SmartPrevent

Collaborative Project

FP7 - 606952

D3.11 Sensor System Requirements Report

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Reviewer: Treelogic and VSL

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Abstract

This deliverable describes the requirements of the SmartPrevent sensor system, including image/video acquisition, embedded analytics, communication, interfaces, software, and algorithm embedding. The visual sensor is a core component of the SmartPrevent [1] project. It is the front end of the system and is in charge of interpreting the activity occurring in an observed scene and describing it in digital format using a low bandwidth protocol. This digital scene-description data provided to the backend system allows it to identify “irregular”, potentially criminal events in real-time, and to alert the relevant first responders (police, emergency etc.). In SmartPrevent, the sensor system has to fulfil a challenging set of requirements including easy installation, secure communication, low false alarm rate and high probability of detection (PoD), and, the most important point, respect for citizens’ privacy in both the ethical and legal aspects. The SmartPrevent project attempts to show that such a system is possible. This document describes the requirements of the sensor system of the SmartPrevent project. In a commercial product, additional requirements may be required, such as low price and resilience to environmental conditions and human actions.

Executive summary

This requirements document is the main source for the sensor system design and its interaction with the other SmartPrevent system components. We focus on the visual sensors system, as the main platform for implementing the main objectives of the project. Special attention is dedicated to the ability to have analysis algorithms embedded into the sensor. This is in contrast with most of the architectural approaches common today, where a video camera broadcasts live streaming video to the backend where the video is stored (almost always) and analysed (in a small percent of cases). This traditional approach would invariably result in high infrastructure costs for transmitting and analysing the video, and include a centralized server farm that could become cost and complexity prohibitive, as well as energy hungry. The approach of embedding analysis algorithms into the visual sensor carries the promise of a low-cost, easy to install sensor network with low dependence on infrastructure (power supply, night illumination and bandwidth), which are usually the most complex and expensive components of any visual sensor system. Here, EVS provides algorithm-developing partners of SmartPrevent (Treelogic, QMUL and Vision Semantics) with the image acquisition, analysis and communication platform onto which they can introduce, test and deploy their algorithms. The current visual sensors, the WiseEye 2.4 has the capability to identify (in real-time) and detect an entrance of object to the field of view in outdoor environment, while able to screen out most of the background changes such as illumination changes and sparkling, rain, snow, moving trees etc., and limited ability to screen out small objects. While doing this (which is not trivial), the WiseEye 2.4 doesn't provide any interpretation of the scene itself, and thus very limited in identifying the public use cases which are the main objective of the SmartPrevent project. This document defines and describes the requirements from (of?) the visual sensors system to enable adding the algorithms that are developed by other partners of the project, algorithms which will make the system of tens or hundreds sensors "Smart". This will require also the algorithm designers to optimize the algorithms to the performance parameters of the sensor – mainly low resolution, medium processing power, and a specific, embedded processor (Freescale IMX53).

It is important to note that the system developed here is inherently respectful of citizens' privacy beyond anything offered today by video surveillance systems. This is because a) the high performance of the algorithms allows the sensors to rely on modest resolution (VGA or CIF), while retaining the ability to interpret various types of human / vehicle behaviour at the same time as limiting personal identification; b) the system does NOT store video or images unless the prescribed criminal activity has been identified.

The SmartPrevent visual sensor is based on EVS patented scene interpretation technology, which went against the popular approach in terms of resolution, frame rate, power consumption and bandwidth. The original EVS sensor was designed for perimeter protection, so that the main task of EVS in this project, with participation of the other algorithm designing partners, is porting our technology from sterile environments to busy city scenes where people, vehicles and animals are constantly moving.

