Integrated Platform for Autonomic Computing

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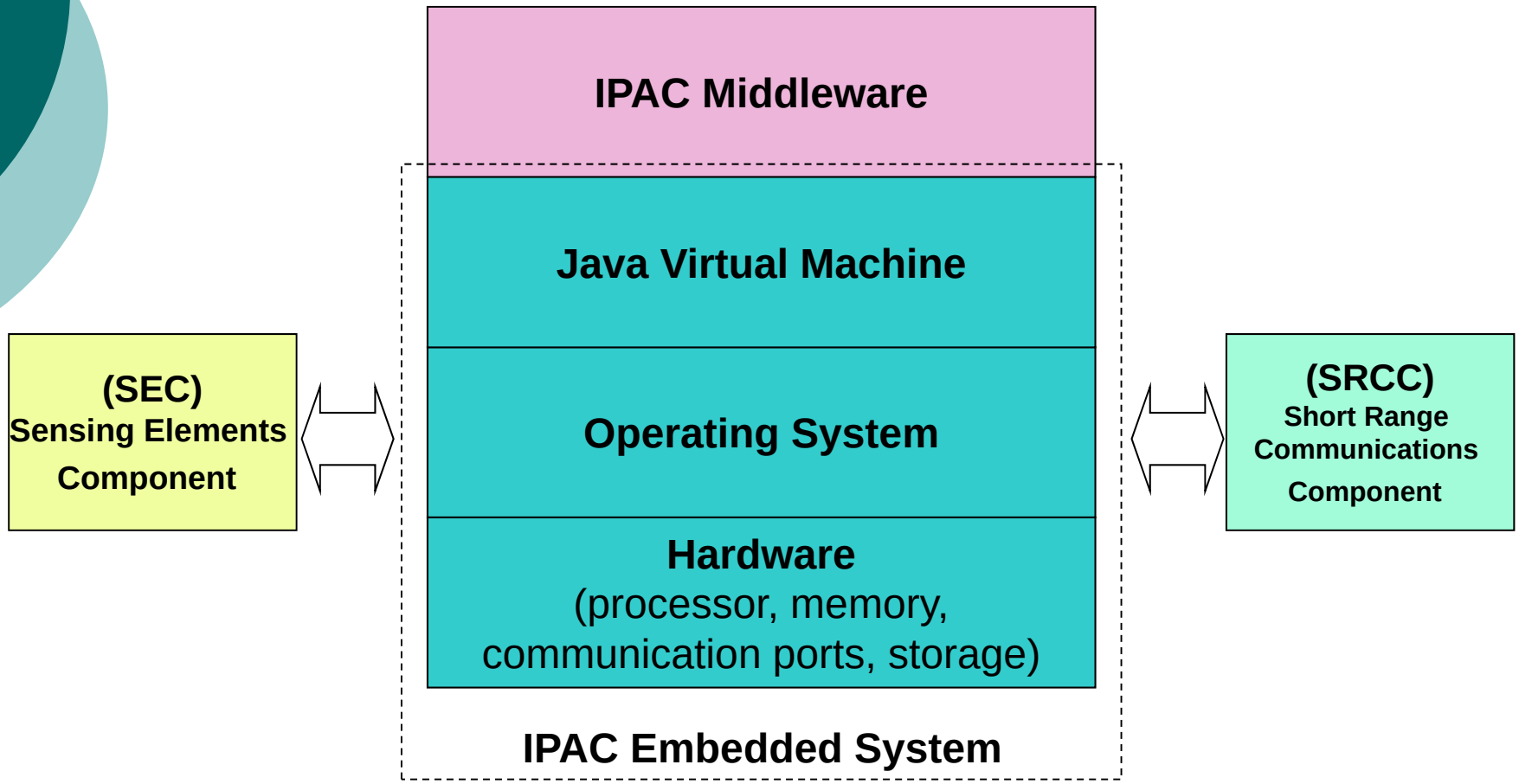
IPAC Technical Objectives

