TÉCNICO LISBOA

# SENTINEL
## ANTI-DRONE DETECTION SYSTEM

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## I. PROBLEM DEFINITION

With the rapid growth of the drone industry, the misuse of drones is also on the rise, posing significant threats to public safety. These issues are expected to become increasingly common affecting a large portion of the population.

With the evolution of technology and the increasing complexity of drones, it is necessary to develop and design fast and effective solutions to detect and identify these threats.

## II. EXISTING SOLUTIONS

### 1.RADAR DETECTION SYSTEMS

This systems detect drones by movement in the airspace, but may have difficulty with small objects

### 2. ACOUSTIC SENSORS

Acoustic sensors detect drones by capturing and analyzing their sound signatures, even when they're not visible.

### 3. NEUTRALIZATION SOLUTIONS

Signal blocking systems disrupt drone communications by emitting interfering radio waves or taking control via network capture.

## III. OUR SOLUTION

Our prototype uses smart drone detection, a rotating camera, and real-time tracking. It operates in three distinct modes:

### SWEEPING
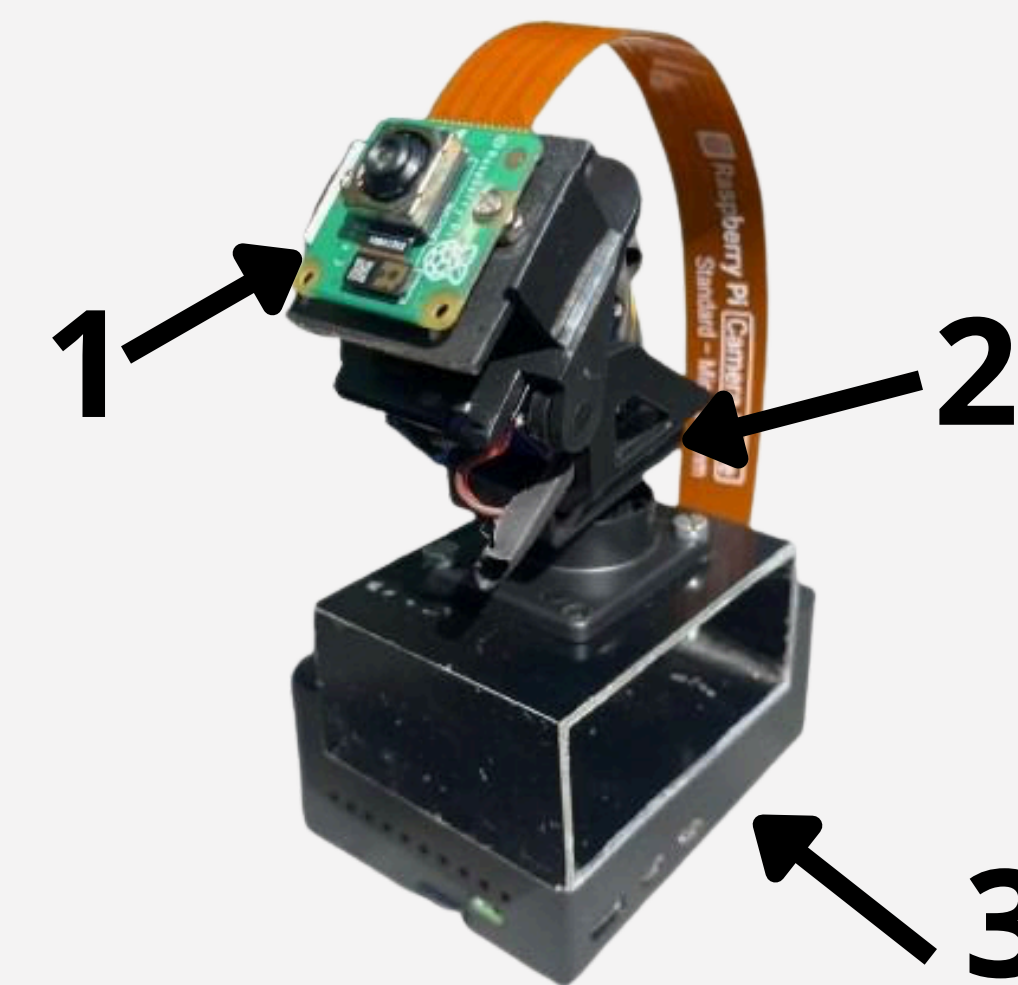The camera continuously pans ("sweeps")the sky in defined increments