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Abstract (for dissemination)	This deliverable describes the requirements of the SmartPrevent sensor system, including image/video acquisition, embedded analytics, communication, interfaces, software, and algorithm embedding. The visual sensor is a core component of the SmartPrevent project. It is the front end of the system and is in charge of interpreting the activity occurring in an observed scene and describing it in digital format using a low bandwidth protocol. This digital scene-description data provided to the backend system allows it to identify “irregular”, potentially criminal events in real-time, and to alert the relevant first responders (police, emergency etc.). In SmartPrevent, the sensor system has to fulfil a challenging set of requirements including easy installation, secure communication, low false alarm rate and high probability of detection (PoD), and, the most important point, respect for citizens’ privacy in both the ethical and legal aspects. The SmartPrevent project attempts to show that such a system is possible. This document describes the requirements from the sensor system of the SmartPrevent project. In a commercial product, additional requirements may be required, such as low price and resilience to environmental conditions and human actions.
Keywords	Use cases, system requirements, visual sensors capabilities

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Abbreviations

CIF: Common Intermediate Format

EMI: Electro-Magnetic Interference

IP66: International Protection grade 66

LUX: Luxes

m: Meters

MCS: Monitoring and Control System

PoD: Probability of Detection

RFI: Radio-Frequency Interference

RQn: ReQuirement number

VGA: Video Graphics Array

W: Watts

1 Introduction

From year to year, our sense of security is diminished: at home, on the job, and during travel. Current surveillance systems cannot meet this demand. They are complicated and expensive, demand expertise to install and configure, and suffer from high rates of false alerts. As the world becomes less secure, it is looking for effective, affordable security solutions. Further, as described in the SmartPrevent proposal, increase in urban population leads to an increase in crime. The increase of criminal activity is manifested in an increased frequency of small crimes like graffiti, theft, robbery, and destruction of rubbish bins. This is where a smart, easily deployable visual sensor system can play a central role.

The EVS sensor was designed for perimeter protection, securing a “sterile” area where nothing is supposed to be moving –not people, nor vehicles or animals. Thus, the main issue tackled by the original EVS sensor (predecessor of the SmartPrevent sensor) was discriminating between illumination and weather artefacts on the one hand– rain, snow, shadows, moving branches – and real objects moving in the protected area, on the other hand. The high performance of these sensors (~1 false alarm per sensor per week) allowed us to conceive porting our technology from sterile environments to busy city scenes where people, vehicles and animals are constantly moving. Here, we will provide an opportunity to three additional partners (TREE, QMUL and VSL) to develop their own machine vision algorithms tailored for crime detection and optimize them for embedding into the EVS sensor. SmartPrevent will attempt to embed as many as possible of the algorithms into the sensor, and consider alternative approaches for algorithms that will prove difficult to embed.

The organization of the rest of this deliverable is as follows: Section 2 describes the use cases, derived from the project’s main requirement document. Section 3 analyses these use cases to derive from them sensor requirements and work package descriptions – hardware, software, algorithms and communications. Section 4 describes the visual sensor to be used for the project. A brief conclusion is provided in section 5.

2 Use Cases

This section describes the use cases of the SmartPrevent sensors. In each use case will be defined.

2.1 Routine use case

Table 1: SmartPrevent use case #1. This use case describes the routine case where the sensor is observing a scene, running the algorithms, and sending back alerts when detected according to the specific use cases.

Item	**Description**	
Objective	Detection of suspicious situations based on SmartPrevent embedded algorithms, comparing current scene events to a normal situation in the same place, at a defined time period.	
Pre-condition	The sensor in normal operation	
Post-condition	ALARM state – sensor detects alerts and sends notifications	
Related requirements	Described in “Smart Prevent Scenarios” excel document. Initially includes three alert types – Graffiti painting, Anti-social behavior, and illegal parking / circulation in forbidden areas.	
Event	ALARM event declaration	
Description	**Step**	**Action**
Identification of alert condition	1	Send notification to backend with corresponding video clip
Receive notification of status from backend	2	Continue sending video or go back to normal status
End of alert condition	3	Go back to normal status

2.1.1 Graffiti painting

This is the first sub-use-case of 2.1.

