Sikorsky Challenge

2023

PROTECTION OF CRITICAL INFRASTRUCTURE OF THE COASTAL SEABED AREA

Oksana VOVK

THE IDEA OF THE PROJECT

A system is proposed that is aimed at determining the characteristics of the seabed and underwater objects in order **to timely detect and predict geoanomalies** that pose a threat to the integrity of critical underwater infrastructure.

The proposed system **"Guardian GeoRadar Medusa - GGRM"** allows **mapping the geostructure of the seabed** in order to identify areas of violation of the structural integrity of the underwater infrastructure on an autonomous platform.

MARKET TARGET GROUPS

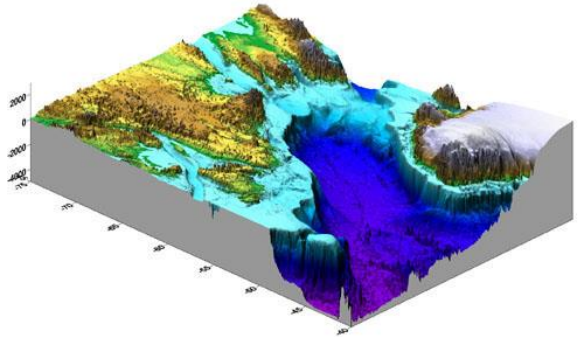
The defense sector has a strong interest in advanced maritime security technology. GGRM system's capabilities can potentially be used to protect military underwater infrastructure and maritime borders. Anticipated target markets for GGRM system include: **The oil and gas sector**, which relies heavily on underwater production and transportation infrastructure. The implementation of GGRM system can improve the safety of these critical assets, reducing the risk of environmental disasters and operational disruptions. **Maritime security and defense:** Governments and defense organizations can benefit from a system that can protect vital underwater defense infrastructure, such as naval bases, submarine facilities, and maritime borders.

Environmental Monitoring and Conservation: Environmental agencies and conservation organizations can use the system to monitor and assess the impact of human activities on marine ecosystems, helping to ensure sustainable practices. **Underwater Construction and Engineering, Port`s infrastructure:** Companies involved in underwater construction and engineering projects.

PROBLEMS SOLVING BY GGRM

GGRM system is designed to solve the problem of protecting underwater critical infrastructure from the aggressive effects of natural and anthropogenic factors. The main aspects of the problem solved by this system are:

- Early detection of threats;
- Real-time monitoring;
- Prediction of anomalies;
- Use of innovative technologies;
- High reliability and stability;
- An integrated approach;
- Visualization of results;
- Universality of application.

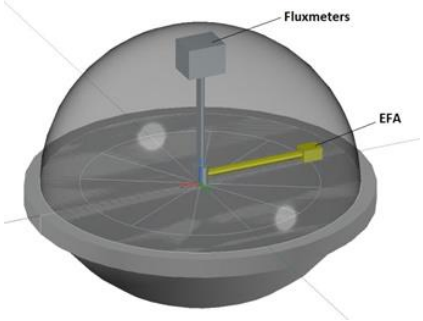


THE SYSTEM FOCUSES ON EARLY DETECTION, REAL-TIME MONITORING, ANOMALY PREDICTION AND THE USE OF INNOVATIVE GIS TECHNOLOGIES

COMPETITORS

As a result of the commercial analysis, similar monitoring systems were found, but they all work **temporarily**, not constantly in real time. As a result, the database is limited and it is difficult to decipher the measurements obtained.

TECHNICAL SOLUTION



The technical solution is represent a stand-alone platform, where the main elements are electromagnetic signal detectors of the protected area - EFA and fluxometer, uninterruptible power supply (solar panels), signal processing and transmission unit.

The EFA device allows detecting active geodynamic zones of change in the seabed electrical conductivity anisotropy up to a depth of 900 meters.

The use of a set of EFA methods and a fluxmeter will eliminate the ambiguity of interpretation of the measurement results of each method, and detail the geodynamic state of the seabed massif under study.

