European Mining in the Green and Digital Era

3rd Press Release

Advancing mining innovation: Ore sorting system and industrial IoT infrastructure

During the past 6 months, the I-SENSE research group of the Institute of Communication and Computer Systems (ICCS) of the National Technical University of Athens was committed to designing the systems that will be used during the MASTERMINE project's integration. Special focus was given to the GREENMINE and CYBERMINE modules, aiming to enhance the environmental sustainability of the mining operations and foster the connectivity and digitalisation of mines, respectively. I-SENSE introduced the design of an Ore Sorting System which will be installed in TERNA MAG's premises next year and aims to improve the efficiency of the magnesite sorting process that already takes place in the mine.

TERNA MAG is a mining company that exploits magnesite deposits in the northern part of Evia Island. The company produces magnesite and magnesia, and it is also one of the end-users of the MASTERMINE project. This innovative Ore Sorter system will make use of Optical, Hyperspectral and X-Ray technology to recognize ore samples and subsequently utilise pneumatic systems to separate them into categories based on their composition. After visiting the premises of TERNA MAG, the ICCS team has determined the mechanical requirements of the systems, including the types of ore that need to be separated, the size fractions in which the ore is currently divided, and the steps where the existing sorting process can be enhanced to produce a final magnesite product of higher quality.

Based on these requirements, the first version of mechanical designs has been developed, creating the basic form of the sorting system, including the sensors' placement, separation module, and conveyance module. Moreover, pneumatic equipment has been procured, along with samples from TERNA MAG, to create prototypes and create lab simulations of the sorting process.

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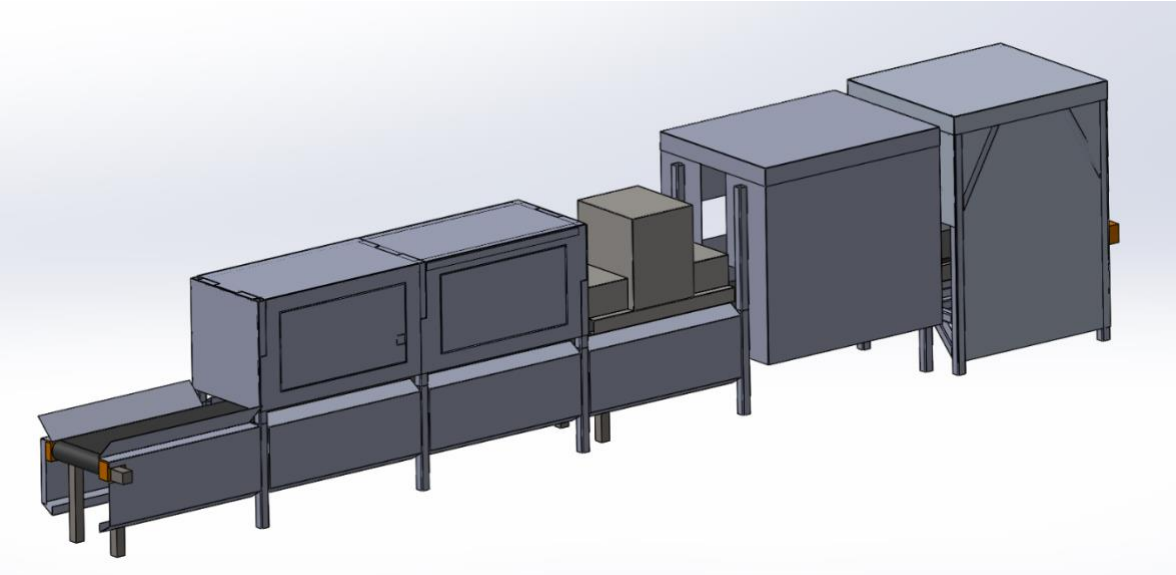
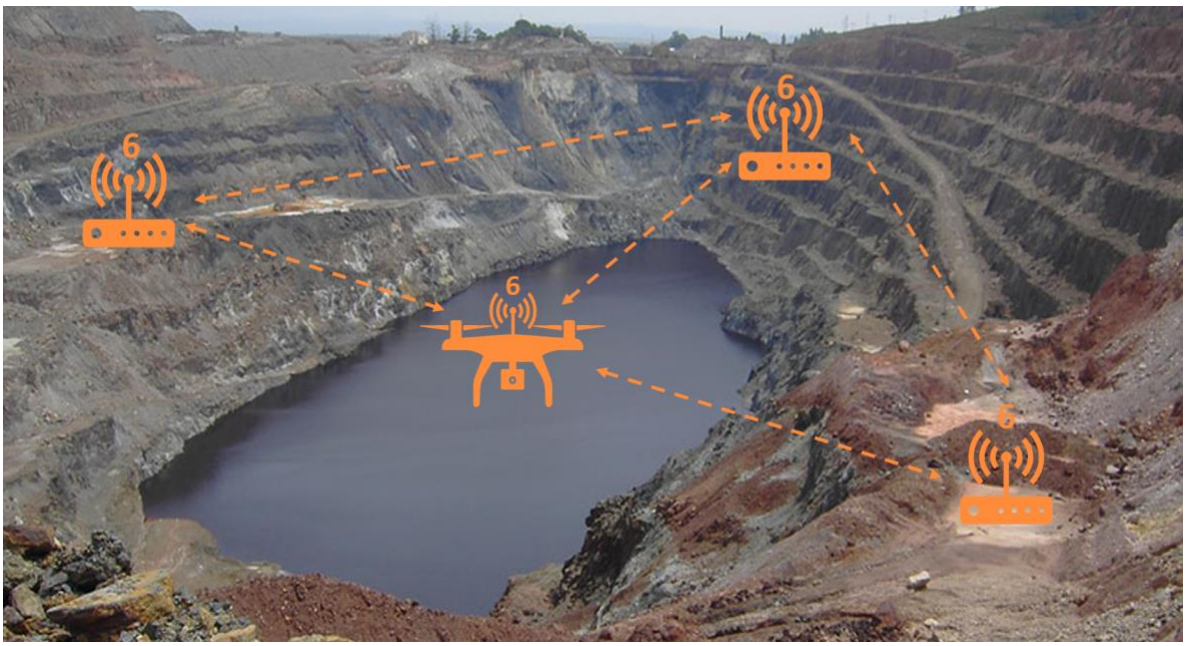