Main points:

Location: Plaza de España

Timing: night or early morning

Area covered by sensor: 15x15m

Traffic: low, the graffiti painter and perhaps a few supporters

Activity: painting graffiti

Illumination: might need IR illumination

Other features: backpacks, spray paint cans

2.1.2 Anti-social behavior

Second sub-use-case of 2.1.

Main points:

Location: Plaza de España

Timing: evenings and mid-days

Area covered by sensor: 20x20m

Traffic: low to medium

Activity (note: some of these are easier to identify – e.g. running, crowding, others more complicated, e.g. begging or urinating, providing a range of algorithmic challenges)

- Execution of sudden and sharp movements

- Creation of groups (from none to three or more people).

- People running and/or jumping (not expected movements)

- Raising the hands.

- A person fallen on the floor.

- A person or a group push and hit other people.

- A person throwing different objects (bottles, terrace chairs, etc).

- A person knocking over trash bins and litter bins.

- People with drink glasses or bottles out of the terrace area.

- Unleashed dogs

- Begging (make different with someone that is falling)

- A person with his arm on his back trying to hide something. (Usually a blunt object that is an extension of his hand).

- People with the face covered by handkerchief, hood, ski mask or similar items.

- Urinating at public spaces.

Illumination: daylight or street illumination

Other features: N/D

2.1.3 Illegal parking and illegal circulation in forbidden areas

This is the 3rd sub-use-case of 2.1.

Main points:

Location: Pedestrian street. A long wide street with a lot of urban furniture, such as lampposts, flower posts, stone benches and trees. It is a crowded street where a lot of shops, bank offices and other establishments are located.

Timing: specific time points e.g. shop opening times

Area covered by sensor: 30x20m

Traffic: high, crowded with cars and pedestrians

Activity: illegal parking or driving through forbidden areas

Illumination: daylight with perhaps street illumination

Other features: specific forbidden activities pre-noted in the software

2.2 Dataset acquisition use case

This use case describes how to build the video dataset as an aid to algorithm development.

Table 2. SmartPrevent use case #2

Item	Description	
Objective	Collection of a video dataset for development of surveillance algorithms	
Pre-condition	Sensor in video acquisition mode	
Post-condition	Sensor in video acquisition mode	
Related requirements	Connection to storage device User interface to control the recording – preferably remotely	
Event	Video acquisition demand	
Description	**Step**	**Action**
Begin acquisition	1	Start acquiring video and sending to receiver end
End acquisition	2	Finish recording and go back to normal status

2.3 Algorithm development use case

Table 3. SmartPrevent use case #3

Item	Description	
Objective	Development of algorithms for embedding in sensor. Development environment created offline with benchmark for developing and testing algorithms. Could include injection of video sequences from project's datasets for testing. Could use Freescale IMX53 evaluation board and development environment. EVS will provide methods and guidance on how to perform this reverse stream.	
Pre-condition	Sensor in "software update mode"	
Post-condition	Sensor in "normal operation mode"	
Related requirements	• Sensor processor development environment for the IMX53-6AVV8C processor, with the cross compiler environment. • Video benchmark for development-testing algorithms • Protocol for updating sensor software	
Event	Software update	
Description	**Step**	**Action**
Begin software update	1	Update the sensor software
End software update	2	Sensor ready for work

3 Requirements analysis

This chapter describes the list of requirements that the SmartPrevent sensors need to fulfil in order to respond appropriately to the objectives of the SmartPrevent project as described in the project proposal (B1.1):

“The SmartPrevent system offers a preventive functionality of crimes. In conventional systems, this task falls to the security staffs which means loss of efficiency and increased stress. SmartPrevent can trigger alarms when criminal activities till in their early stage, so that the end user can focus their attention efficiently”

“For this reason, the proposed system must have as main goal the generation of a set of applications that minimize human error as much as possible by means of the automatization of the end user tasks “