### DETECTION
Detects drones via our real-time image detection neural network

### TRACKING
The dual-rotor mount follows the drone's movements to keep it centered

### CAPTION:

1- Camera Module

2- Rotors support

3- Metal case:
-Raspberry Pi 5
-Ai accelerator

This section below covers the functionality of our final prototype and the key steps required

### 1. MACHINE LEARNING

We trained a neural network with over 50000 images to detect and classify drones in real time.
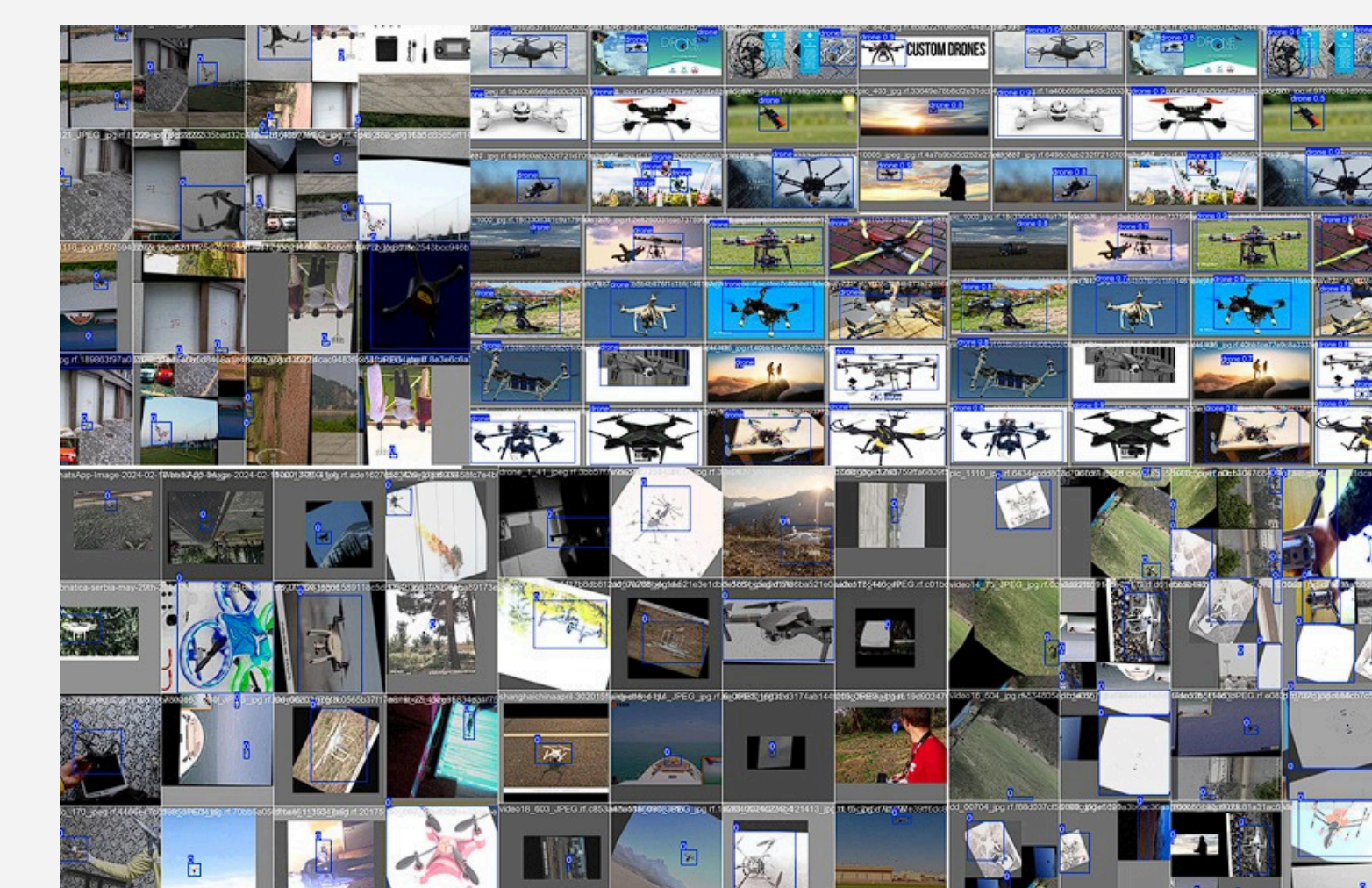
### 2. ROTATING CAMERA

