

Projeto e desenvolvimento de um veículo autónomo biomimético de subsuperfície

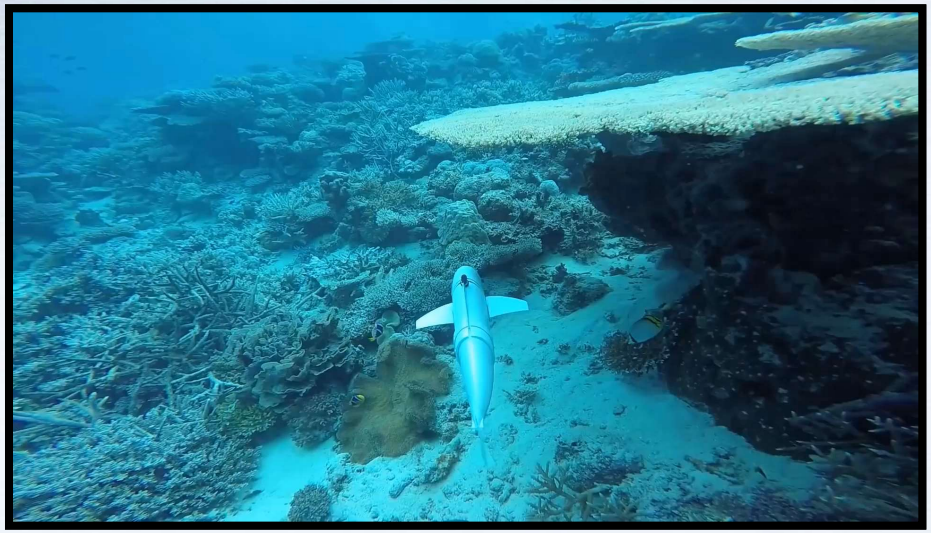
Projeto e desenvolvimento do hardware e software

Aluno mestrando: ASPOF EN-AEL Rocha Araújo
Orientador: Professor Bruno Damas
Co-orientador: Professor Vítor Viegas