“The SmartPrevent system allows for automatic detection of crimes, and therefore it can make a selective storage of only the moments when they are performing these criminal acts. Thus, we get two clear benefits, firstly, we only stored video content that contain a crime, this allows for better storage space utilization, consequently, we improve the system' ability to take punitive action against offenders. Secondly, the system allows the user to remove all content from people who are not performing criminal acts and directly preserves the privacy of them”

“We must add its daily operations cost, having to take into account other factors such as security staff wages, power consumption cost, night lighting, data storage, etc. The SmartPrevent system takes all these costs into account, in this way to be detailed in the impact section (B3), the measures proposed for lowering the costs. First, the visual sensor proposed are of low cost (both device, installation and operating), and easy to maintain, etc..Furthermore, the intelligent storage and alarms system are oriented for the end user (indicated in previous objectives) minimize the storage and use of security personnel and therefore the costs that incurred.”

The requirements described in this paragraph derived directly from the above objectives and together with the use cases will be the main input for the production of the sensors’ high-level design.

The requirements are described using a template with the following sections:

- Requirement identifier: unique ID for the requirement
- Requirement name: descriptive name of the requirement
- Concise description of the requirement: expression of the requirement in a short and concise manner.
- Requirement justification: short description to justify the requirement.
- Compliance classifier: level of compliance expected for the requirement, classified as *Mandatory*, *Recommended* or *Optional*.
- Stakeholders: involved actors or entities that have a valid interest in the requirement.
- Use case scenario applicability: a comma separated list of each use case scenario where the requirement is applicable.
- Reference: Description document where this requirement was extracted from.

Table 4. Requirement 'Detection and monitoring of objects in the observed scene' Moving objects

Sensor-RQ1-a	**Detection and monitoring of objects in the observed scene (Moving objects)**
Concise description of the requirement	
The sensor has to be capable of identification and detection of moving objects in the scene while ignoring background change. People and car detection should be above 95% from WiseEye detection capabilities.	
Requirement justification	
This is mandatory in optimizing the use of the heavy algorithms module in in saving data transfer over the lan and wan , assuming hundreds of sensors distributed	
Compliance classifier	Mandatory
Stakeholders	Operators, end users, responders
Use case scenario applicability	1.1 Routine use case
Reference	
D2.11 Initial specification and design of system (section 2 & 4), SmartPrevent Scenarios, provided by Las Rozas City Hall representatives and Local Police Body, as end users of the system. Annex I shows the list of video sequences captured. (these videos are saved on SmartPrevent Content Management system [2]).	

Table 5. Requirement 'Detection and monitoring of objects in the observed scene' Detection response time

Sensor-RQ1-b	**Detection and monitoring of objects in the observed scene (Detection response time)**
Concise description of the requirement	
The sensor should have capacity of detection of people in real time – at least 10 frames per second in VGA resolution	
Requirement justification	
The Low Level and the High Level algorithms need this for getting good results of the scene interpretation	
Compliance classifier	Mandatory
Stakeholders	Operators, end users, responders
Use case scenario applicability	1.1 Routine use case
Reference	
D2.11 Initial specification and design of system (section 2 & 4), SmartPrevent Scenarios, provided by Las Rozas City Hall representatives and Local Police Body, as end users of the system. Annex I shows the list of video sequences captured. (these videos are saved on SmartPrevent Content Management system [2]).	

Table 6. Requirement ‘Detection and monitoring of objects in the observed scene’ Illumination.

Sensor-RQ1-c	**Detection and monitoring of objects in the observed scene (Illumination)**
Concise description of the requirement	
The sensor should eliminate changes in illumination includes day & night.at a level of an average of 1 per day reducing detection performance	
Requirement justification	
Reducing of false alarm due to illumination changes improve the performance of the low/high level modules	
Compliance classifier	Mandatory
Stakeholders	Operators, end users, responders
Use case scenario applicability	1.1 Routine use case
Reference	
D2.11 Initial specification and design of system (section 2 & 4), SmartPrevent Scenarios, provided by Las Rozas City Hall representatives and Local Police Body, as end users of the system. Annex I shows the list of video sequences captured. (these videos are saved on SmartPrevent Content Management system [2]).	

