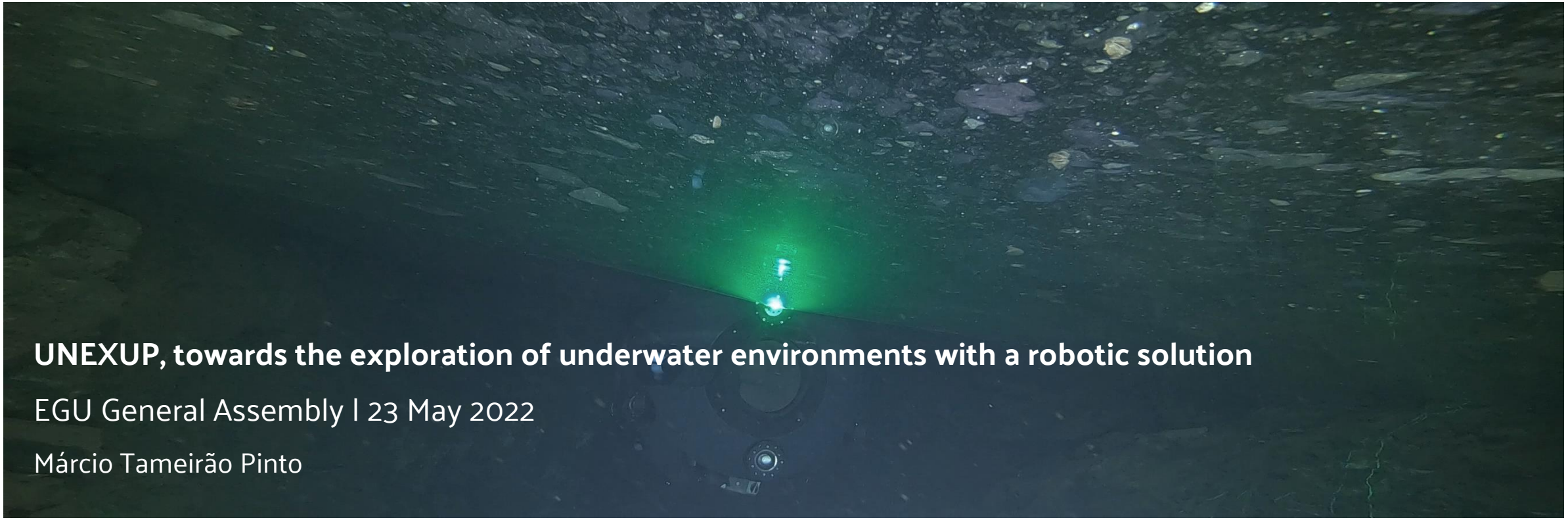
UNEXUP



UNEXUP, towards the exploration of underwater environments with a robotic solution

EGU General Assembly | 23 May 2022

Márcio Tameirão Pinto

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UNEXUP Details

- Co-funding: EIT RawMaterials
- Start date: January 2020
- Duration: 36 months
- Context: Direct continuation of the Horizon 2020 UNEXMIN project (unexmin.eu/)
- Output: A robot-based exploration service – spatial and geoscientific – for mines and other underwater environments

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Consortium partners – three knowledge pillars

- Research

GeoZS
Geološki zavod Slovenije

INESCTEC
TECHNOLOGY & SCIENCE
ASSOCIATE LABORATORY PORTUGAL

- Education

MISKOLCI EGYETEM
UNIVERSITY OF MISKOLC

POLITÉCNICA

- Industry

LINEXMIN
GEOROBOTICS

LPRC LA PALMA RESEARCH CENTRE

4coders

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UNEXMIN - UNEXUP

(2016 – 2019)

Development and testing of a multi-robotic platform for spatial and geoscientific survey of underwater environments

Core objective: Develop a prototype for underwater exploration; raise scientific interest

(2020 – 2022)

Commercialization of the robotic technology, while further improving its software, hardware and capabilities

Core objective: Upgrade the robotic technology; commercialize it as an exploration service