PROJECT DEVELOPMENT ROADMAP

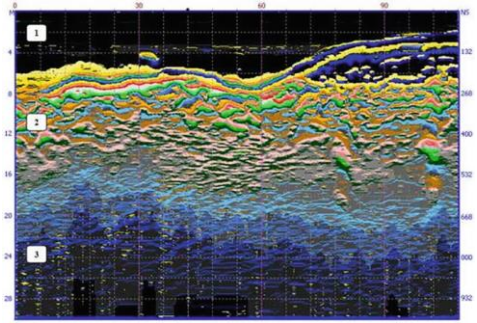
Key stages in 12 months:

- GGRM prototype:

Design and build a stand-alone platform with integrated EFA devices, a fluxmeter, and a signal processing and transmission system. Conducting preliminary testing of platform functionality and stability in a controlled environment.

- Software development:

Start development of the unit software for data processing and interpretation. Implement algorithms for comparing the collected data with the local background data, detecting anomalies and generating profile pickets anomalies and generating profile pickets.



Key stage in 24 months:

- Field testing: Deployment of the GGRM system in a real coastal underwater environment to conduct field tests and verify its performance in various conditions.

ESTIMATED PROJECT COST

Stage 1 - Technical documentation development

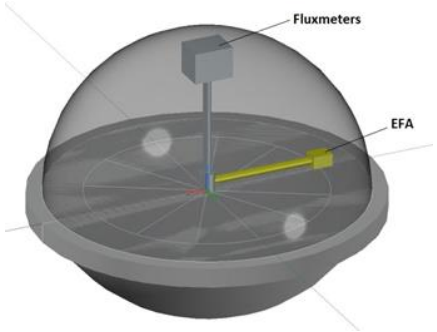
Stage 2 - Creation of design solutions

Stage 3 - Production of a prototype/model sample

Stage 3.1 - Software development

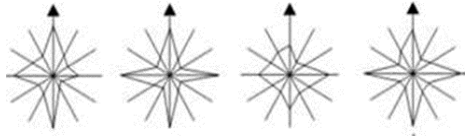
Stage 4 - Testing and harmonization

500000 EUR

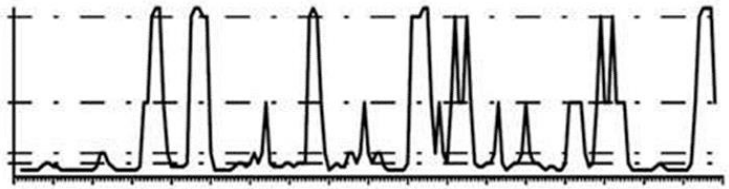


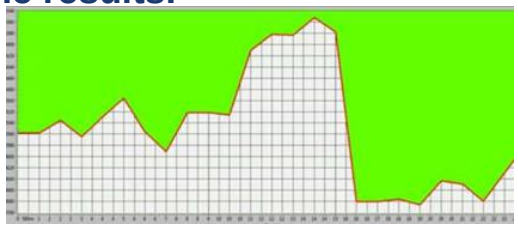
THE CURRENT LEVEL OF TECHNOLOGICAL READINESS

Monitoring the state of electric field strength in the surface layer of the Earth's atmosphere is necessary to ensure the normal functioning of complex technical systems. The device implements a set of analog and digital methods of information signal processing. The use of digital technologies reduces the errors inherent in analog methods, as well as increases the accuracy of measurements and the speed of data transmission for further analysis and archiving. Particular attention is paid to the formation of the algorithm of the computing process, which results in the final measurement result.

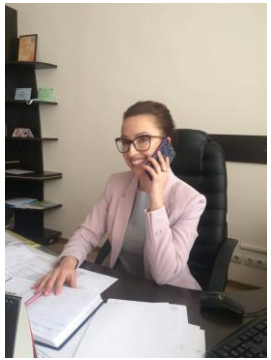


The stage of project development at the stage of successful testing of the monitoring technology using the EFA device and fluxmeter, and the development of a program for processing the results.





PROJECT TEAM



Oksana VOVK

LEADER

Natalia ZUIEVSKA

Mykola YAKYMCHUK

Elnur SHUKURLU

Scientific and management support

Andrzey Krzemien

CEO

Vadym BRONYTSKYI

IT leader