AUTOPILOT Webinar Series (II):

Developing Automated Driving Pilots for IoT: Brainport

31 May 2018 – 16.00 -17.00 CET
Webinar Agenda

1. Webinar Introduction

2. Introduction of the Brainport pilot site and overview of the services (Sven Jansen, TNO)

3. IoT configuration and functions (Emi Mathews – TASS)

4. Video surveillance (Jorge Garcia – Vicomtech)

5. Drone application (Robert Kaul, DLR)

6. Next steps towards the pilots (Sven Jansen, TNO)

7. Discussion
# Webinar Objectives and Audience

<table>
<thead>
<tr>
<th><strong>Objective</strong></th>
<th><strong>Audience</strong></th>
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<tr>
<td>• Present the pilot sites, use cases and approaches to external public</td>
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<td>• Communicate the evaluation and findings to stakeholders</td>
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<td>• Include external audience into the project development and into the automated driving debate</td>
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<td>• Research stakeholders</td>
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<td>• Industry stakeholders</td>
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<td>• Institutions and authorities</td>
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<td>• AUTOPILOT partners</td>
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Introducing AUTOPILOT

• **Idea**  Large-scale pilots at intersection between IoT and automated driving

• **Pilot Sites**  Tampere, Versailles, Livorno, Brainport, Daejeon, Vigo

• **Length**  January 2017 to December 2019

• **Partners**  44, coordinated by ERTICO – ITS Europe

• **Budget**  €24.16 Million

• **EU Grant**  €19.92 Million
AUTOPilot Challenge

• Demonstrate added value of Internet of Things for Automated Driving

Internet of Things:
• Information beyond reach of sensors
• Data in context (e.g. trustworthiness)
• Anything connected as source

Automated Driving:
• Travel planning
• Decision making
• Steer and speed control
PILOT SITE BRAINPORT (NL)

In the Brainport, 5 “mini-projects” work together to build up a demonstration between the Automotive Campus in Helmond and Eindhoven, based on 5 use cases:

- CAR SHARING
- PLATOONING
- HIGHWAY PILOT
- AUTOMATED VALET PARKING
- RELOCATION

IoT sources are road-side cameras, drones, traffic lights, smartphones and wearables.
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Automated Valet Parking

• The car is enabled through IoT to drive unmanned to a parking spot, and to return to the driver on command

• This offers:
  • Comfort service to car drivers (no time lost finding a parking spot)
  • More efficient use of space on parking lots (cars can be parked closer)
  • Less damage to cars during parking
  • Optimization of logistics and reducing congestion in and towards parking area
  • More efficient use of EV charging spots
  • ...
Test location: Automotive Campus Helmond

- Facilities and fixed cameras
- Drone camera application
- Image processing
- Test vehicles
- Drop off zone
- Vehicle control & IoT
- Control room
IoT configuration and functions

TASS - Emi Mathews
IoT concept of Automated Valet Parking

- **Image data processing**
- Control room
  - Baseline parking map
  - Available parking spots
  - Route calculation

Vehicle
  - Vehicle position
  - Parking maneuvers
  - Steering and speed cmnd

Baseline parking map
Available parking spots
Route calculation
Vehicle position
Parking maneuvers
Steering and speed cmnd
IoT configuration and functions

- Uses publish/subscribe messaging protocol
  - OneM2M - Restful API
  - IBM Watson - MQTT
- Enables data sharing
- Interworking of IoT platforms
- Standardized data models
IoT configuration and functions
Video Surveillance

VicomTech – Jorge Garcia
Video surveillance technologies

Free parking spot detection

• Goal is to recognize available parking spot using video surveillance cameras.

• This technology is based on deep learning approach:
  • 2 labels
  • Layout of parking spots is required
Video surveillance technologies

Free parking spot detection

• **Application:**
  - Every a configurable time period – status of parking spots are evaluated
  - If there exist motion in the parking spots – status remains equal
  - Major problems come with occlusion – overhead perspectives are preferred
Drone application

DLR – Robert Kaul
Drone application

• MAV and ground-station PC act as IoT device.
• MAV is able to navigate autonomously in outdoor as well as indoor (GPS-denied) environments.
• IoT AVP application sends list of parking spots for occupancy checking.
• Using input from cameras and deep-learning the occupancy status of parking spots is determined.
Drone application – system overview

- Custom coaxial tricopter design by DLR
- Size & weight: 68x68x30 cm, 2.6kg
- Flight time: approx. 10min

- Sensors: 2 stereo camera pairs, IMU
- Single camera field of view: 125°x80°
- Total field of view: 240°x80°
- Computers: Intel i7, FPGA (stereo processing), BeagleBoneBlack (ARM-based)
Drone application – demonstration video

• Video von Pre-Plugfest in Braunschweig (siehe Teamsite)
Outlook on automated driving and piloting

TNO – Sven Jansen
Automated Driving

• Non-GPS localization
• Obstacle detection
• High maneuverability
Outlook to Pilot execution in Brainport

• 2 plug fest events completed
  • Most partners available on-site
  • Integration of technologies validated, baseline functionality defined for first piloting

• Piloting will consider (at least) 2 system variants
  • 2018: Main focus on service concept of individual use cases
  • 2019: Integration of services and extended automated driving

• Public demonstrations in conjunction with ITS2019 conference
Timeline of AUTOPILOT for Brainport

WP2 DEVELOPMENT

1-1-2017 Kick off
1-7-2017 Use case def
Wk4-2018 Plug Fest1
Wk20-2018 Plug Fest2
Mid May 2018 Input Deliverable 2.6
SEP 2018 Pilot Fest 1
DEC 2018 Pilot Fest 2 local event workshops interviews

WP3 Piloting & WP4 Evaluation

May 2019 Pilot Fest 4 local event workshops interviews
June 2019 ITS 2019 Demo Fest
MAR 2019 Pilot Fest 3
Q4 Project closure

[Short Presentation Title]
Thank you for your attention

Questions?
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