Marinha

Underwater Vehicles

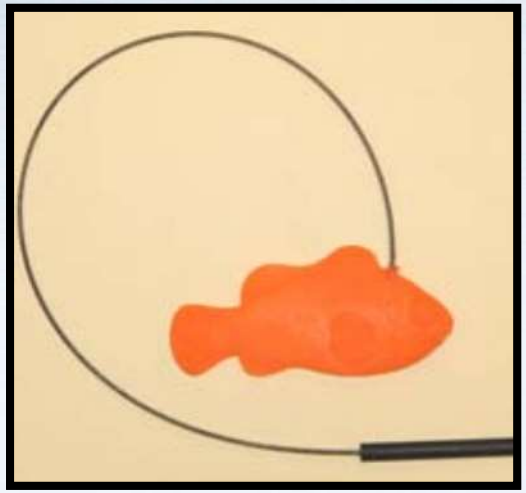
Biomimetic Underwater Vehicles



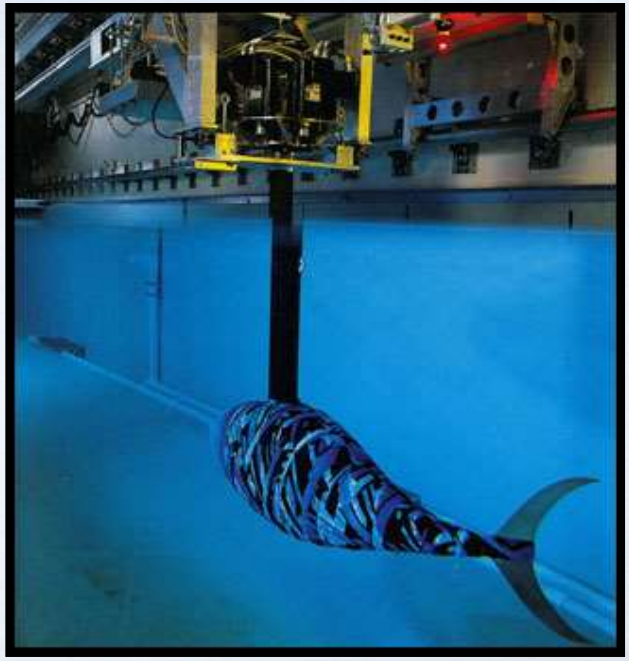


Underwater Vehicles

Biomimetic Underwater Vehicles



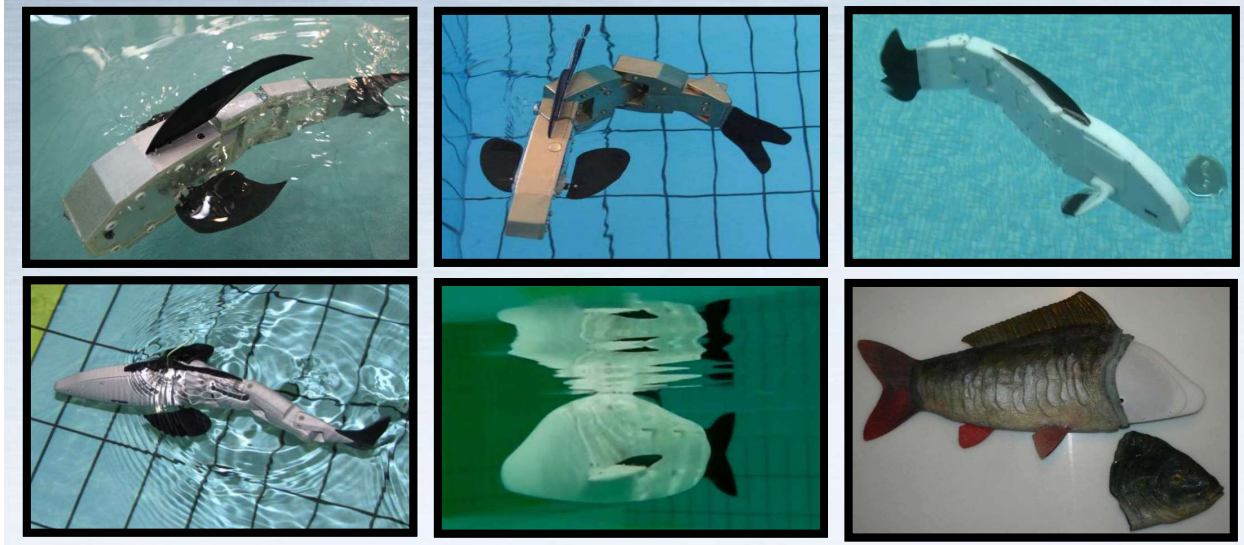
TwiddleFish



RoboTuna

Underwater Vehicles

Biomimetic Underwater Vehicles - Civis



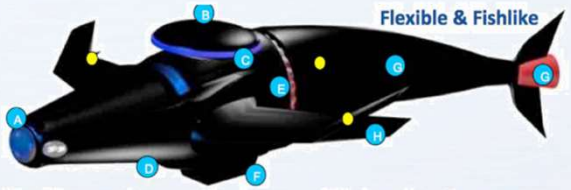
CyberFish



Robot Squid



Bionic Manta Ray Robot



FaaS



Ichthus



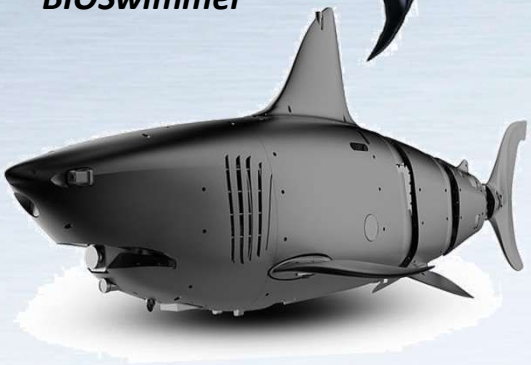