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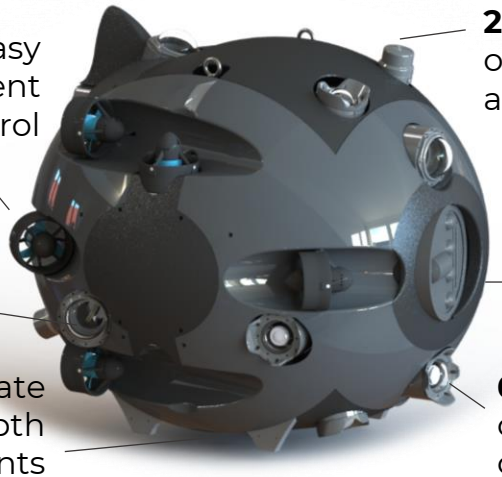
UX-1Neo

- ✓ **Ellipsoidal (700 x 620 mm)**
- ✓ **Modular design**
- ✓ **Less than 90 Kg**
- ✓ **Swappable batteries**
- ✓ **Over 500m depth**
- ✓ **>8h operation estimated**



8 thrusters: easy and efficient motion control

6 SLSs: detailed mapping of the environment

DVL: accurate position and depth measurements

2 scanning sonars: obstacles detection and avoidance

Multibeam sonar: mapping of large mine cavities

6 Cameras: complete perception of the environment

Mechanical pendulum: pitch position lock

- ✓ **Hyperspectral unit**
- ✓ **Water sampler unit,**
- ✓ **Water chemistry unit**
  - **pH**
  - **O2 concentration**
  - **EC**
  - **temperature,**
  - **pressure**
- ✓ **Sub-bottom profiler**
- ✓ **Fluxgate magnetometer**

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Field Missions

- **Urgeiriça Mine, Portugal – 05/2021**
  - First field mission with UX-1Neo
  - Testing UX-1Neo & training of operators
  - 6 days mission
  - Reached the bottom at 186 m

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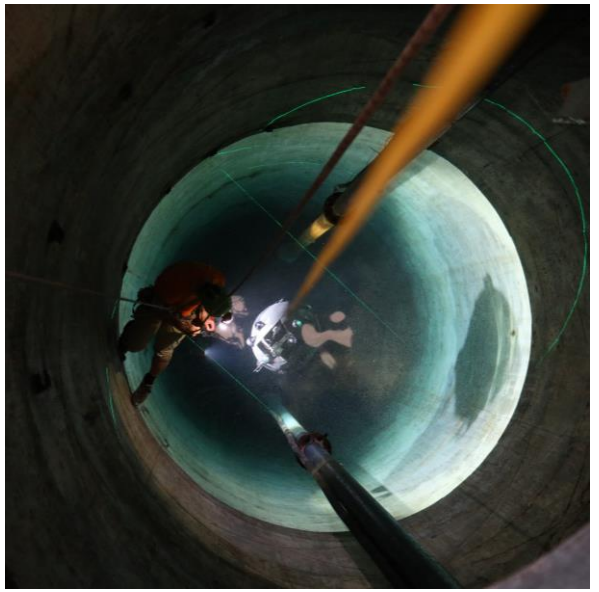
Field Missions

- **Csor well, Hungary – 06/2021**
  - Accurate 3D Mapping of the Csor well
  - Commercial field mission
  - 1-day mission
  - ~66 m