- IPAC *aim:* deliver a middleware and service creation environment for embedded, intelligent, collaborative, context-aware services in mobile nodes
- *IPAC scope*: diverse applications in a collaborative nomadic environment
- IPAC *services*: supported by knowledge and ontology engineering techniques, dealing with interoperability, integration, and re-configuration/adaptation issues

IPAC Key Enablers

- Autonomic Computing in Mobile Ad-hoc environments
- Sensing components to realize context awareness
- Short Range Communications (SRC) to materialize a highly distributed architecture
- Reliable and efficient information dissemination algorithms: Rumor (epidemical) Spreading
- Embedded Service/Application modeling and provision
- Collaborative context-awareness

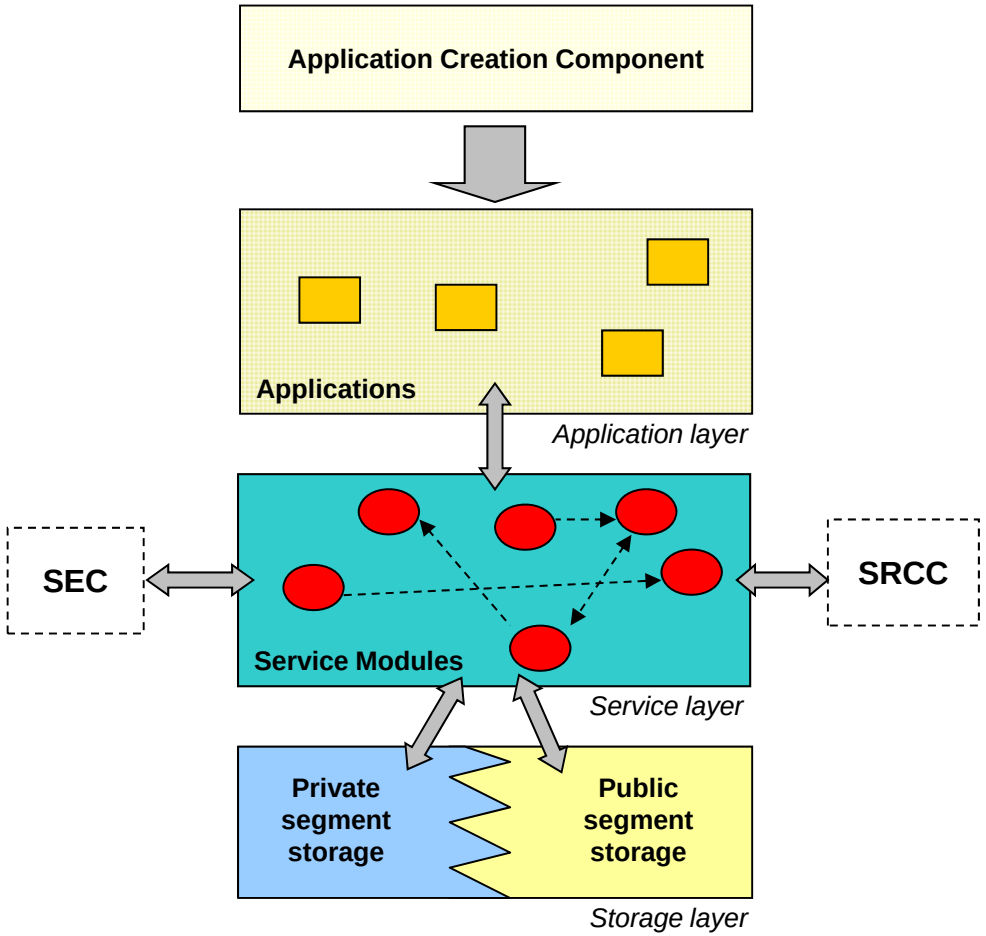
IPAC Node Architecture



IPAC Middleware Architecture

- Structure: service layer, storage layer, application layer.
- Development technologies: Java-based, lightweight container for dynamic software components.
- Implementation technology: Open Services Gateway initiative (OSGi).