RoboShoal

Underwater Vehicles

Biomimetic Underwater Vehicles - Militares



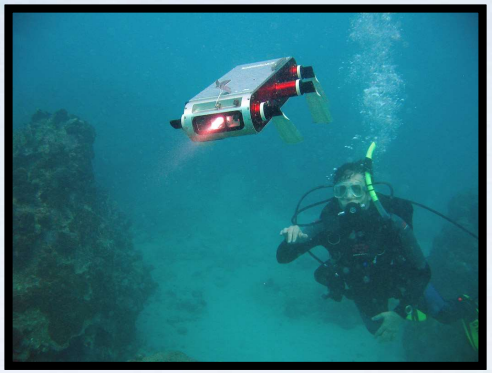
BIOSwimmer



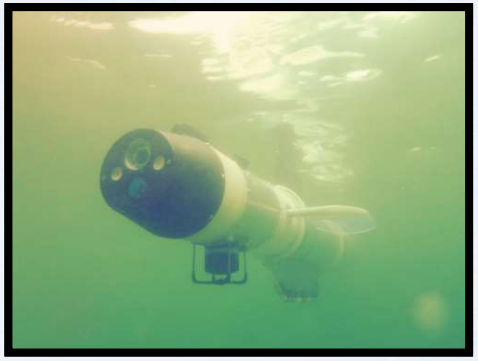
Robo-Shark



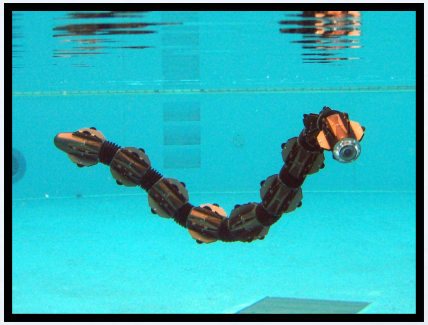
GhostSwimmer



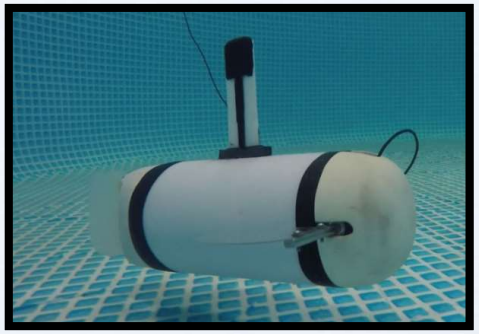
Aqua2



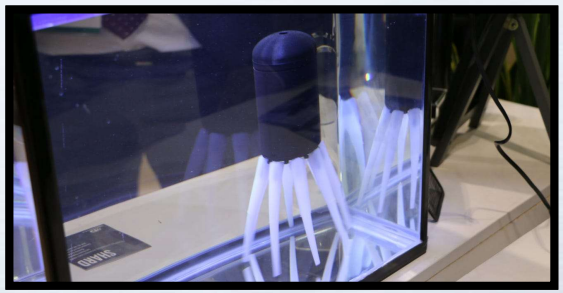
CyberSeal



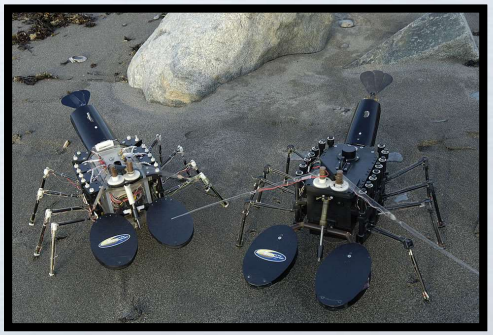
ACM-R5H



Mini CyberSeal

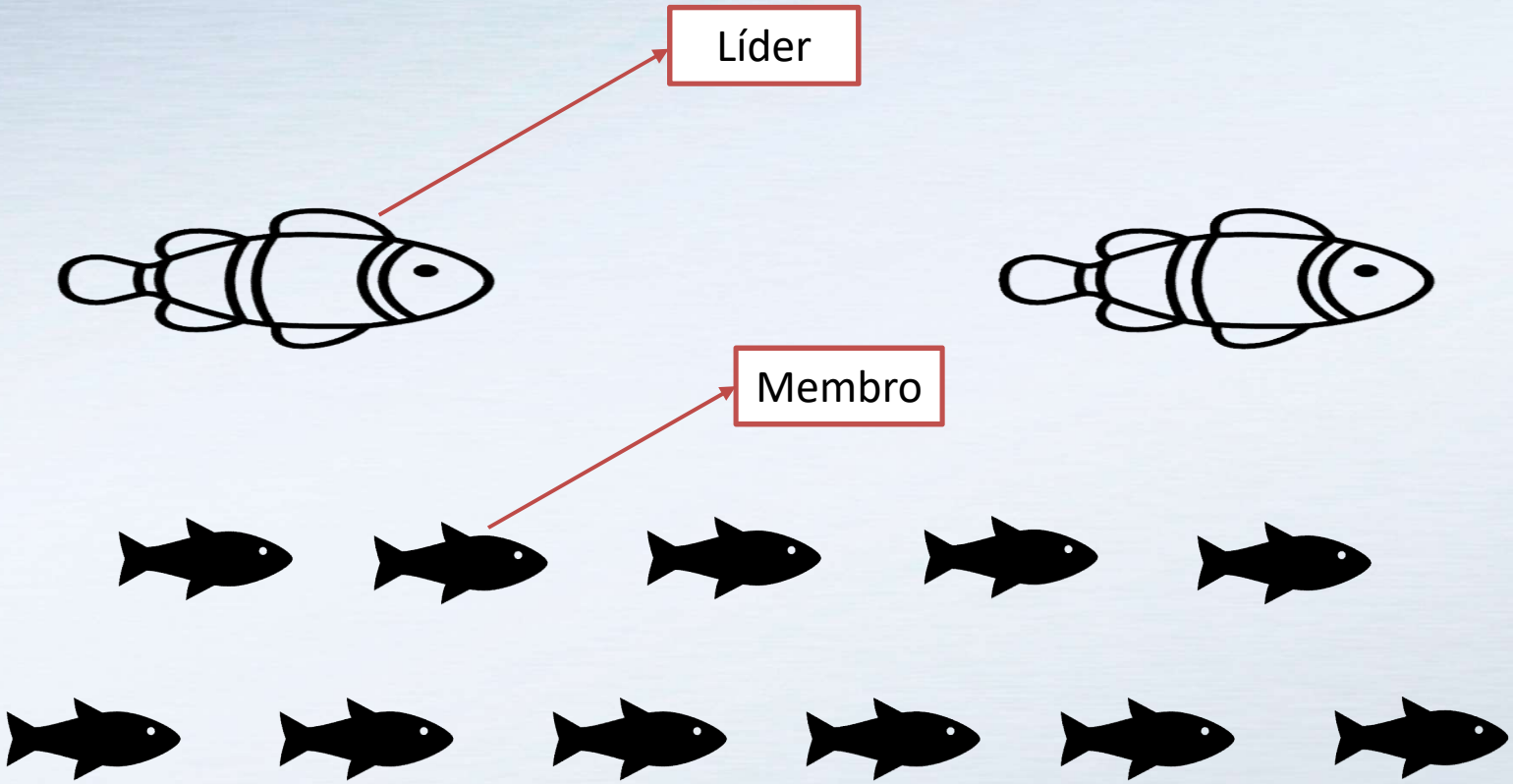


