



## **TH - SENSOR GUARD**

Advanced People Counting System  
for Hash Environments

*Developed as a Master's Thesis  
Project in collaboration with*



**POLITECNICO  
MILANO 1863**



## The Project

Originally developed as a Master's Thesis in Design & Engineering at the Politecnico di Milano, TH-Sensor Guard is an advanced solution for organizations responsible for territory management (CAI, SAT, ERSAF) and the monitoring of people flows in restricted environments.



## The Challenge

The core innovation lies in the integration of DLP technology (additive manufacturing) into an outdoor system. The result is based on a rigorous analysis of materials, tolerances, and mechanical properties, aimed at overcoming the limitations of existing solutions: costly maintenance, poor portability, and vulnerability to vandalism.

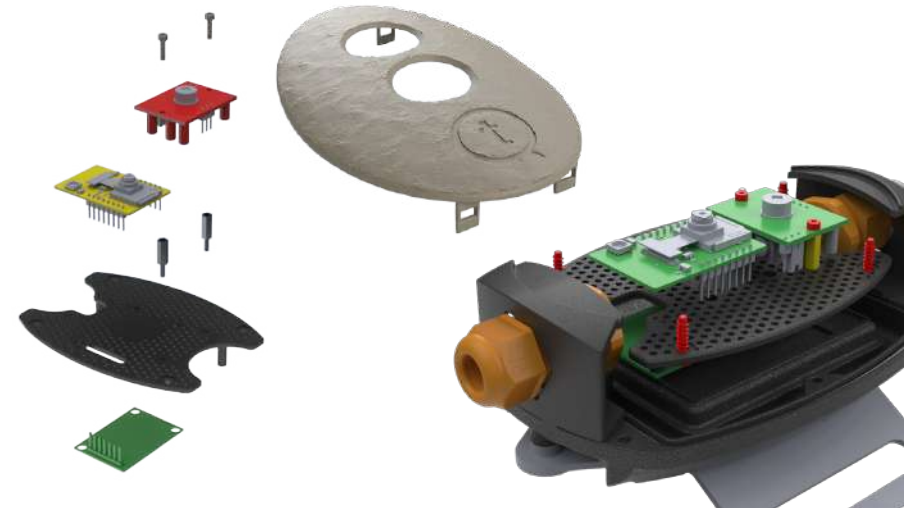


## Requirements

- DLP enclosure with IP66/IP67 protection rating and IK08 impact resistance.
- Security Core: Integrated mechanical anti-vandalism systems.
- Smart Design: Ultra-compact dimensions for maximum portability and easy installation.

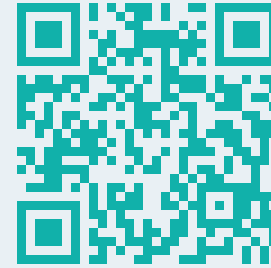


Key Challenges	Solutions
<p><b>Large Footprint</b> Bulky systems with transportation limited to 1-2 units.</p>	<p><b>Ultra-Compact Design</b> Pocket-sized design; up to 5 units can be carried in a single backpack.</p>
<p><b>Vandalism</b> Visible and vulnerable systems exposed to theft and tampering.</p>	<p><b>Security Design</b> Concealed screws and camouflage covers (Rock/Wood finishes).</p>
<p><b>Durability</b> Material degradation caused by UV exposure and extreme temperatures.</p>	<p><b>Advanced Materials</b> IP66/IP67 protection and IK08 impact resistance.</p>
<p><b>Dati &amp; Privacy</b> Counting inaccuracies and privacy-related concerns.</p>	<p><b>Edge AI</b> On-device AI-based human/animal detection with automatic image deletion.</p>
<p><b>Hardware Engineering Challenge</b> Development of an enclosure optimized for wiring management and technical compatibility.</p>	<p><b>Board System Integration</b> Electronic system analysis and integration to maximize efficiency and internal compatibility.</p>
<p><b>Maintenance</b> Costly servicing and complex technical interventions.</p>	<p><b>User-Friendly</b> Simplified architecture enabling DIY battery replacement.</p>





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