Intra-Logistics with Integrated Automatic Deployment: Safe and Scalable Fleets in Shared Spaces

H2020-ICT-2016-2017
Grant agreement no: 732737

DELIVERABLE 9.2

ILIAD flyer

Due date: month 18 (June 2018)
Deliverable type: DEC
Lead beneficiary: ORU

Dissemination Level: PUBLIC

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Contents

1 Overview

Deliverable D9.2 consists of a flyer for distribution at conferences and trade shows.

The present version of the four-page flyer (to be printed in booklet fashion) is included as Section 2. An editable version of this template flyer is also made available to the members of the consortium, and can be adjusted for specific events or target audiences, as needed.

An earlier version, used during the CeBIT 2017 trade fair, is included as Section 3

2 Four-page flyer, 2018

ILIAD

Intra-Logistics with Integrated Automatic Deployment: safe and scalable fleets in shared spaces

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Abstract

Today, intralogistic services have to respond quickly to changing market needs, unforeseeable trends and shorter product life cycles. These drivers pose new demands on intralogistic systems to be highly flexible, rock-solid reliable, self-optimising, quickly deployable and safe yet efficient in environments shared with humans. ILIAD will enable the transition to automation of intralogistic services with key stakeholders from the food distribution sector, where these challenges are particularly pressing.

> *ambitious goals for complex cognitive systems*

We will develop robotic solutions that can integrate with current warehouse facilities, extending the state of the art to achieve self-deploying fleets of heterogeneous robots in multiple-actor systems;

- life-long self-optimisation;
- manipulation from a mobile platform;
- efficient and safe operation in environments shared with humans; and
- efficient fleet management with formal guarantees.

Scientifically, ILIAD pursues ambitious goals for complex cognitive systems in human environments beyond a specific use-case. We will overcome limitations in the state of the art in

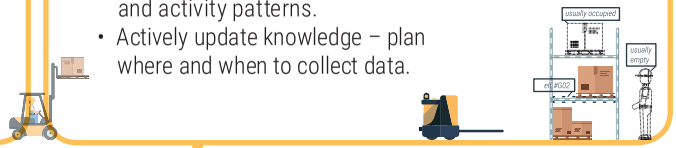
- tracking and analysing humans;
- quantifying map quality and predicting future states depending on activity patterns inferred from long-term observations;
- planning of socially normative movements using learned human models;
- integration of task allocation, coordination and motion planning for heterogeneous robot fleets; and
- systematically studying human safety in mixed environments, providing a foundation for future safety standards.

Fleet management

- Integrated task allocation, motion planning and coordination.
- Guaranteed deadlock-free operation.
- Continuously revise w.r.t. changing requirements..

Effortless deployment and long-term operation

- Automatically build structural & semantic maps.
- Automatically life-long calibration of sensors.
- Integrated maps of different modalities.
  - Lifelong mapping & localisation.
  - Learn and predict human motion and activity patterns.
  - Actively update knowledge – plan where and when to collect data.

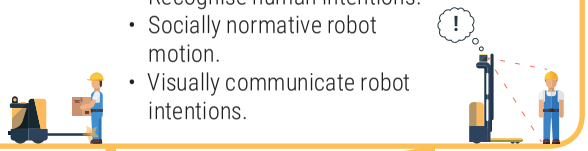


Manipulation

- Novel end effectors for flexible manipulation.
- Planning for picking and palletising of heterogeneous goods.
- Perception for segmenting transparent wrapping and tightly stacked objects.

Safe and human-aware operation

- Study human safety in shared environments.
- Connect injury biomechanics to safe control and planning.
- Safety recommendation for certifying learning systems that work alongside humans.
  - Reliable detection, tracking and analysis of people.
  - Detect full body and head orientation.
  - Recognise human intentions.
  - Socially normative robot motion.
  - Visually communicate robot intentions.



