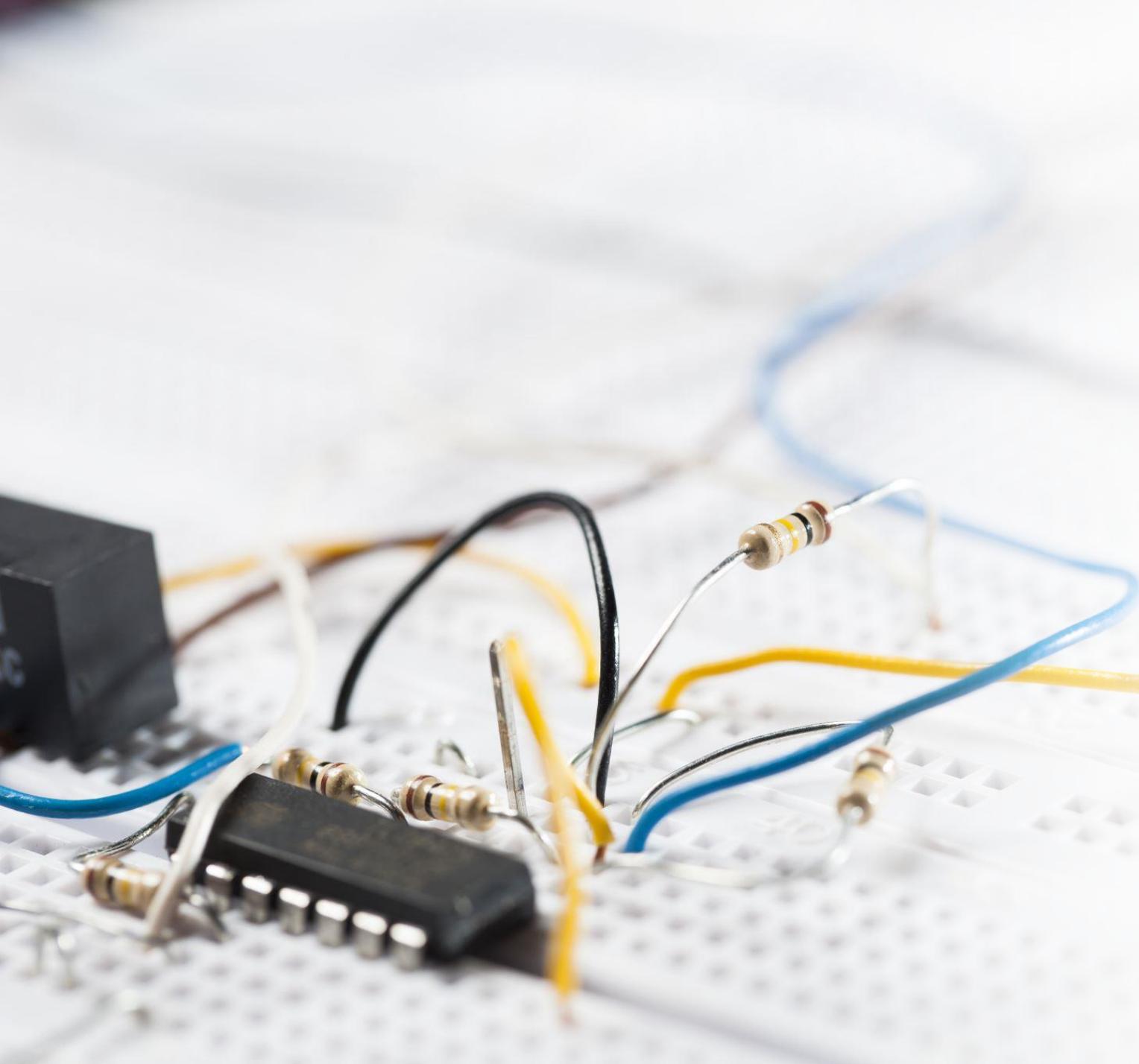


# UAVs used in experiment

Both drones logged sensor data on their SD card

Additionally, as they were passing by, they connected on hotspot and data on server which we observed in real time





# Cost-Effective and Adaptable Solution

UAV-based system offers a low-cost, energy-efficient alternative to static monitoring stations.