IPAC Middleware Architecture



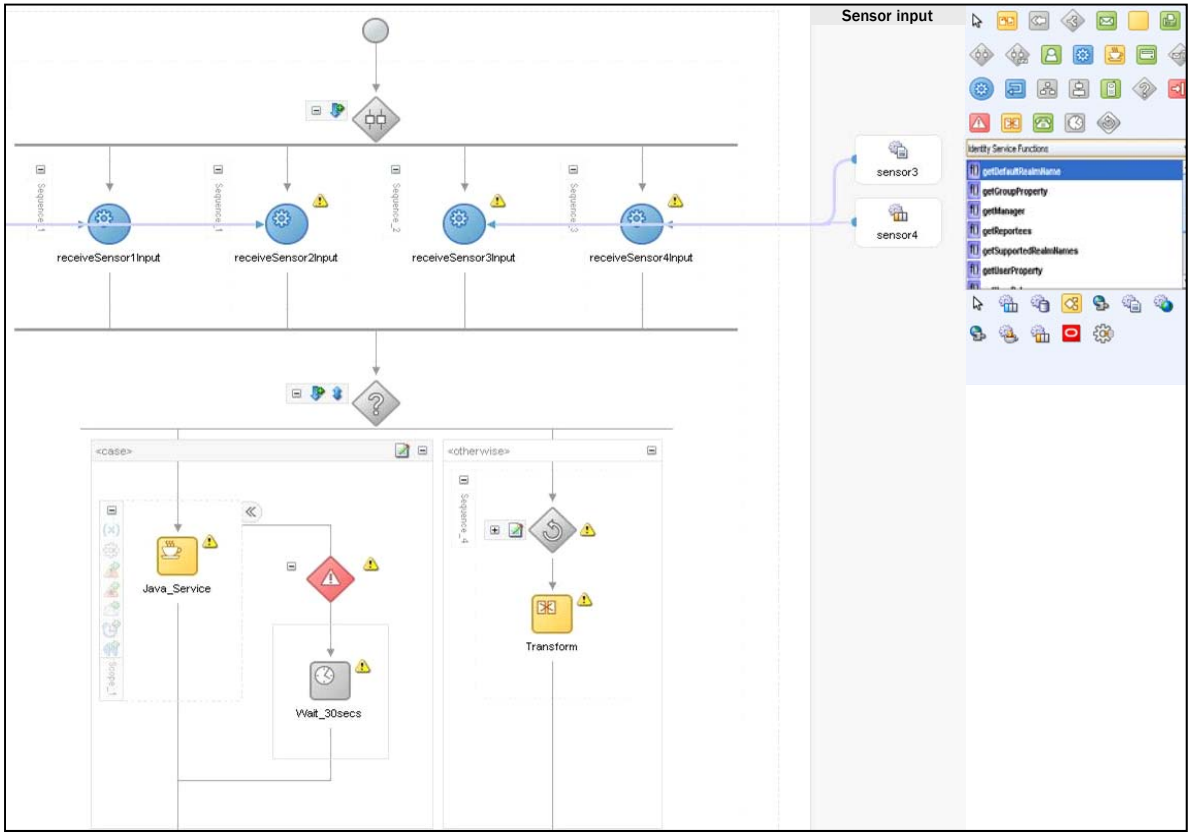
Knowledge management

In-node knowledge management for:

