Multi AGV Systems in Shared Industrial Environments: Advanced Sensing and Control Techniques for Enhanced Safety and Improved Efficiency

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PAN-Robots project

• Name: Plug And Navigate ROBOTS for smart factories (PAN-ROBOTS)
• Included in Seventh Framework Programme (ICT)
• Duration: 36 months
• Start date: 1\textsuperscript{st} November 2012
• End date: 31\textsuperscript{th} October 2015
• Grant Agreement no: 314193

www.pan-robots.eu
1. Sick AG – Germany
Partners

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2. Elettric 80 – Italy
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4. Teknologian Tutkimuskeskus VTT – Finland
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5. Technical University of Cluj-Napoca – Romania
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3. University of Modena e Reggio Emilia – Italy
4. Teknologian Tutkimuskeskus VTT – Finland
5. Technical University of Cluj-Napoca – Romania
6. Coca-Cola Iberia Partners – Spain
The PAN-Robots project
Main characteristics

Shared environment
Main characteristics

Shared environment

Interaction with humans
(operators, manual forklifts, ...)

PAN ROBOTS
Plug&Navigate robots for smart factories
Interaction with humans
Safety

Interaction with humans

SAFETY

DECREASED EFFICIENCY
Speed reduction at intersections
Queues

An AGV stops due to an obstacle

Queue of AGVs
Typical environment
Local sensing
We would need to look around the corners...
Hierarchical data fusion

• Medium level
  – Sensing systems communicate *medium level* features
    • Bounding box, position velocity, etc.
  – The centralized system merges data

• High level
  – Sensing systems communicate the *class*
    • Pedestrian, forklift, static object, etc.
  – The centralized system combines classes
• Avoidance of an obstacle on the AGV’s path
• Idea: global view + classification allow safe high level actions
Case study

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• Idea: global view + classification allow safe high level actions
Case study

- Avoidance of an obstacle on the AGV’s path
- Idea: global view + classification allow safe high level actions
Case study

- Avoidance of an obstacle on the AGV’s path
- Idea: global view + classification allow safe high level actions

STOP!
Case study

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Case study

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Related works

Automatic roadmap creation

Related works

Automatic roadmap creation

Related works

Automatic roadmap creation

Related works

- Hierarchical planning

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www.arscontrol.org
www.pan-robots.eu