Table 7. Requirement ‘Detection and monitoring of objects in the observed scene’ (Background noise)

Sensor-RQ1-d	**Detection and monitoring of objects in the observed scene (Background noise)**
Concise description of the requirement	
The sensor can automatically screen out background such as sparkling, rain, wind, snow, at average level of 5 false positive per day without reducing detection performance	
Requirement justification	
Reducing of false alarm due to such changes improve the performance of the low/high level modules	
Compliance classifier	Mandatory
Stakeholders	Operators, end users, responders
Use case scenario applicability	1.1 Routine use case
Reference	
D2.11 Initial specification and design of system (section 2 & 4), SmartPrevent Scenarios, provided by Las Rozas City Hall representatives and Local Police Body, as end users of the system. Annex I shows the list of video sequences captured. (these videos are saved on SmartPrevent Content Management system [2]).	

Table 8. Requirement ‘Operate 24/7’

Sensor-RQ2	**Operate 24/7**
Concise description of the requirement	
The sensors should operate 24/7 in all weather conditions, with daylight as well as night-time with standard street illumination	
Requirement justification	
The system is focused on the surveillance of certain areas / locations in a city, so it is necessary to ensure that the visual sensors are functional all day, every day of the year.	
Compliance Classifier	Mandatory
Stakeholders	Developers, end-users
Use case scenario applicability	1.1 Routine use case
Reference	
D2.11 Initial specification and design of system (section 2 & 4), SmartPrevent Scenarios, provided by Las Rozas City Hall representatives and Local Police Body, as end users of the system. Annex I shows the list of video sequences captured. (these videos are saved on SmartPrevent Content Management system [2]).	

Table 9. Requirement ‘Resilient communication with communication network’

Sensor-RQ3	**Resilient communication with communication network**
Concise description of the requirement	
Sensor must interface and communicate with SmartPrevent wired/wireless network, sending an alert if communication is malfunctioning. In the case of the wireless network, the sensors must be covered by more than one access point, with a protocol for fault mitigation.	
Requirement justification	
Communication with backend is mandatory to provide the alerts to appropriate responders.	
Compliance Classifier	Mandatory
Stakeholders	Developers, end-users
Use case scenario applicability	1.1 Routine use case
Reference	
D2.11 Initial specification and design of system (section 2 & 4), SmartPrevent	

Table 10. Requirement ‘Video streaming on demand’

Sensor-RQ4	**Video streaming on demand**
Concise description of the requirement	
The sensor must provide streaming video upon demand from the MCS to the mobile terminals of the first responders	
Requirement justification	
In case of alert the responders need real-time video to monitor the evolving situation and automatically store video sequences containing criminal and/or vandalism acts in order to use it as evidence in later judicial process.	
Compliance Classifier	Mandatory
Stakeholders	End-users, responders
Use case scenario applicability	1.1 Routine use case
Reference	
D2.11 Initial specification and design of system (section 2 & 4).	

Table 11. Requirement ‘IT features / parameter configuration’

Sensor-RQ5	**IT features / parameter configuration**
Concise description of the requirement	
Sensors must respond to backend IT requests such as software update, configuration change, etc.	
Requirement justification	
Sensor may be required to provide improved distinction between people, vehicles, crowding etc. This may require parameter configuration or optimization of the software for the specific requirements.	
Compliance Classifier	Mandatory
Stakeholders	Developers
Use case scenario applicability	1.3 Algorithm development use case
Reference	
D2.11 Initial specification and design of system (section 5 - SmartPrevent Architecture)	

Table 12. Requirement ‘Resolution and time stamp’