Provides a flexible and mobile solution for air quality monitoring.

Can be deployed as needed, reducing the need for permanent infrastructure.

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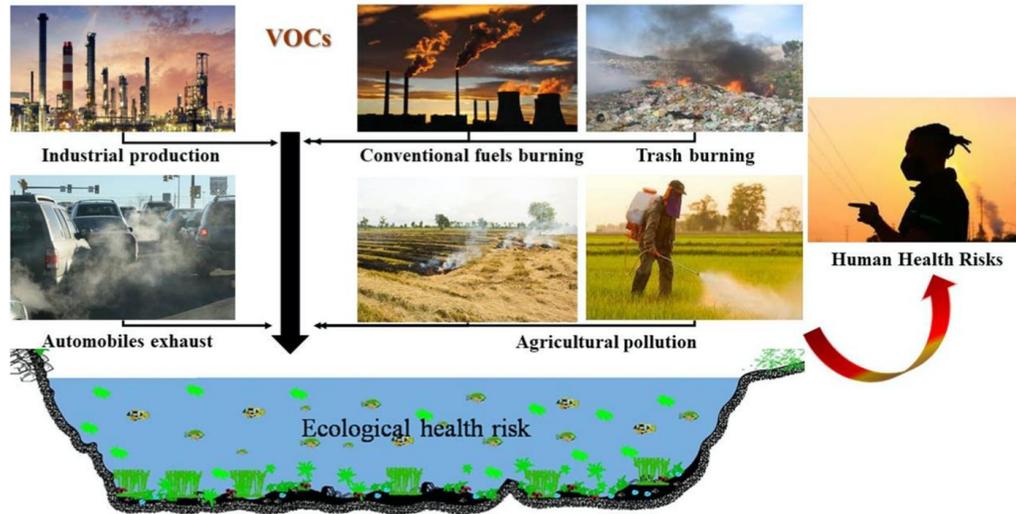
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 **MONI.CA**

**Example of how simple-to-use tools can activate youth in  
local communities**

- 1° **Health risks** of air pollution
- 2° Define **threshold values** for real time data measured with the UAVs
- 3° **Data visualization** and **3D model**
- 4° **Alerting system**

## Volatile Organic Compounds - VOCs



From *Davide & Niculescu 2021*

Breathing VOCs can **irritate the eyes, nose and throat**, can cause **difficulty breathing and nausea**, and can **damage the central nervous system** and other organs. Some VOCs can **cause cancer**. They also **contribute to O<sub>3</sub> formation**.

## Particulate matter (PM)



PM<sub>10</sub> deposit in the higher lung system  
 PM<sub>2.5</sub> can enter the lung function  
 PM<sub>1.0</sub> can enter the bloodstream through alveoli  
 IARC - Group 1  
*Saju et al., 2023*

## Carbon monoxide - CO



In outdoor environments its concentration is **correlated to fires**.  
 When inhaled it can bind haemoglobin and **block the transport of O<sub>2</sub>** through the bloodstream



## MODERATE RISK ALERT

Moderate Risk Alert: Air Quality  
Advisory External Inbox 

 **no-reply** 8:33PM    
to ▾

The current Air Quality Index (AQI) indicates moderate air pollution levels. Individuals with respiratory conditions are advised to minimize outdoor activities. If outdoor exposure is necessary, please ensure you wear appropriate personal protective equipment (PPE), such as an FFP2 mask. You will receive further notification once air quality returns to normal levels.

## HAZARDOUS RISK ALERT

High Risk Alert: Air Quality  
Advisory External Inbox 

 **no-reply** 8:36PM    
to ▾

The Air Quality Index (AQI) has reached hazardous levels. All residents are strongly advised to refrain from outdoor activities. If going outdoors is unavoidable, please use suitable personal protective equipment (PPE), such as an FFP2 mask. You will be notified when air quality conditions improve.

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