3D design of the Ore Sorter

Furthermore, significant progress has been achieved in the development of the Industrial IoT system. This system aims to establish a network offering WiFi 6 connectivity within mines, which in turn will allow for sensors (installed as part of the project's other modules e.g. GREENMINE, AUTOMINE, GEOMINE), to send and receive data related to the mines operations. This system is therefore a crucial part of MASTERMINE's infrastructure.

Several bilateral discussions have taken place between the end users of the sorting system and the ICCS team to determine the spatial requirements for the installation of the system in each mine and the necessary equipment. Moreover, a summary of technical requirements has also been set by MASTERMINE's technical partners, to define the networking needs as far as sensors' data collection and exchange are concerned.



Overview of the IIoT system architecture

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This information has been aggregated and analysed by the ICCS Team, and WiFi-6 equipment has been procured accordingly to set up the first prototype of the network and explore its functionalities. This equipment will also be used to ensure the applicability of drone-mounted APs, another innovative solution of the MASTERMINE project. These Access Points mounted on UAVs will be used to extend the network coverage provided by the IIoT network. In that manner, sensors outside the network's normal range, or those installed in difficult-to-reach areas, will be capable of data exchange without the need for mine workers to manually collect these data.

About the project

MASTERMINE is a 4-year Horizon Europe co-funded project which aspires to become the go-to ecosystem for mines that envision digitalisation, environmental sustainability, productivity monitoring and public acceptance within their strategic goals. The focus will be on an Industrial Metaverse (IM) approach to build a digitalized copy of a real-world mine.

The project will demonstrate its applicability in 4 EU demo cases and one replication demo in South Africa. The mining partners offer access to a total of 10 mines around Europe, producing 10 different raw materials, including 4 CRMs (Cobalt, Coking Coal, Phosphate Rock and Platinum).

MASTERMINE consists of six high-level modules:

- CYBERMINE: Leading the digital transformation of EU mines.
- AUTOMINE: Establishing autonomous and electric operations along with smart monitoring and maintenance.
- GEOMINE: Ensuring safety and stability in critical structures.
- GREENMINE: Enhancing the environmental sustainability of the mines.
- METAMINE: Building the first mining metaverse of the EU mines.
- OURMINE: Connecting the mining industry with the surrounding community to build trust and foster social innovation.

Project title: European Mining in the Green and Digital Era

Project ID: 101091895

Start Date: 01/12/2012

Project Duration: 48 months

Project Consortium:

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