The motorized base allows 360° camera movement to track targets dynamically. (0º-180º H / 0º-90º V)

### 3. DYNAMIC TRACKING

The system follows detected drones automatically, adjusting the camera angle continuously.
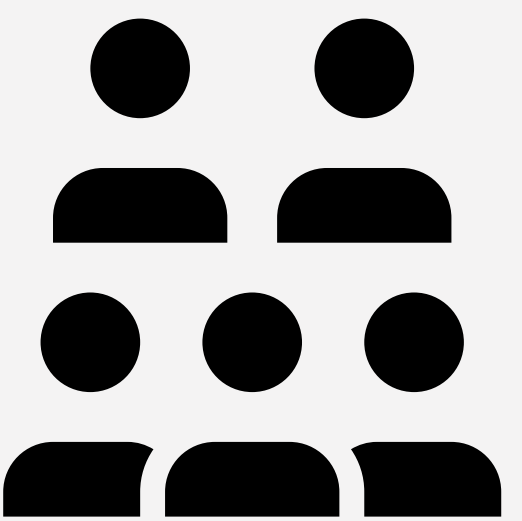
### 4. DASHBOARD WEB

A live dashboard displays tracking data and alerts for user monitoring and control.

## IV. TARGET AUDIENCE

Our target audience consists of security companies that utilize surveillance cameras, enabling us to seamlessly integrate our system with their existing camera infrastructure.
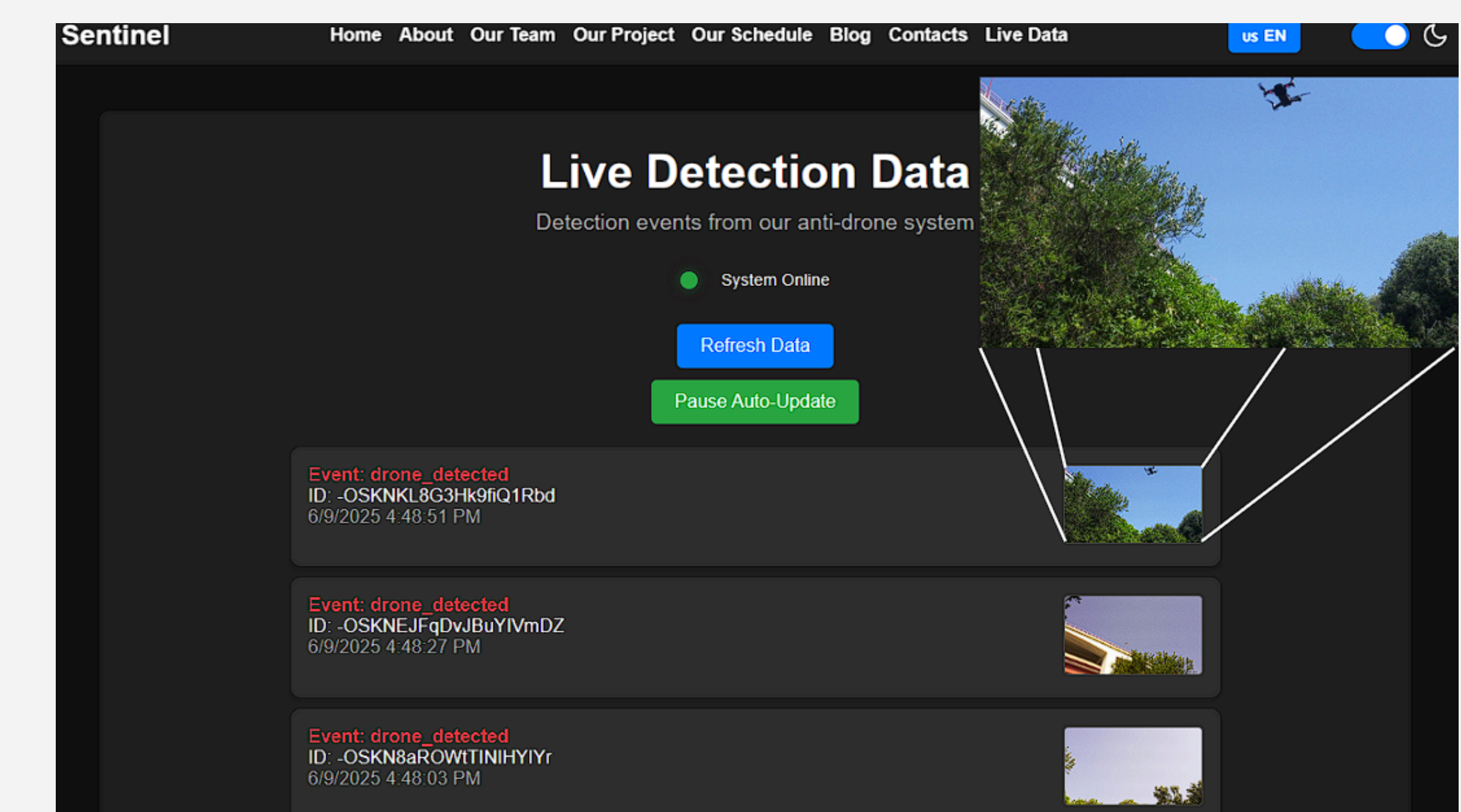
## V. BENEFITS