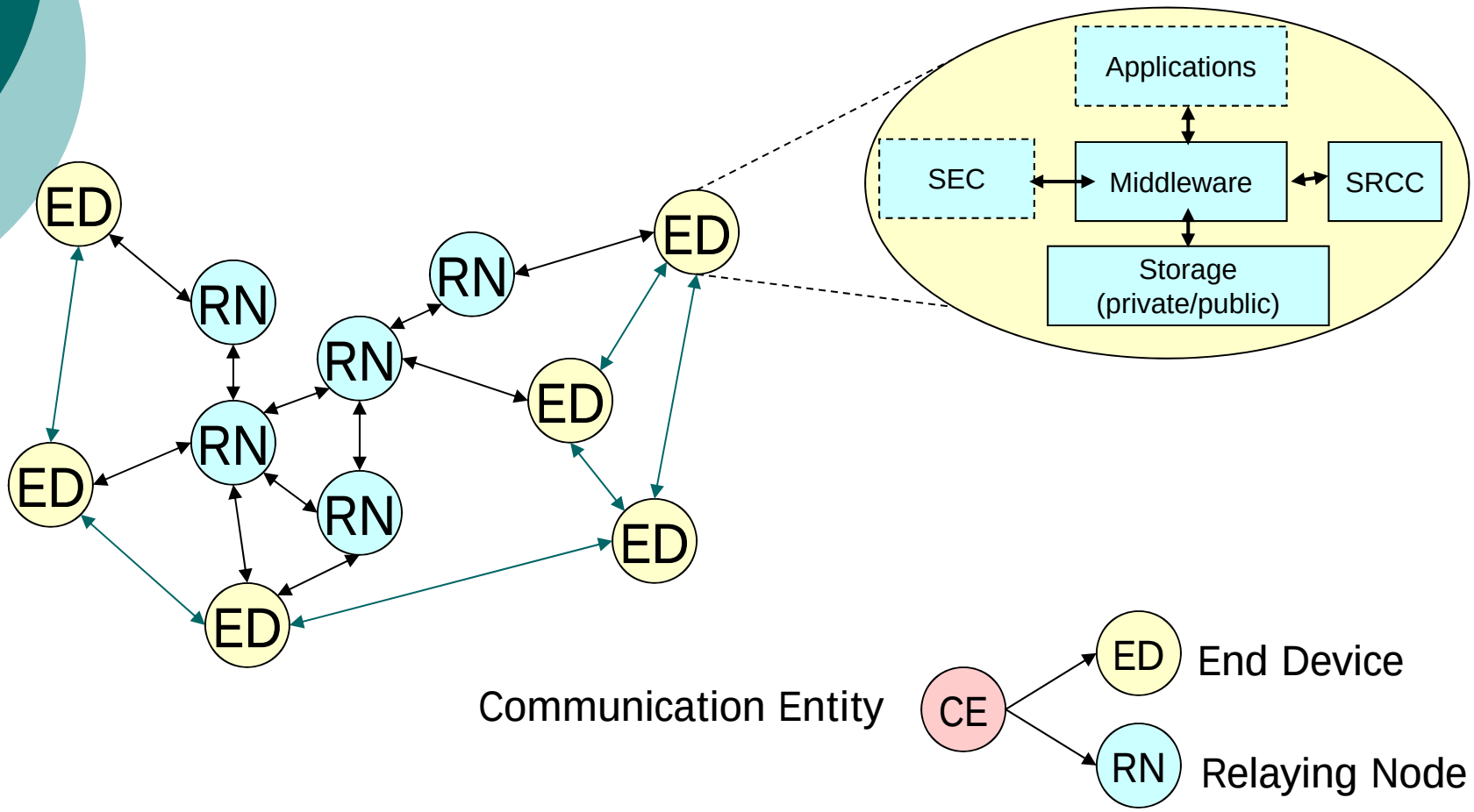
- modeling possible situations (i.e., context) of the IPAC node/system,
- storing situation-information,
- reasoning over contextual data,
- identifying possible conflicts in the system,
- inferring new information based on sensor data,
- disseminating inferred information to interested parties.

