# NUTRA – Ocean Passive Sensor Network

This document presents the concept of a passive underwater sensor network designed for scalable, autonomous, and non-invasive environmental and tactical monitoring.

## System Description

The system consists of autonomous seabed sensors that react to specific environmental triggers (e.g., chemical traces, fuel, seismic activity, temperature changes).

Upon detection, a buoy is released to the surface, transmitting its position via GPS to satellites or aerial vehicles.

## Advantages

- Fully autonomous, requires no infrastructure.

- Low-cost and easy to produce.

- Modular and scalable deployment.

- Virtually undetectable in passive mode.

- Dual-purpose: tactical defense and early disaster warning.

- Environmentally neutral design.

## AI Integration

Future versions may include embedded AI modules for autonomous decision-making. For example, the system could ignore minor disturbances (e.g., magnitude 3 tremors), but trigger alerts on more significant events or pollutant concentrations.

## Deployment

Sensors can be deployed via drone, air-drop, or manually. Density of deployment is adjustable based on the task.

## Prototype

A DIY prototype can be built using basic materials (e.g., sponges, floatation devices, simple chemical reagents). The goal is to demonstrate the passive detection and buoy-release mechanism in a controlled environment (e.g., pool).

— Alexander Shakhov, 2025