Shard



RoboLobster

SWARM OF BIOMIMETIC UNDERWATER VEHICLES - SABUVIS



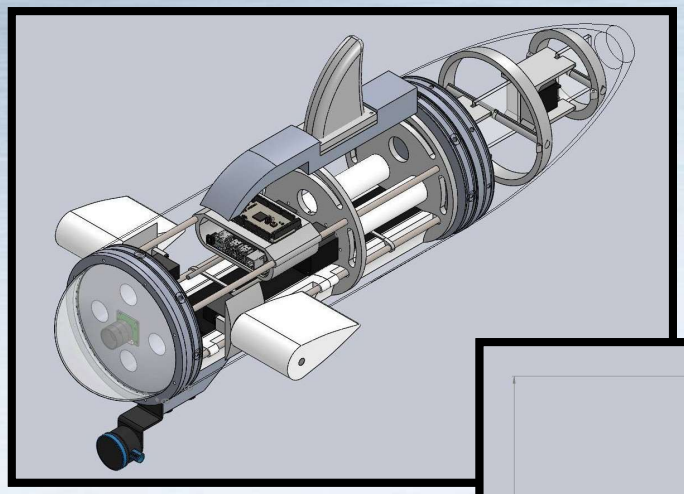
Definição do protótipo

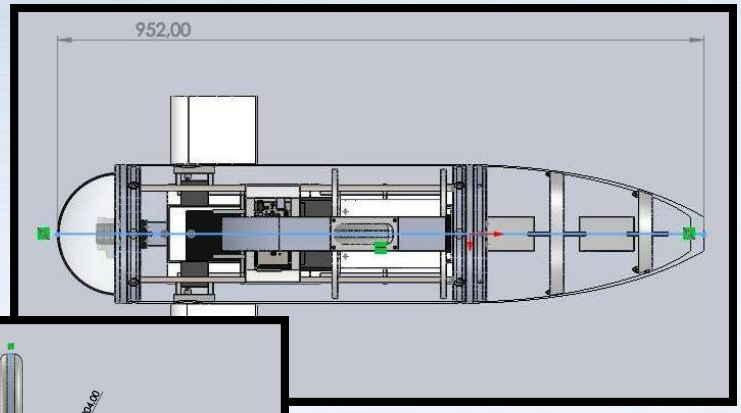
Requisitos operacionais

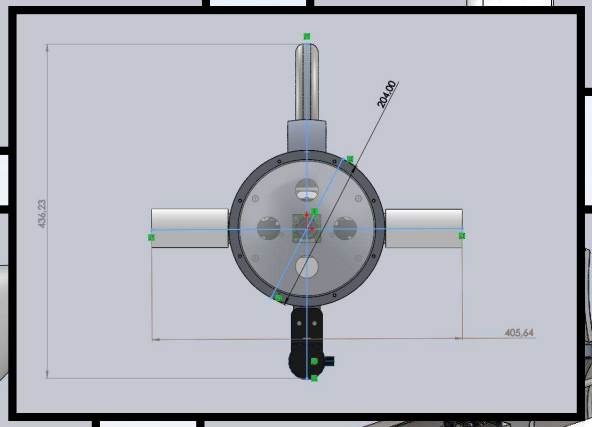
- Inspiração: peixe
- Velocidade horizontal máxima: 1 m/s
- Velocidade vertical máxima: 0,5 m/s
- Autonomia: 2h (veloc. média 0,5 m/s)
- Profundidade máxima: 10m
- Águas navegáveis: costa portuguesa (água salgada)
- Baixo orçamento