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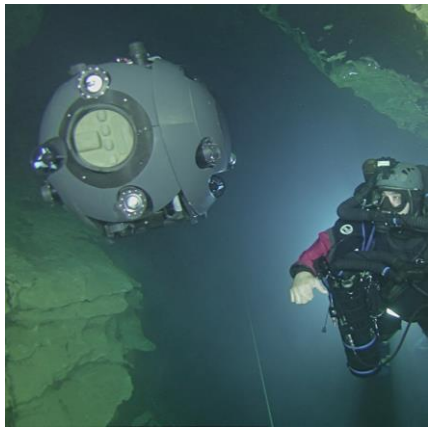
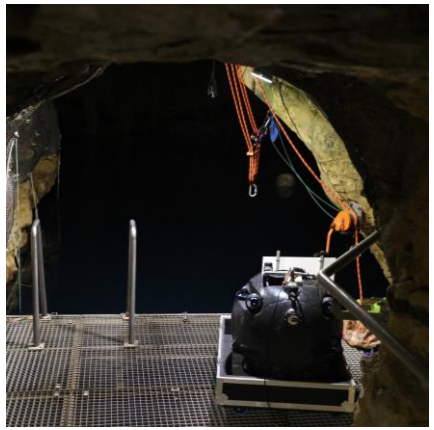
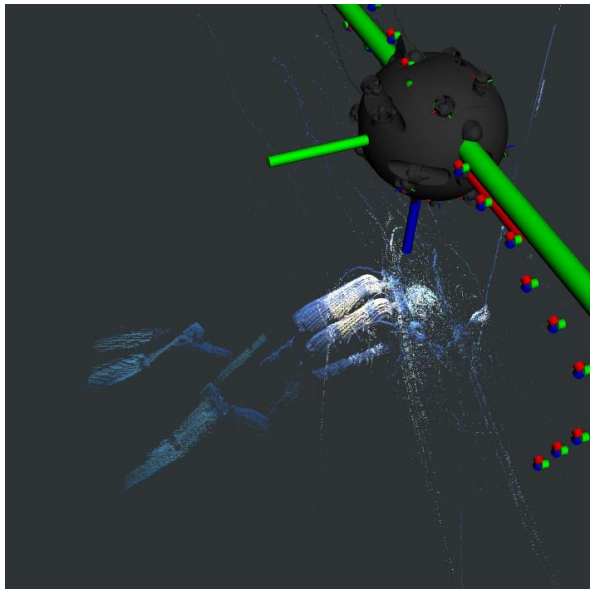
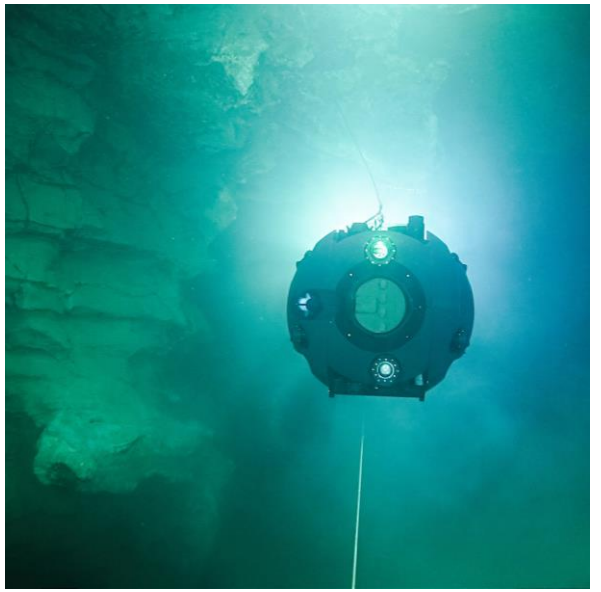
Field Missions

- **Molnár János cave, Hungary – 06/2021**
  - Further testing of UX-1Neo
  - 3-day mission
  - Underwater footages/ video material









