Designing the future public transportation services with autonomous vehicles

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Key Project Objectives

Prepare the adoption and deployment of Autonomous vehicles for public transportation

Objective #1
Demonstrate the suitability and efficiency of the use of small autonomous vehicles for different public transportation models
- Operate regular commercial public transportation services at different sites and environments

Objective #2
Propose and test disruptive public transport services.
- Operate on-demand, door-to-door, environmentally friendly, personalised public transportation services under different conditions and environments
4 year project
16 Partners – 4 sites
20 MEUR budget
15.4MEUR EU Contribution
May 1st, 2018 – April 30, 2022
4 validation sites
(operating on open street, mixed traffic, with regular time schedule)

- **Geneva – TPG**
  - September 2018 – Meyrin: regular service, 2 AVs
  - Fall 2020 – Bell-Idee
    - On-demand, door-to-door, fleet of 3 AVs

- **Lyon – Keolis**
  - May 2018 – regular service at Confluence – 2 AVs
  - November 2019 - Parc Olympique Lyonnais stadium
    - Complex roads, hi-speed traffic, V2X – 2 AVs

- **Luxembourg – Sales-Lentz**
  - September 2018 – Pfaffenthal - 2 AVs
  - Summer 2020 - Contern
    - Complex road, link to train services, on-demand – 2 AVs

- **Copenhagen – Holo**
  - May 2018 – Oslo, Gothenburg - 3 AVs
  - Fall 2020 – Nordhaven
    - Multimodal mobility, on-demand – 4 AVs
The long way towards autonomous vehicles’ public transportation

The full power of autonomous vehicles in public transportation is not yet demonstrated

The road is full of obstacles

- Legal Barriers
- Technical shortcomings
- Transport Model changes
- Business models
Legal Barriers

- Public transportation = fixed bus routes and fixed bus stops
- Vehicle & itinerary homologation
  - Authority fragmentation in EU countries
  - Safety requirements
    - Speed restrictions
  - Regulatory fragmentation in EU
Technical Shortcomings

- Vehicle speed vs. safety
- Conformance with shared public transportation vehicle requirements
- Lack of passenger services to replace the driver offered services (including safety)
- Smart city infrastructure
- Vehicle anti-tampering construction
Transport Model changes

- From large busses to fleet of small buses
- From fixed bus stops to anyplace
  - Going to where no bus has gone before
  - Increase in transportation kms
- Multimodal transportation
Business models

Not yet clear how the business model can be profitable

- Driver costs – intervention team costs
- Required technical infrastructure cost
- What is the critical mass of vehicles?
- Ecological operation
- Vehicle life time
- Micro or macro economic model?
Public transportation will be the first area to deploy autonomous vehicles

Operational model “simpler” than for private cars
- Lower speeds (no more than 55km/h)
- Restrained operation area
  - Well mapped and under control

  No need for more than level 4 autonomous driving

Business model concept attractive to operators
- Improved service
- Very promising economic model
- High interest from actors to adopt
The Belle-Idee test site

A 36 hectares site with mixed traffic and population

- Patients, school kids, professionals
- Hospital, commercial area, school
- Cars, bicycles, pedestrians, patients

*Today it is served with a bus line traversing the site*

*Transfers between buildings is done using the private cars*
Full autonomous busses deployment

- Suppression of the bus line
- Transfer between buildings using Autonomous vehicles
  - 69 virtual bus-stops
  - All roads are covered
- Target: Busses operating 24/24
  - Inductive charging
  - Automated exit from hangar
The Belle-Idee site (Geneva)

On-demand – door-to-door services

- On demand, door to door travel
  - No predefined routing, no predefined bus stops (with stop point exclusions), within a specific urban area, immediate or deferred

- Intelligent planner
  - Propose optimal travel planning, with traditional service coordination based on passenger personnel needs and capabilities

- In-vehicle services
  - “follow your kid”
  - passenger security
Belle-Idee Preview
Towards COS emissions reduction at the Belle-Idee site

- Cars are parked at the outer periphery
- Internal transport with Autonomous Busses
- Recharging with the use photovoltaic
  - The operation of the vesicles for a long period will allow us to identify the power needs under real operation conditions.
Thank you!!

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