Flexible intralogistics for the transition to automation

- Logistic stakeholders of all scales need robotic solutions that integrate with current warehouses.
- Deployment cost of first truck should be minimal, and additional trucks should integrate seamlessly.
- Current robotic solutions need purpose-built warehouses, and are unsuitable for bulky or perishable goods.

ILIAD's innovations will facilitate

- fleets of heterogeneous robots in human-robot shared environments,
- life-long operating when environment and requirements change,
- introspective assessment of quality of environment representations,
- manipulation of delicate and flexible objects, also far beyond the logistics domain.

Partners

Örebro University

University of Lincoln

Università di Pisa

Leibniz Universität Hannover

Bosch – Invented for life

Kollmorgen

ACTOR – Analytics Control Technology Operations Research

Orkla

L.E.S. – Logistic Engineering Services Ltd

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 732737.

3 Two-page flyer used at CeBIT 2017

ILIAD

Intra-Logistics with Integrated Automatic Deployment: safe and scalable fleets in shared spaces

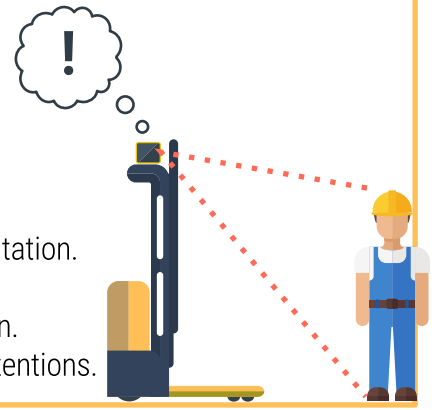
Effortless deployment

- Automatically build structural & semantic maps.
- Automatically verify map and localisation quality.
- Automatic life-long calibration of sensors.

Safe and human-aware operation

- Study human safety in shared environments.
- Connect injury biomechanics to safe motion control and planning.
- Elaborate safety recommendations for certifying learning systems that work alongside humans.

- Reliable people detection.
- Detect full body and head orientation.
- Recognise human intentions.
- Socially normative robot motion.
- Visually communicate robot intentions.

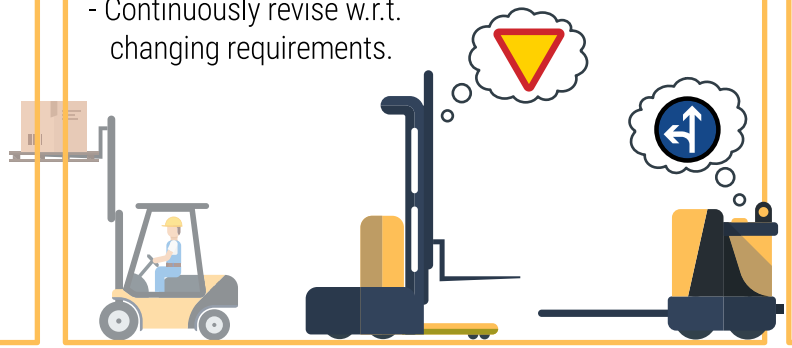


Long-term operation

- Life-long learning from human activities.
- Learn and predict human motion and activity patterns.
- Actively update knowledge — plan when and where to collect data.

Fleet management

- Holistic task allocation, motion planning and coordination.
- Guaranteed deadlock-free operation.
- Continuously revise w.r.t. changing requirements.



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ILIAD
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also far beyond the logistics domain.
Walking Person
Observing AGV02
Shelf R213
Picking Area 01
Plastic Wrapping
Detected
Needs Unwrapping
AGV02
Picking & Palletizing
Congestion predicted
Tuesday, 13.05-13.10
AGV01
Moving Goods to Staging Post B
Temporary Pallet
Storage Detected
Standing Person
Not observing AGVs
Örebro University
University of Lincoln
Università di Pisa
Leibniz Universität Hannover
BOSCH
Invented for life
KOLLMORGEN
ACTOR
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