

OPIL

Open Platform for Innovations in Logistics

OPIL is a set of software modules providing ready connectivity with physical factory equipment and other modules for optimal material handling. These include (but not limited to) Mobile Robots, Automated Guided Vehicles, forklifts, workers, sensors as well as IT software such as ERP (Enterprise Resource Planning) system.

In L4MS project, a 3D simulator (Visual Components®) connected to OPIL, allows virtual testing of factory logistics. Due to the identical behavior of the virtual agents (e.g. mobile robots or workers) inside Visual Components and the real physical agents in your factory, the adoption of holistic logistics approach from layout changes to material handling will be smooth and easy. This approach helps to reduce the planning, optimization and installation time of the new logistics solution. For system integrators, this makes the process faster thanks to the data OPIL can provide.

OPIL is based on Open Source components and it supports the adaptation of new technologies and other Open Source frameworks. This reduces dependency of one service provider and cuts back installation time. OPIL also enables customization which is crucial especially for small and medium sized companies.



Heart of OPIL

Based Messaging system on FIWARE open architecture, this system allows interactions among several components (also external) in the platform.

The open architecture supports the usage of Open Source frameworks such as ROS (Robot Operating System) for the development of new components, for example perception or mobile manipulation.



Task Planner - "Brain module" of OPIL

Task planner orchestrates three functions:

- Task Supervisor monitors the execution of a task dispatched to the AGVs and factory workers.
- Business Process Optimization decides and optimizes the tasks to be dispatched to the different workers and AGVs.
- Motion Task Planning plans the routes for the Mobile Robots and AGVs.



Robot Agent Node (RAN)

RAN translates the motion to AGV's or Mobile Robots native controller. This helps to navigate on the factory floor as it includes the factory's layout. RAN manages the sequences of tasks to perform.



Sensor agent node (SAN)

SAN receives raw data from sensors located in the factory. This will indicate when to release a specific transportation task to the AGV / Mobile Robot. This functionality brings more flexibility to production control and material handling.



Digital Twin - 3D simulation tools

OPIL provides Interfaces towards external 3D simulation tools. In L4MS project, OPIL is connected to Visual Components which creates a transparent substitute of the physical factory and collects data from its components, for example Robot, Human and Sensor Agent Nodes via OPIL. This will speed up optimization of the logistics plan, layout design and estimation of investment costs.



Human Agent Node (HAN)

HAN reads specifications of a task; what is the task, where and when to perform it. This component will be visible to the factory worker through an online interface. OPIL can also give recommendations to the factory worker in return. Each workstation in the factory can have its own HAN.



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L4MS

Smart logistics for manufacturing

www.l4ms.eu

Developers' Guide available at
readthedocs.io and DockerHub

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Effective deployment of mobile robots through IoT and virtualization

- > L4MS acceleration program offers an Industrial IoT platform OPIL (Open Platform for Innovations in Logistics OPIL) for manufacturers and automation providers to enhance communication between different factory floor elements.
- > Automated factory logistic systems are usually configured for one structured, well defined operation environment with one or fleet of Mobile Robots. Costly reconfiguration, scalability and 'vendor lock' brings limits especially for small & medium-sized manufacturers and technology suppliers who often require customization from the solution.
- > OPIL can help turn factory's operation environment into a flexible and responsive logistic system by introducing a 3D factory simulator to the process. This enables virtual testing before investment decision and helps validate most cost-effective human-robot-logistics solutions.