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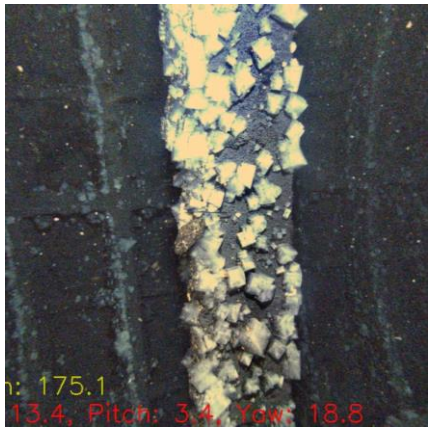
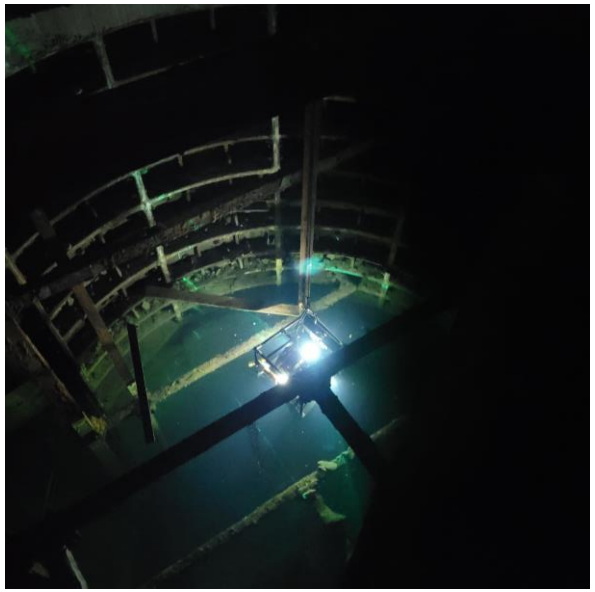
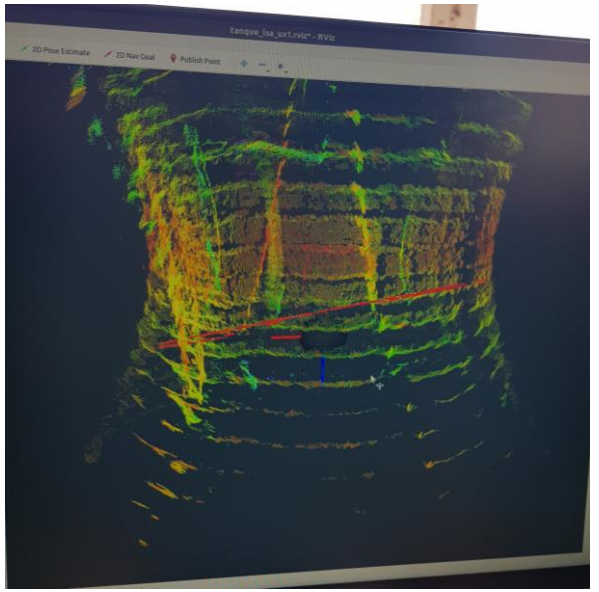
Field Missions

- **Solotvyno mine, Ukraine – 06/2021**
  - Commercial mission, mine assessment
  - 10-day mission
  - Exploration of 3 shafts and 2 lakes in salty water







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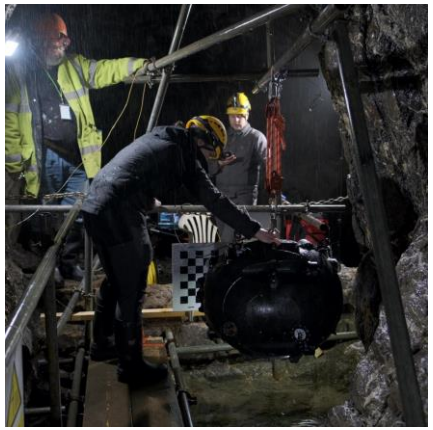
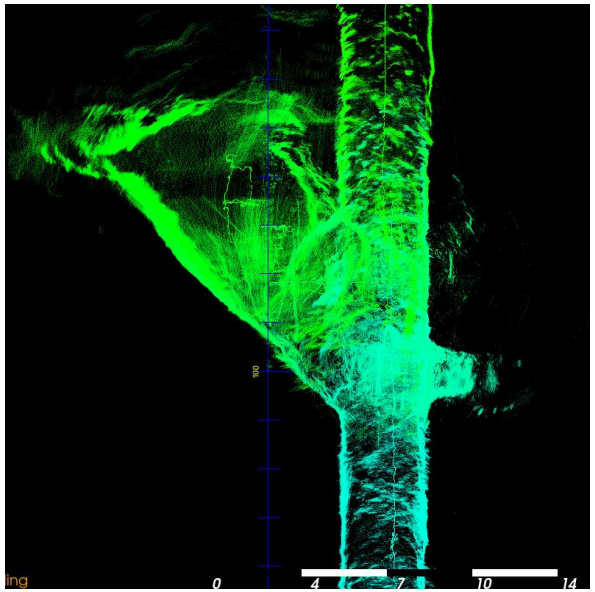
Field Missions

- **Ecton mine, UK – 03/2022**
  - Spatial data with sonars and lasers
  - Water parameter measurements
  - 3D photogrammetric models





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Commercialization

UNEXMIN GEOROBOTICS

INTERESTED IN HAVING YOUR FLOODED SITE SURVEYED?
CONTACT UGR: info@unexmin-georobotics.com

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