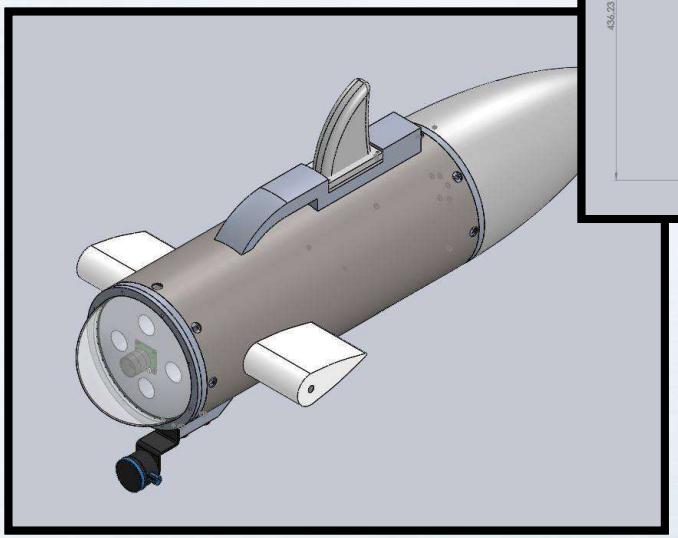
Definição do protótipo

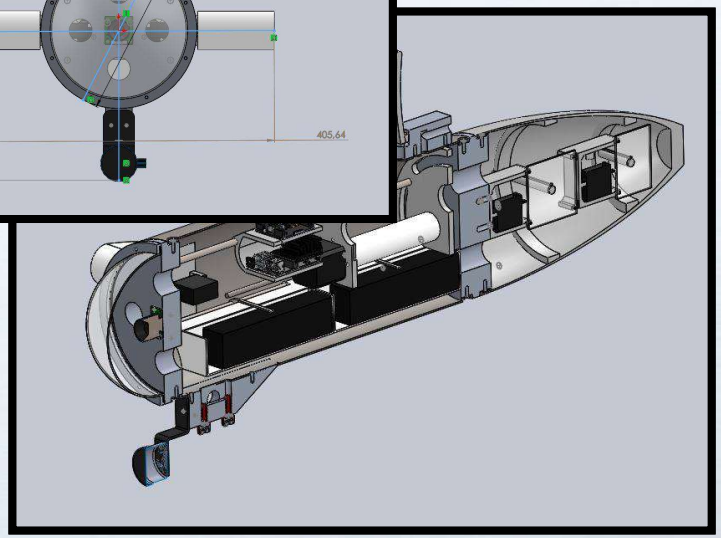
Design e estrutura







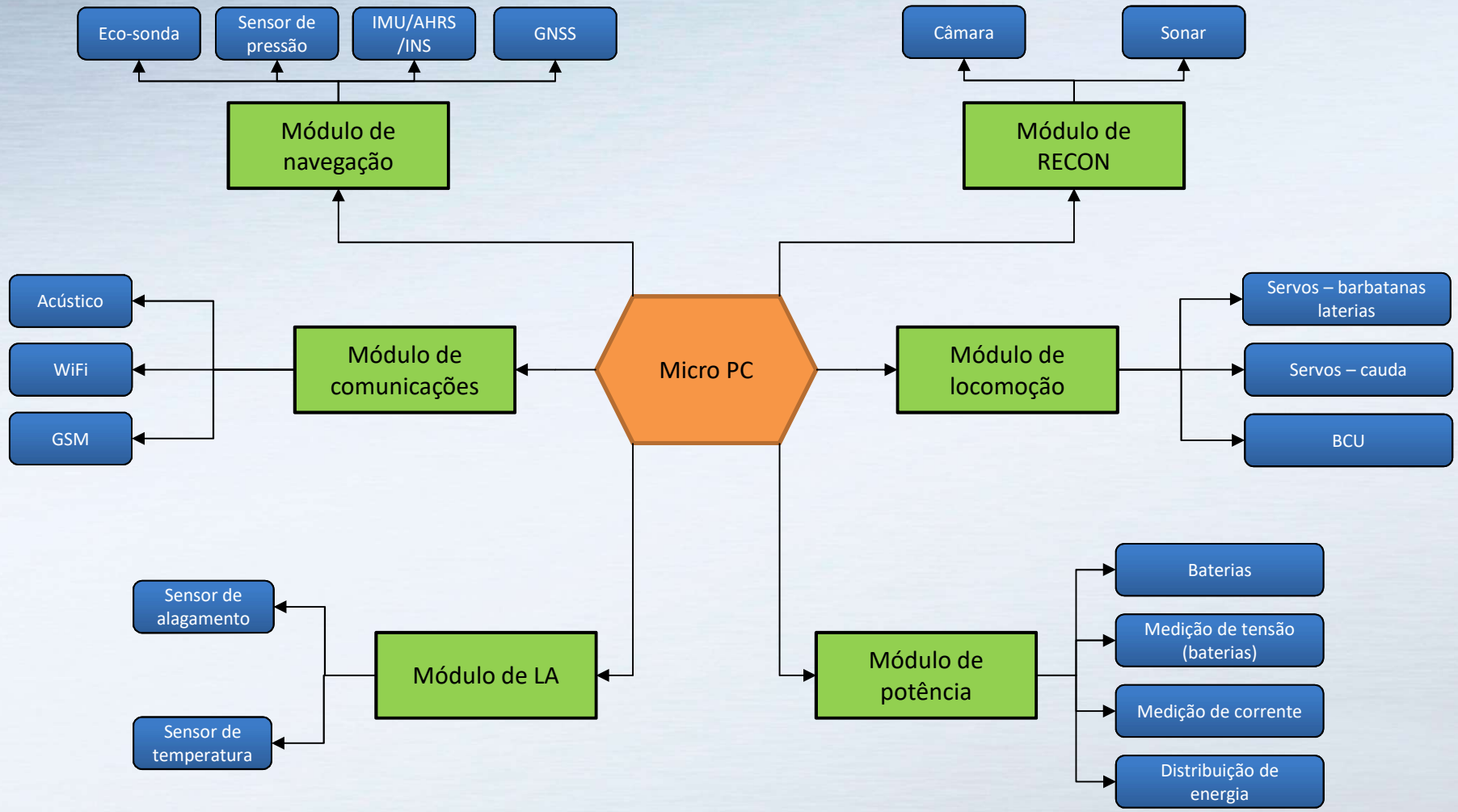




Peso: 21 Kg
Comprimento: 95,2 cm
Altura: 43,623 cm
Largura: 40,564 cm

Projeto de Hardware

Organização do sistema robótico



Projeto de Hardware

Seleção dos componentes






Eco-sonda | Sensor de pressão | IMU/AHRS /INS | GNSS

Módulo de navegação




Câmara | Sonar

Módulo de RECON





Micro PC

Acústico | WiFi | GSM



Módulo de comunicações



Módulo de locomoção



Servos – barbatanas laterias | Servos – cauda | BCU





Sensor de alagamento | Sensor de temperatura

Módulo de LA

Módulo de potência







Baterias | Medição de tensão (baterias) | Medição de corrente | Distribuição de energia

Projeto de Hardware

Resumo do material adquirido

Módulo de hardware	Tipo de equipamento	Equipamento	Empresa produtora	
Micro PC	PC principal	Jetson Nano Development Kit	NVIDIA	
Comunicações	GSM	SIM800L GSM-GPRS 5V V2.0	RoHS	
~~Comunicações~~	~~Modem Acústico~~	~~Micromodem~~	~~WHOI~~	2500€
Comunicações	WiFi	Bullet BM2HP	Ubiquiti	
Navegação	Sensor de pressão	Bar30	BlueRobotics	
Navegação	AHRS	VN-100T Development Kit	VectorNav	
Navegação	GNSS	NEO-7M	Ublox	
Navegação	Eco-sonda	Ping Sonar Altimeter and Echosounder (Ping1D)	BlueRobotics	
LA	Sensor de alagamento	SOS Leak Sensor	BlueRobotics	
~~RECON~~	~~Sonar~~	~~Ping360 Scanning Imaging Sonar~~	~~BlueRobotics~~	1793€
RECON	Câmara	8mP Sony IMX219	Arducam	
Locomoção	Microcontrolador	Mega 2560	Arduino	
Locomoção	BCU Stepper Driver	MP6500	Pololu	
Locomoção	Módulo de relés	Módulo Relé 5V 4 Canais	Hong Wei	
Potência	Sensor de medição de corrente	ACS712T	MicroSystems	
Potência	Sensor de medição de tensão	B25	Eieship	
			Total 2350€	