Sensor-RQ6	**Resolution and time stamp**
Concise description of the requirement	
Sensors must be able to provide frames at a spatial resolution of above 320x240, and a frame rate of over 15 fps. In addition, each sensor need to be able to provide a time stamp for each frame and can be synchronised against other sensors.	
Requirement justification	
The sensors need to provide images for processing modules to detect subtle petty criminal activity. Sufficient resolution and frame rate is critical for extracting features and developing detection models. Since multiple sensors are needed to cover a wide scene, these sensors need to be synchronised.	
Compliance Classifier	Mandatory
Stakeholders	Developers
Use case scenario applicability	1.3 Algorithm development use case
Reference	
D2.11 Initial specification and design of system (section 5 - SmartPrevent Architecture)	

Table 13. Requirement ‘Metadata format’

Sensor-RQ7	**Metadata format**
Concise description of the requirement	
The metadata produced by the sensor on-board processing modules must conform the standard XML metadata format defined by the project system specification and shared by other processing modules that reside on the other platforms in the SmartPrevent system.	
Requirement justification	
The on-board processing module outputs contain information such as object location. This information will be used by other processing modules running on the other hardware platforms in the system, e.g. a PC platform. Therefore, the metadata must confirm to a standard format in order to be understood and used by other processing modules.	
Compliance Classifier	Mandatory
Stakeholders	Developers
Use case scenario applicability	1.3 Algorithm development use case
Reference	
D2.11 Initial specification and design of system (section 5 - SmartPrevent Architecture)	

Table 14 Requirement ‘performance of the visual sensors network’

Sensor-RQ8	**Sensor performance and system performance**
Concise description of the requirement	
The visual sensor should be HW upgraded as the current HW cannot support the night vision needs of camera in a city at night and cannot provide computational needs of the algorithm module which are responsible for the scene interpretation	
Requirement justification	
Currently the WiseEye 2.4 needs additional illumination during the night. The Smart prevent sensor will have to work in regular city night illumination. The computational power of the sensor will need to support at least part of the algorithm module of the scene interpretation. Analysing that a movement in the street is regular activity will reduce the network traffic of a system with hundreds of visual sensors.	
Compliance Classifier	Mandatory
Stakeholders	Developers
Use case scenario applicability	2.1 routine use case
Reference	
D2.11 Initial specification and design of system (section 5 - SmartPrevent Architecture)	

Table 15 Requirement ‘Sensor programmability’

Sensor-RQ9	**Sensor programmability**
Concise description of the requirement	
The visual sensor should be open to add new modules and to enable remote upgrading of sw.	
Requirement justification	
The sensor system should be open to enable adding new modules (the low level algorithm) , enable to add new SW libraries , to enable real-time interface with the sensor modules and to enable remote upgrading of new SW versions of many sensors	
Compliance Classifier	Mandatory
Stakeholders	Developers
Use case scenario applicability	2.3
Reference	
D2.11 Initial specification and design of system (section 5 - SmartPrevent Architecture)	

4 Visual sensor capabilities related to SmartPrevent

The WiseEye sensor is uniquely suited for the SmartPrevent project [3]. The main features which contribute towards that end are as follows:

