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From Madrid metro to industrial manufacturing, FORTIS advances with new collaborative technologies

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FBK is a partner in the European project that develops advanced solutions for monitoring, safety and efficiency of processes on construction sites and in factories

Collaborative technologies and intelligent systems to make construction sites, infrastructures and factories more efficient and safe: this is the goal of **FORTIS**, the European project funded by **Horizon Europe** that brings together research centres, universities and companies from all over Europe. The consortium works on the development of advanced perception and automation solutions to improve process monitoring, operator safety and the sustainability of industrial and infrastructure activities. Currently, the project focuses on three main areas: **construction, infrastructure and manufacturing**, where the introduction of digital tools and intelligent sensors can concretely transform the quality of work and operational efficiency.

Within the FORTIS consortium, **Fondazione Bruno Kessler** contributes through its **DCenter for Digital Industry** and in particular with the **TeV – Technologies of Vision** Unit, supported by the **3DOM – 3D Optical Metrology** Unit. Thanks to advanced skills in the fields of machine vision, image analysis and three-dimensional perception, FBK develops solutions that allow automated systems to better understand their surroundings and communicate effectively with people. **The goal** is to create technologies capable of adapting the methods of communication and **human-robot interaction** according to the operating context and of reacting safely and collaboratively to different situations. In this way, FBK contributes to making the interaction between people and machines smarter, promoting more natural cooperation and greater safety in complex production and infrastructure contexts.

A first application is carried out at the **Madrid metro**, where FORTIS experiments with solutions for **monitoring the status of tracks and infrastructures**. It is a particularly difficult environment from a sensory point of view, where low brightness greatly reduces visibility, making manual inspections necessary by specialized personnel with the use of dedicated machinery. The project aims to make this process more efficient and safe thanks to the use of autonomous mobile systems capable of inspecting railway sections, detecting signs of wear and promptly reporting any critical issues. This allows to reduce intervention times and costs, while improving safety and service continuity, with direct positive repercussions on people's lives, who can count on more reliable travel, fewer interruptions and a safer travel environment.

A second use case concerns the **construction sector**, with a focus on the **construction of prefabricated buildings**. In this context, FORTIS works to **integrate digital technologies into industrial vehicles** used on construction sites, such as forklifts used for handling panels and structures. These are large open and dynamic environments, where visual perception can be hampered by varying light conditions, dust and external weather factors that significantly affect visibility. The aim is to enhance the ability of these vehicles to perceive the surrounding environment, recognize the presence of operators and manage movements autonomously and safely, even in dynamic and noisy environments. This is an important step towards smarter construction sites, where human-machine collaboration becomes a key element for productivity and the protection of people.

The **third use case**, developed in collaboration with the company Beko, instead focuses on advanced manufacturing. Here FORTIS aims to make internal material handling systems smarter and more coordinated, through the use of vision and perception algorithms that allow better planning of operations and optimisation of factory logistics. Even in this environment, characterized by confined spaces and multiple moving objects, systems must be able to adapt the way they perceive and communicate to ensure safety and continuity of processes. The solutions developed

aim to reduce waste and waiting times, improving the flexibility of production processes and the overall quality of factory work.

"With FORTIS we are creating a new type of collaboration between people and robots," explains **Andrea Caraffa**, researcher at FBK's TeV unit. *"Machines that not only see, but understand the context, recognize gestures and interact in a natural way: a concrete step towards the work of the future."*

*"One of the main challenges for FORTIS is the holistic approach we have taken. The toolkits we are developing will be used in very different industrial contexts, each with specific needs and constraints. For this reason, we aim to create a universal and cutting-edge software solution, capable of supporting both human-robot collaboration and multi-robot management, "*says **Paweł Trybała, researcher** at the 3DOM unit.

The research team, made up of **Andrea Caraffa, Paul Chippendale, Mattia Nardon and Fabio Poiesi** from TeV and **Pawel Trybala** and **Fabio Remondino** from 3DOM, combines their skills to integrate data from optical and 3D sensors, allowing the position of people and objects in space to be estimated in real time. This integration guarantees precise analysis and reliable decision-making processes, critical aspects in all contexts where safety is a priority.

Recently, a **project meeting** was hosted at **Fondazione Bruno Kessler**, during which European partners shared the results obtained in the previous months of activity and planned the next steps. The consortium consists of 9 partners from six European countries (Finland, Spain, Italy, Portugal, Slovenia, Ireland). The meeting represented an important opportunity for exchange between research and industry, with the common goal of bringing solutions to the field that combine technological reliability and practical value for operators.

With its combination of scientific expertise, applied experimentation and European collaboration, FORTIS represents a concrete step towards a safer, more efficient and conscious industry, in which technology becomes an ally capable of communicating, perceiving and collaborating with people, improving processes and supporting human work in all environmental conditions.

PERMALINK

https://magazine.fbk.eu/en/news/from-madrid-metro-to-industrial-manufacturing-fortis-advances-with-new-collaborative-technologies/

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