Middleware

ROS

- Interface de transmissão de mensagens entre processos;
- Recursos semelhantes ao sistema operativo;
- Suporte e ferramentas de linguagem de programação de alto nível;
- Disponibilidade de bibliotecas de terceiros;
- Facilidade na construção de pacotes de software;
- Suporte da comunidade;
- Extensas ferramentas e simuladores.

The MOOS



DUNE

The Orocos Project

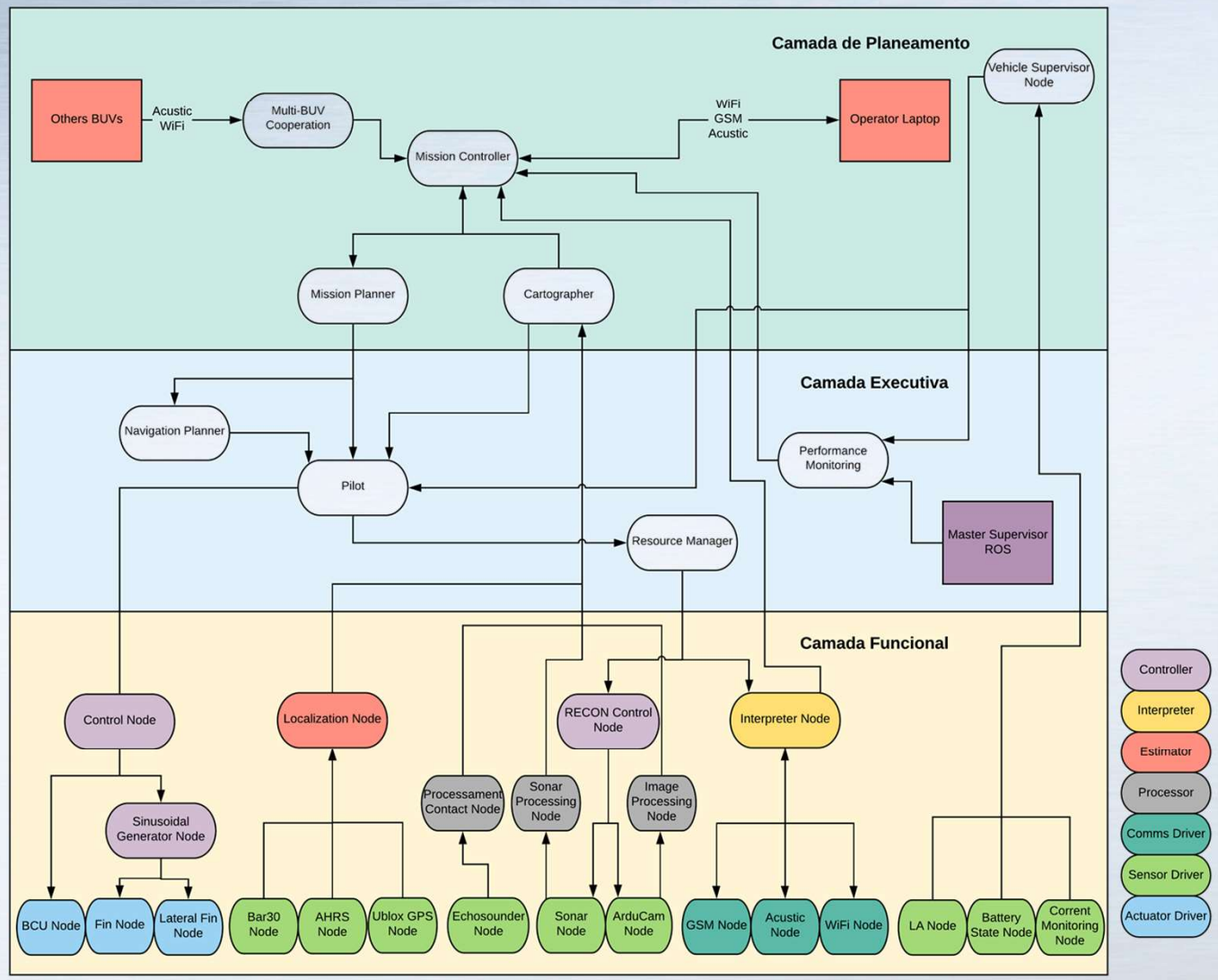
Linguagens selecionadas



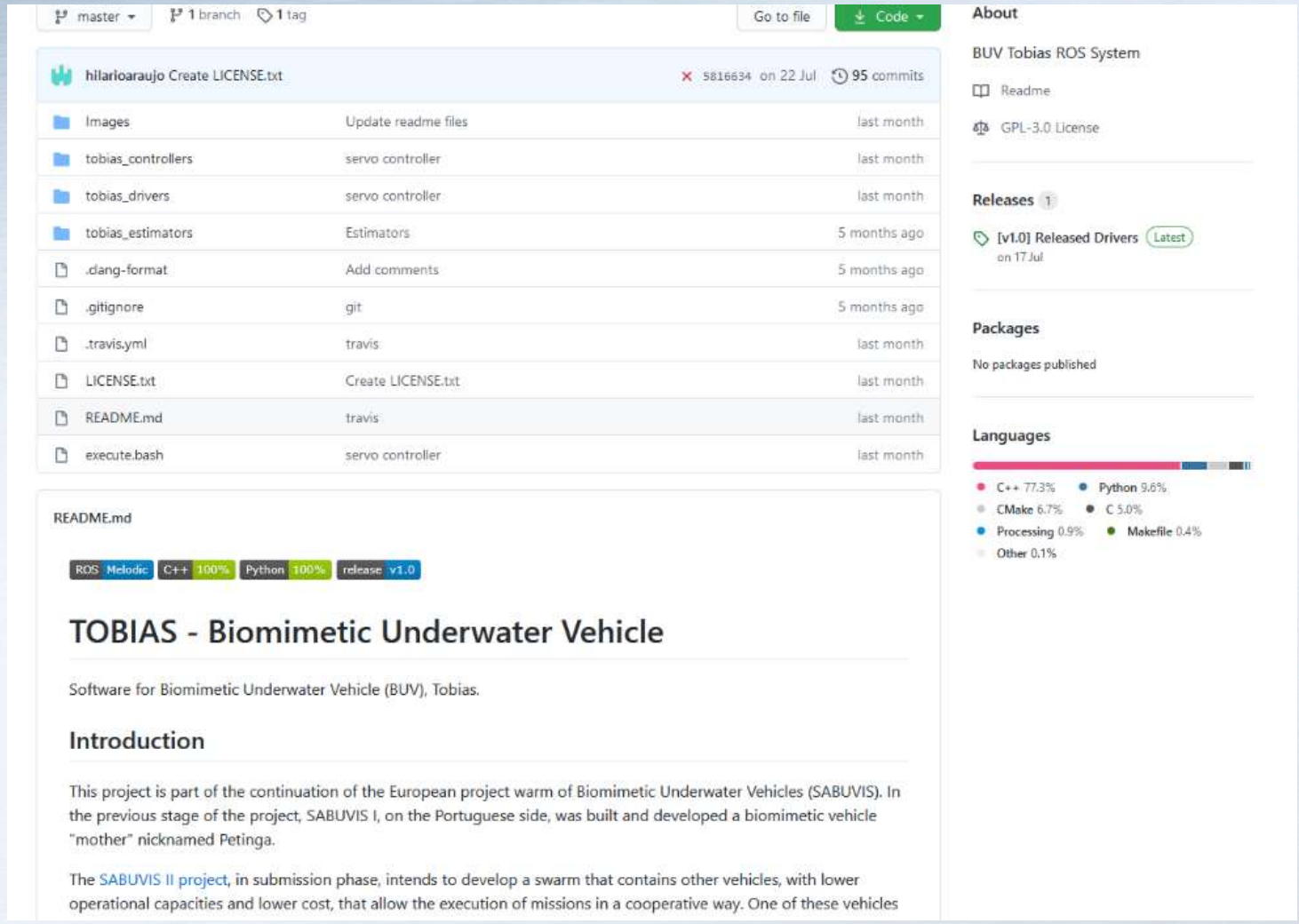


Projeto de software

Arquitetura robótica implementada



Desenvolvimento



master · 1 branch · 1 tag · Go to file · Code

hilarioaraujo Create LICENSE.txt — 5816634 on 22 Jul — 95 commits

Images	Update readme files	last month
tobias_controllers	servo controller	last month
tobias_drivers	servo controller	last month
tobias_estimators	Estimators	5 months ago
.clang-format	Add comments	5 months ago
.gitignore	git	5 months ago
.travis.yml	travis	last month
LICENSE.txt	Create LICENSE.txt	last month
README.md	travis	last month