1. A field-proven analytics-based video surveillance system, one of few such products available anywhere with analytics embedded into the sensor
2. Thousands of units working 24/7 worldwide, catching infiltrators and providing quality surveillance information with minimal nuisance from false alarms
3. Complete, high-end surveillance system encapsulated into a single device. We will need to upgrade the HW of the WiseEye with stronger CPU , larger flash memory and lager RAM to support additional algorithm modules
4. Very low energy consumption under 1W. We will have to use efficient CPU platform to keep such power consumption with better computing performance.
5. The CMOS element will need to be replaced to support very high low light sensitivity, better than .1 LUX
6. Easily amenable for embedding novel algorithms for advanced applications; we will use Linux operating system with Java application for remote monitoring, and remote management and control
7. Low cost, low form factor
8. Optional wireless communication , to enable easier and lower cost installation efforts
9. Minimizing false alarms – lowest false alarm rate in the market (often under 1 false alarm per sensor per day) and ability to screen activity which is not suspicious as defined in the use cases.
10. Provides an alert video clip to the control center / smart phone in seconds
11. Technology developed specifically for harsh situations (IP66), adopted by the Israeli Army and other homeland security / defense organizations
12. Day/Night and All Weather operation; accurate detection even under conditions of rain, snow, dust, etc.
13. Immune to electromagnetic interference (EMI or RFI) and to acoustic noise and to interference from metal objects, conductive materials, or object/background temperature differences – works like the human eye
14. Easily integrates with any control center platform and with any other security system, both as input or as output
15. Maintenance free, can work years without seeing a technician
16. Remote setup and configuration over the network
17. Plug N' Play, automatic installation; starts operating within 30 seconds of power on.

The scope of the project was to develop image processing algorithm in order to identify in real time set of illegal activities within a city. The project team have chosen Emza visual sensors network as the basic configuration, because of its open architecture and its ability to embed external algorithms. Emza also support other cameras (Analog and IP) with is set of decoders (the WiseShield) with the same functionality of upgradability.

IP Cameras with video analytics for outdoor environment with ability to embed additional algorithm are rarely found in the market. Just to mention few of them

- VideoIQ products (iCVR) are expensive (above 1.5k$ unit) , high power (above 10 watt), and are not open to upgrade'
- Axis cameras are supporting an upgrade of SW module but their computational power is limited to basic features
- Hike vison cameras , few models(Chinese) have the same limitation as Axis
- There are many Chinese cameras that has Video Motion detection (VMD) capabilities, which is useless in outdoor environment because of its false positive, and there is no option to have any SW upgrade for the device.

5 Conclusions

This document described the design of the SmartPrevent visual sensor system and details of the requirements to be met. The design is a logical step beyond the design of the software for the existing visual sensor of EVS the WiseEye-2.4 that is targeted for protecting crime-ridden areas. The WiseEye2.4 has high performance in identifying intruders in outdoor environment for perimeter protection application. But the SmartPrevent objectives are driving requirements that need major upgrade of the WiseEye 2.4. Firstly it will be implemented within a city (cities) where the movement of people and cars are more intensive than the activities along perimeter. Secondly, we are planning to add more complex intelligent to the system that means, additional non-trivial and complex algorithms to understand (automatically) the scene in front the visual sensor. The objective of the system (as described in details in D2.11) is to identify specific illegal activities within the city in real-time and report to the authorities in almost real-time. In this document, we have defined the requirements of the visual sensor system to enable these additional capabilities. Successful deployment of these sensors will validate the SmartPrevent concept, as well as the algorithmic sub-systems, and can offer a new approach for making urban areas safer and more secure in an effective, cost-effective, and privacy-respecting way.

References

[1] http://www.SmartPrevent.eu

[2] https://labs.treelogic.com/alfresco/d/d/workspace/SpacesStore/5817b32f-306d-4a20-852f-3884b5c21283/SmartPrevent%20Scenarios%20ALR%20V2.xlsx