### 1. AUTONOMOUS

Our system operates independently, detecting, identifying and tracking drones in real time, without the need for constant human intervention.

### 2. HIGHLY SCALABLE

The solution can be easily expanded to cover larger areas or integrated into existing security infrastructures.

### 3. SCALABILITY & FUTURE INTEGRATION

System architecture allows integration of jamming modules in the future. Camera tracking mechanism enables precise targeting of drones with potential RF neutralization systems.

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**Live Detection Data**
Detection events from our anti-drone system

System Online

Refresh Data
Pause Auto-Update

Event: drone_detected
ID.:-OSKNKL8G3Hk9llQ1Rbd
6/9/2025 4:48:51 PM

Event: drone_detected
ID.:-OSKNEJFqDvJBuYlVmDZ
6/9/2025 4:48:27 PM

Event: drone_detected
ID.:-OSKN8aROWtTlNlHYlYr
6/9/2025 4:48:03 PM

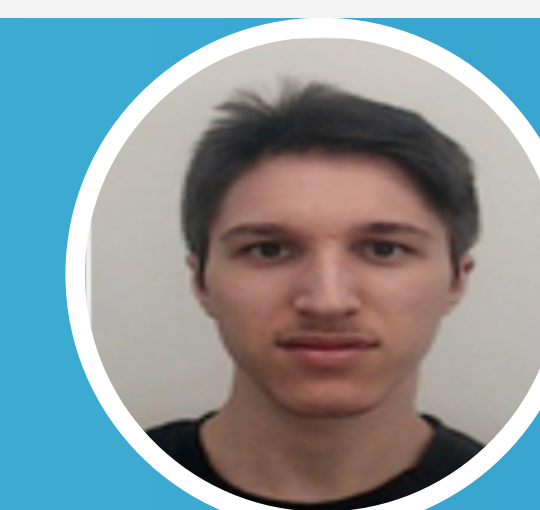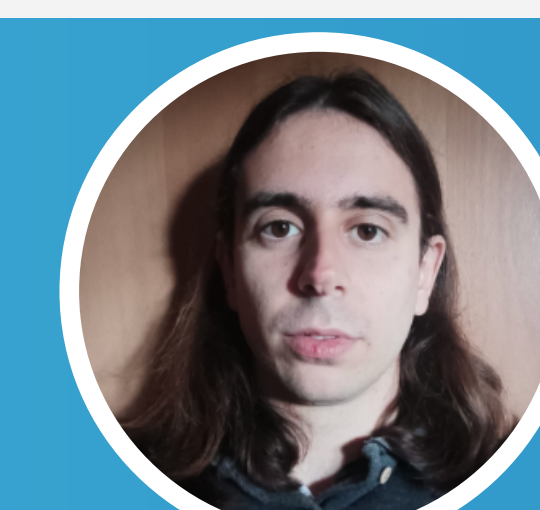OUR TEAM:
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VISIT US!