execute.bash	servo controller	last month

README.md

ROS Melodic · C++ 100% · Python 100% · release v1.0

TOBIAS - Biomimetic Underwater Vehicle

Software for Biomimetic Underwater Vehicle (BUV), Tobias.

Introduction

This project is part of the continuation of the European project warm of Biomimetic Underwater Vehicles (SABUVIS). In the previous stage of the project, SABUVIS I, on the Portuguese side, was built and developed a biomimetic vehicle "mother" nicknamed Petinga.

The SABUVIS II project, in submission phase, intends to develop a swarm that contains other vehicles, with lower operational capacities and lower cost, that allow the execution of missions in a cooperative way. One of these vehicles

About

BUV Tobias ROS System

Readme

GPL-3.0 License

Releases 1

[v1.0] Released Drivers — Latest — on 17 Jul

Packages

No packages published

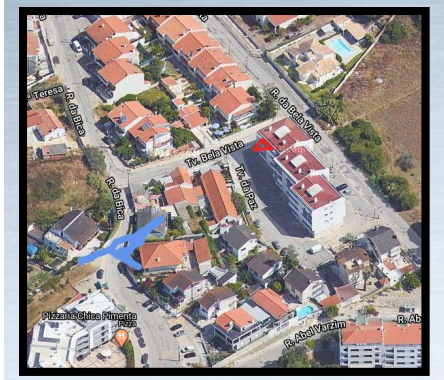
Languages

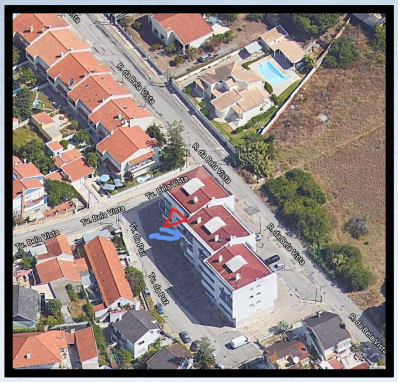
C++ 77.3% · Python 9.6% · CMake 6.7% · C 5.0% · Processing 0.9% · Makefile 0.4% · Other 0.1%