Visual Application Editing

- User-friendly visual application development
- Design-time consistency checking of IPAC applications
- Emulation and debugging of IPAC applications



IPAC Environment



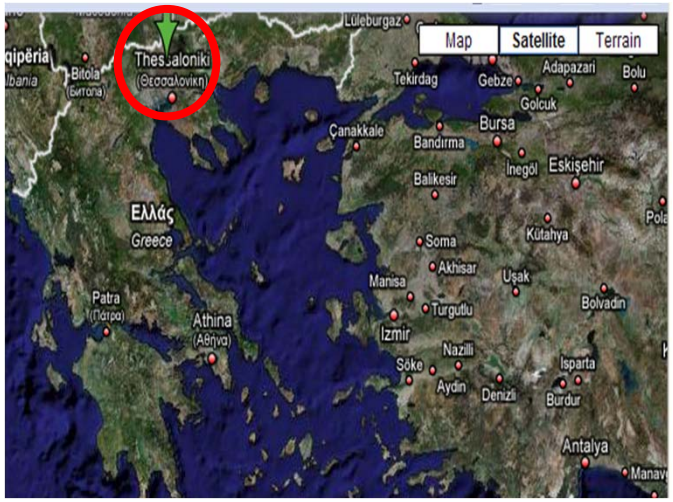
IPAC Trials

IPAC demonstrated through 3 trials

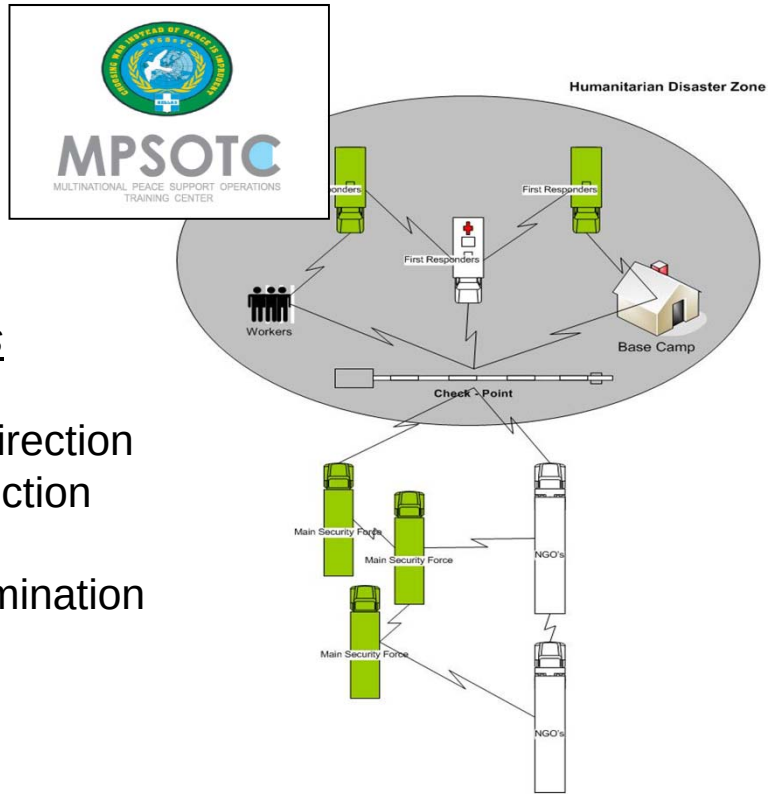
1. IPAC in Humanitarian Relief Operations
   - Simulated crisis management scenarios (e.g., relief force establishment)
   - Secure ad-hoc communications and coordination in crisis zones
2. IPAC in Industrial Environments
   - Advanced Parking Scenarios in Automotive Industry
   - Autonomic communications between vehicles and parking employees
3. IPAC in Intelligent Transportations
   - Detection of snow/fire/accidents and dissemination of alerts
   - Based on a vision sensor