[3] http://www.emza-vs.com/products.htm

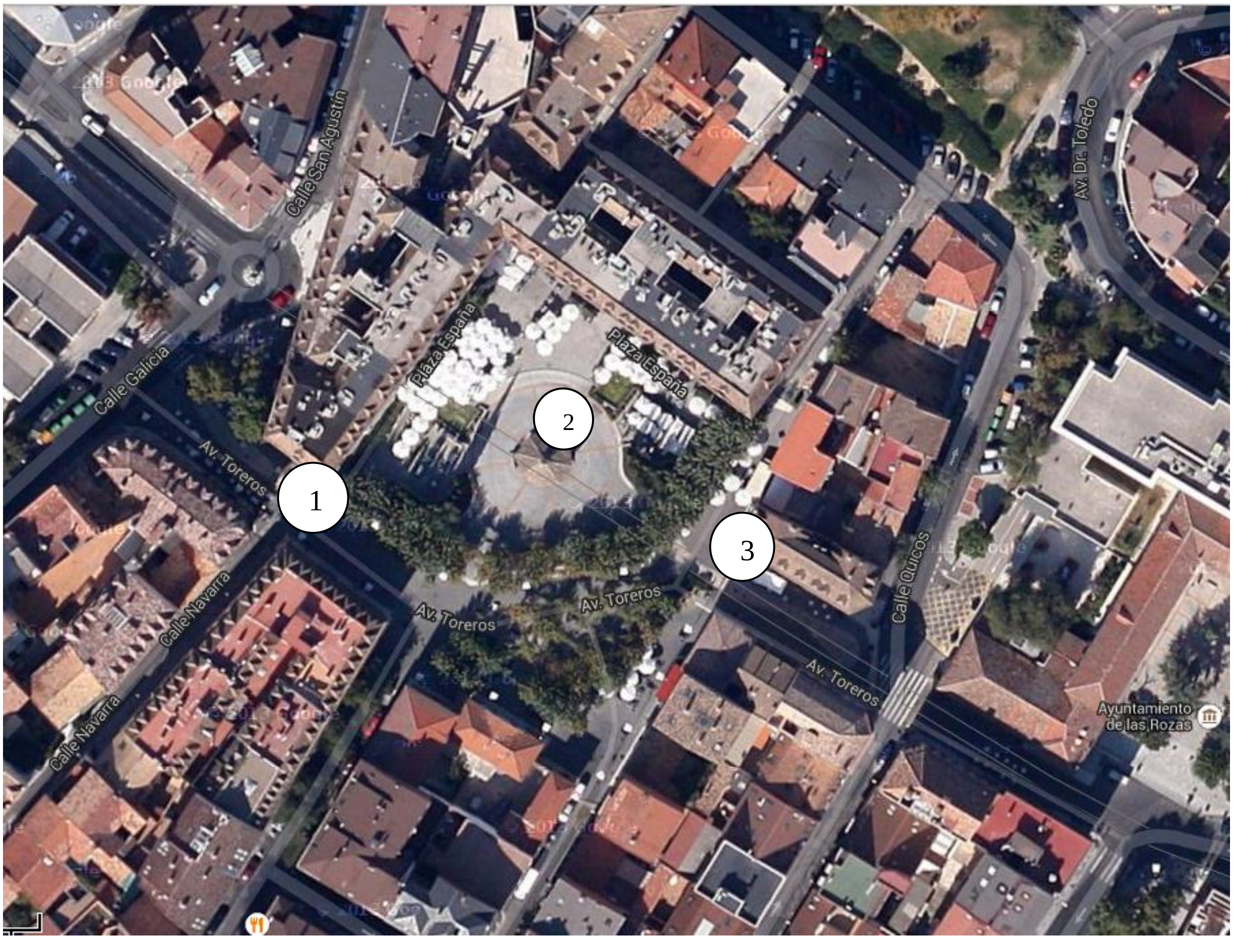
ANNEX I

Ayuntamiento de Las Rozas

POLICÍA Local LAS ROZAS

REPORT OF CAPTURE VIDEO-SEQUENCES OF LAS ROZAS SCENARIOS

At bellow map is marked the position where the camera record has been done. These videos are saved at Smartprevent Content managements system.



PLAZA DE ESPAÑA (SPAIN SQUARE)

(1) entrance of the sapin square

(2) 360º view from the middle of the Square

(3) 360º view from another entrance of the square

Jefatura de Policía Local

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Camera 4. Real St with images from both sides.

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REAL St (several locations)

(5) 360 º view of the Real St and the juction of two streets (Las Cruces st and Iglesias Avenue)

(6) view of Real st from Javerianas Park

(7) view of Real St from the junction with Soria St

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