https://github.com/hilarioaraujo/tobias_ros

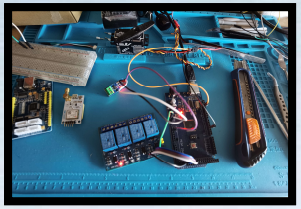
Testes e experiências

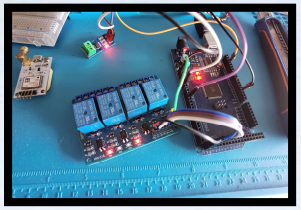
Alguns teste aos drivers

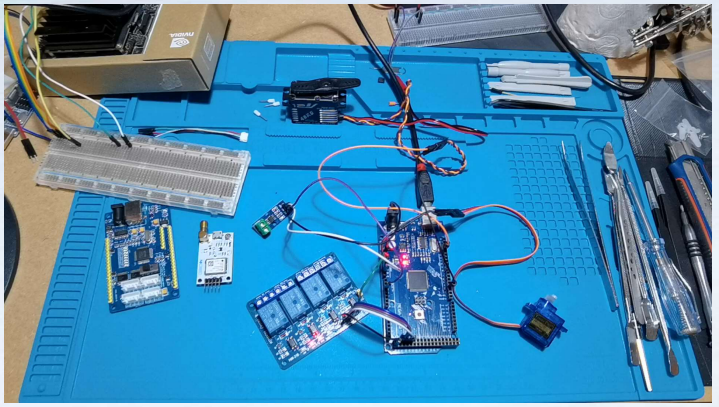




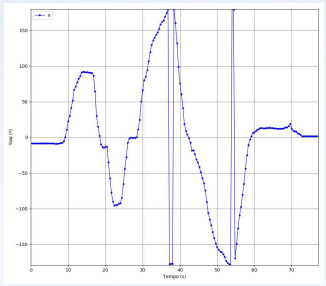
GPS

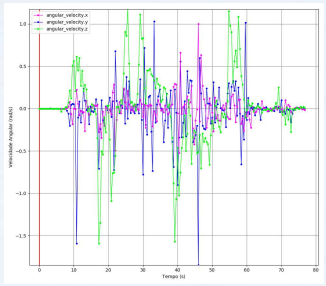


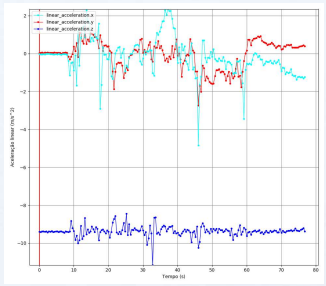


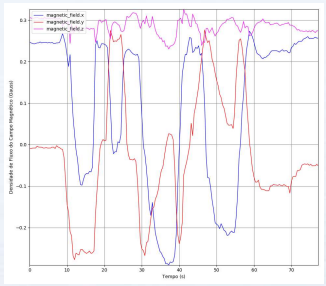


Arduino

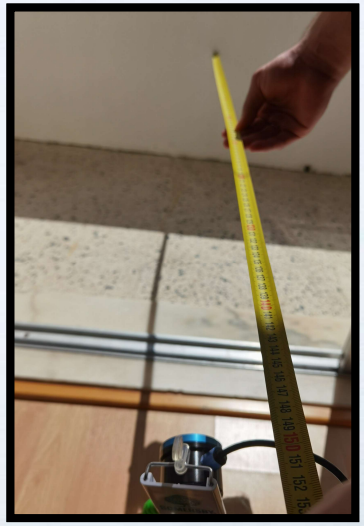




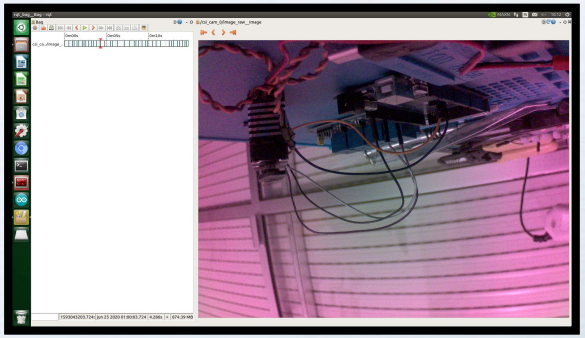




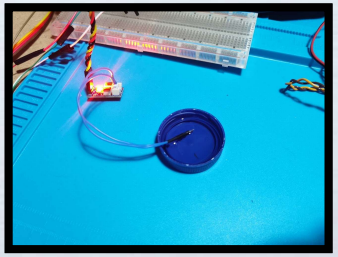
AHRS

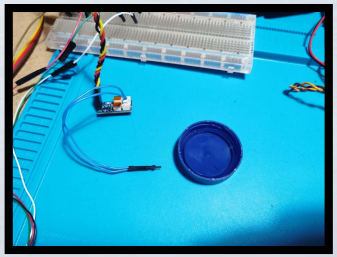


Ecosonda



Câmara





Sos Leak Sensor



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