May 2019

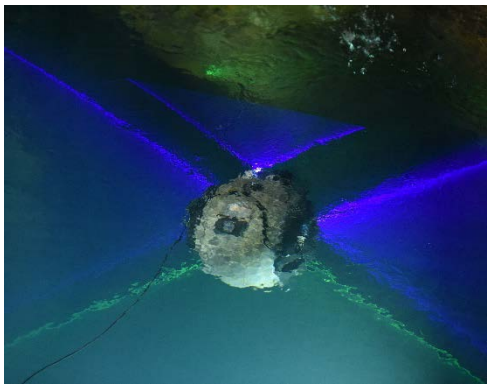
UNEXMIN explores the most relevant mine workings at Deep Ecton; Technology development continues with data processing and analysis

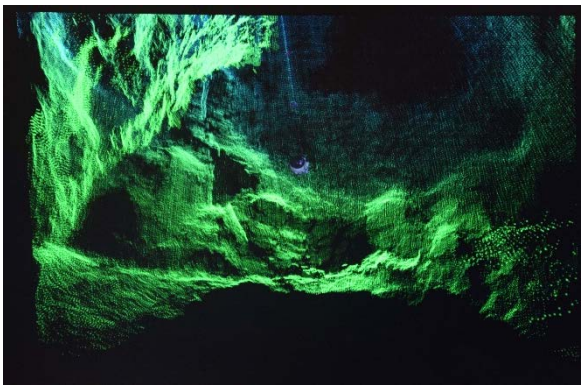
The UNEXMIN project is developing a technology capable of autonomous exploration and mapping of flooded underground mines. The robotic platform uses non-contact methods to gather geological, mineralogical and spatial data without major costs or risks associated. The field trials, set up at four different flooded underground mines in Europe, help the team to access the platform's development and to make improvements to the unique technology.

From the 13th to the 31st of May 2019 the UNEXMIN consortium was in the UK to continue its pilot trials itenerary. Ecton mine received the UNEXMIN team and the UX-1 robots in a trial that marked the fourth time in the field. At Ecton the objective was to dive into the most important flooded mine workings - shafts and galleries - and explore and map them. Geological and archeological identification was also a main aim of the efforts.

During the three-week period, UNEXMIN managed to test the technology in a representative, challenging site. The inspection activities with the UX-1 robots led to the exploration of three of the main flooded shafts in Ecton – the Great shaft, the Winding shaft and the Pipe – with relevant mapping results. Other outcomes of relevance are as follows:

- Deepest dive to 125m in the Great shaft (26/05/2019)
- Geological features and mineralogy identified through visual clues
- Archeological discoveries of importance, including huge workings not seen since the 1850s and linking passages not marked on old plans





With the trial now over, the team will proceed with post-processing the retrieved data. From these, models will be constructed to facilitate viewing the mine workings and identified geological and archeological structures, that nobody has seen for more than 160 years.

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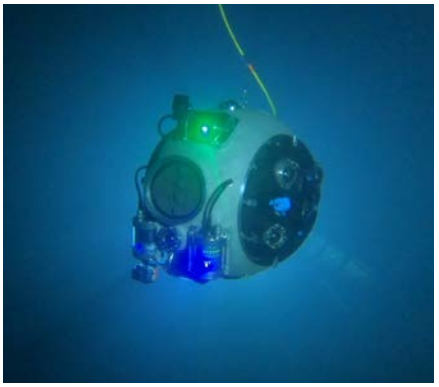
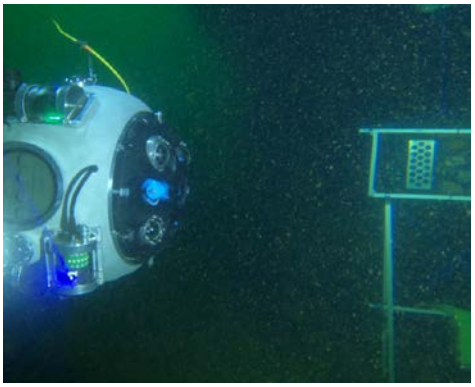
Background

- ➔ The EU is currently dependent on the import of many mineral raw materials
- ➔ Within EU borders there are around 30,000 closed mine sites, many of which with relevant mineral resources still to be exploited
- ➔ Abandoned deep underground mines are becoming more interesting
- ➔ Most of these are currently flooded, making their exploration and assessment a difficult process. There is a lack of information on their status and layout

UNEXMIN develops a novel robotic system for the autonomous exploration and mapping of Europe's flooded mines. The robotic platform, made by three robots, uses non-contact methods for 3D mine mapping to gather geological, mineralogical and spatial data that can be used to consider new exploration and exploitation scenarios for European mineral resources.

UX-1 ROBOT CHARACTERISTICS

- ➔ Maximum operational depth: 500m
- ➔ Spherical shape
- ➔ Diameter: 0.6m
- ➔ Weight: 112Kg
- ➔ Energy consumption: 250-400W
- ➔ Maximum velocity: 1-2Km/h
- ➔ Autonomy: up to 5 hours
- ➔ Neutral buoyancy

Key facts

- ➔ EU funded Horizon 2020 project (RIA: Research and Innovation Action)
- ➔ 12 partners / 7 countries
- ➔ 45 month duration (February 2016 – October 2019)
- ➔ Funding: 4.87 million Euros

Dissemination channels:

Website: www.unexmin.eu

Social media: @UNEXMIN Facebook – Twitter – LinkedIn – YouTube

Videos:

Ecton Salts level - Faro scans
Point Cloud from Salts Level, Deep Ecton
UX-1 Plastic Proto Stability Tests
UNEXMIN: Underwater Explorer for Flooded Mines
UNEXMIN software testing - Universidad Politecnica de Madrid (UPM)
UNEXMIN Project overview
UNEXMIN field trials at Kaatiala mine
UNEXMIN UX-1 robot assembly in Porto
UNEXMIN Idrija tests
UNEXMIN Idrija field trials video
UNEXMIN Ecton field trials short video

Images:

UNEXMIN Image Gallery

Press releases:

July 2016
November 2016
February 2017
July 2017
February 2018
May 2018
July 2018
October 2018
February 2019
May 2019 (1)
May 2019 (2)

UNEXMIN partners:

Universidade of Miskolc, Hungary
Geological Survey of Slovenia, Slovenia
Tampere University, Finland
Universidad Politécnica de Madrid, Spain
La Palma Research Centre, Spain
INESC TEC – Institute for Systems and Computer Engineering, Technology and Science, Portugal
Resources Computing International Ltd (4dcoders), UK
Ecton Mine Educational Trust, UK
European Federation of Geologists, Belgium
Geo-Montan, Hungary
Empresa de Desenvolvimento Mineiro, S.A., Portugal
Idrija Mercury Heritage Management Centre, Slovenia

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This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement n° 690008