The 5G-INDUCE European Project: Smart-safety proliferation as an Industry 4.0 Enabler

Panagiotis Zikos[1], Stathis Vlachos[2], Despina Tomkou[3], Georgios Tsironis[4*]

[1] *Co-CEO & Co-Founder, iLink New Technologies, Athens, Greece*
[2] *Co-CEO & Co-Founder, iLink New Technologies, Athens, Greece*
[3] *Research partner, iLink New Technologies, Athens, Greece*
[4] *European Projects Coordinator, iLink New Technologies, Athens, Greece*
Corresponding author: Tsironis.gio@gmail.com

5G-INDUCE targets the development of an open, ETSI NFV compatible, 5G orchestration platform for the deployment of advanced 5G NetApps. The project focuses on the Smart Industries vertical sector, the fastest growing and most impactful sector in the European economy and the developed Network Apps showcase adv advanced use case functionalities in different fields and with diverse performance requirements, in benefit of the industrial automation, productivity, safety, and security. platform's unique features provide the capability to the NetApp developers to define and modify the application requirements, while the underlay intelligent OSS can expose the network capabilities to the end users on the application level without revealing any infrastructure-related information. This process enables an application-oriented network management and optimization approach that is in line with the operator's role as manager of its own facilities, while it offers the development framework environment to any developer and service provider through which tailored made applications can be designed and deployed, for the benefit of vertical industries and without any indirect dependency through a cloud provider.

For the cause of this project, iLink developed a use case specifically oriented to working safety proliferation within industrial environments. The methodological framework consisted of diverse technologies, combined in such a way that delivers the best possible outcomes. More precisely, the Network Application includes 5 different components utilizing state-of-the-art software architecture (containerized algorithmic structure) alongside IoT UWB (Ultra-Wide Band) sensors acting as the primary data providers (UWB tags and anchors), and 5G technology.

Investigating the application from the sustainability and circular perspective, there are studies that suggest a strong correlation between working safety and ethical working behavior as an enabler for the establishment of more sustainable and circular working environments (Shayganmehr et al., 2021). Furthermore, the strict networking requirements set in Industry 4.0 cannot be met without the unique capabilities of 5G. Nonetheless, the complexity of such technologies, coupled with a lack of knowledge, expertise, and infrastructure in the industrial sector, pose significant obstacles to achieving sustainable supply chain implementation. To address this issue, our project seeks to remove these barriers by providing the appropriate network infrastructure and an efficient software design through a user-friendly application interface.

The application's deployment provides accurate indoor positioning data, aiming at the location-awareness of selected assets-entities (forklifts and workers). After performing numerous testing sessions both in the laboratory and Experimental Facilities (Whirlpool, Italy), the application presented satisfying results regarding the pre-set KPIs (Key Performance Indicators). Indicatively,

100% of the entities mounted with IoT sensors have been identified and visualized properly on the administrator and mobile maps, while the collision detection component correctly estimated all the imminent collision incidents and raised audio and visual alerts to the mobile users (forklift drivers and workers).
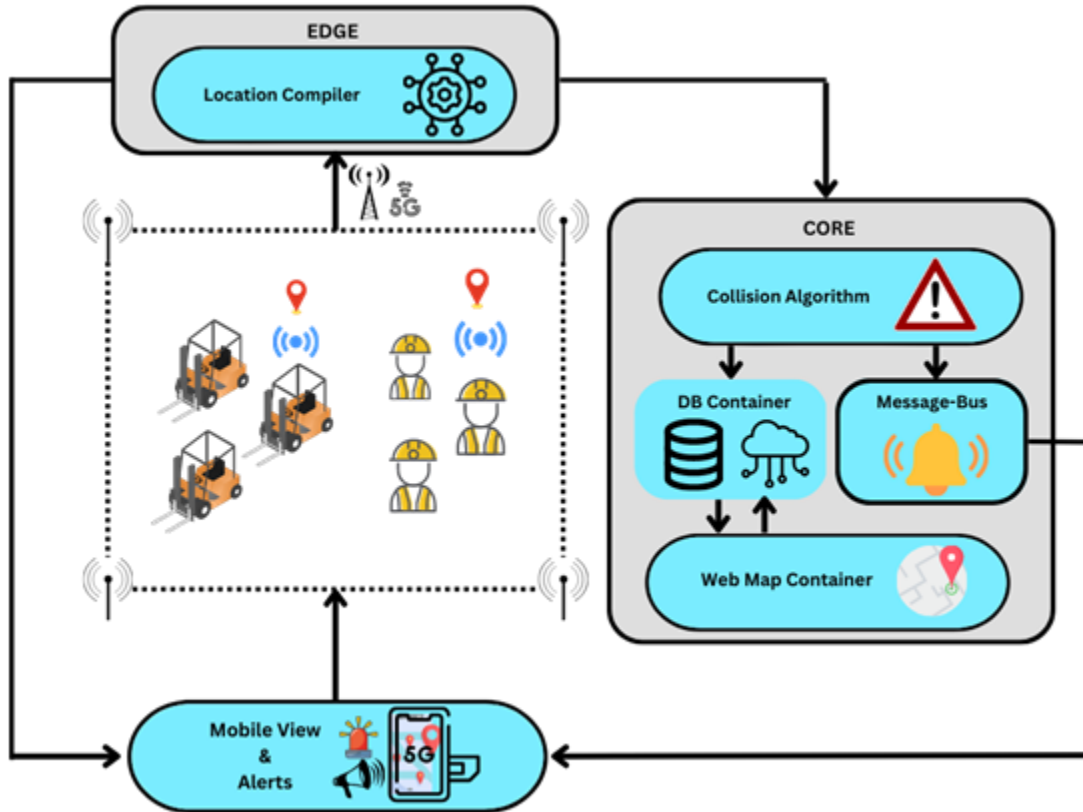
Keywords: smart safety; Industry 4.0; 5G; sustainability; supply chain.

References
Shayganmehr, M., Kumar, A., Garza-Reyes, J. A., & Moktadir, M. A. (2021). Industry 4.0 enablers for a cleaner production and circular economy within the context of business ethics: A study in a developing country. *Journal of Cleaner Production*, *281*, 125280.