Evaluation criteria: *Performance, Reliability, Efficiency*

Humanitarian Relief Ops



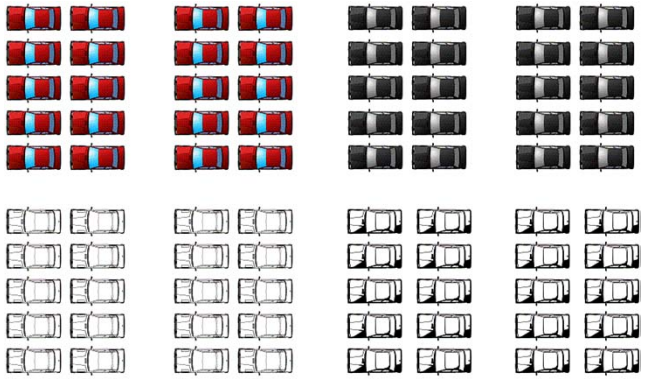
Where?
Multinational Peace Support Operating Training Centre (MPSOTC)
http://www.mpsotc.gr/
Kilkis, Greece



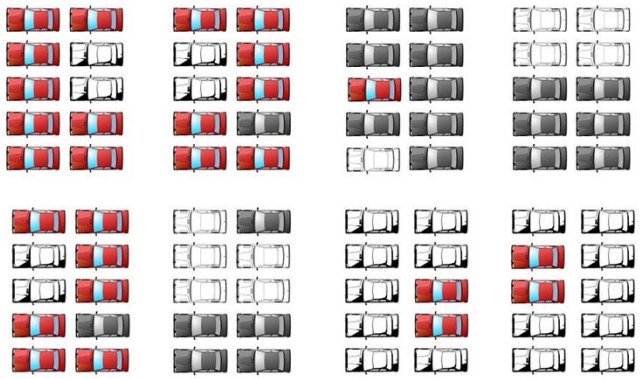
Types of communications
Vehicle to Vehicle
Vehicle to Check-Point
Vehicle to Pedestrian
Pedestrian to Pedestrian

Types of sensors
GPS
Wind Speed & Direction
Fire/Smoke Detection
Vehicle Status
Chemical Contamination
Vibrations
Presence (RFID)

Industrial Application



Parking - Today



Parking – with IPAC

Where

CRF (FIAT)

Parking of Production Plant

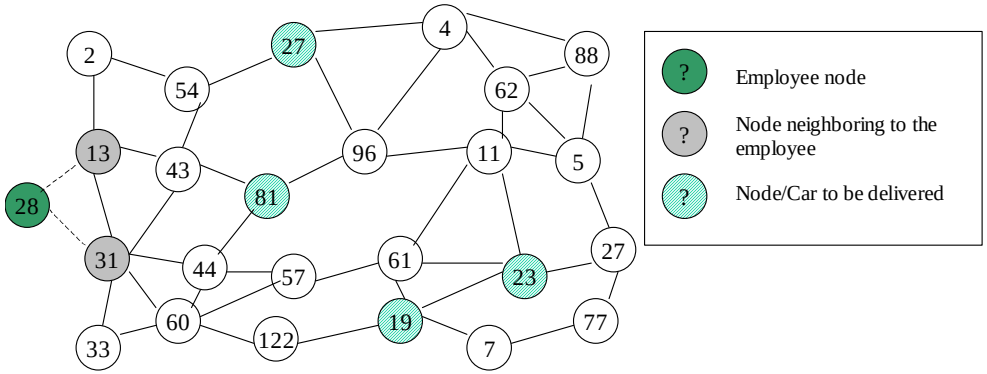
Setup

Types of communications

Vehicle to Worker

Worker to Worker

(Vehicle/Worker to Infrastructure)



Types of Sensors

RFID, WSN-based localization

ITS Application

Where

Small-scale laboratory experiment (CSEM)

Setup

Types of communications

Vehicle to Vehicle

Vehicle to Roadside Infrastructure

Types of Sensors

Vision Sensor (possible input: vehicle presence, distance to vehicles, road markings, Lane departure, fog, snow)

Thank You!

http://ipac.di.uoa.gr