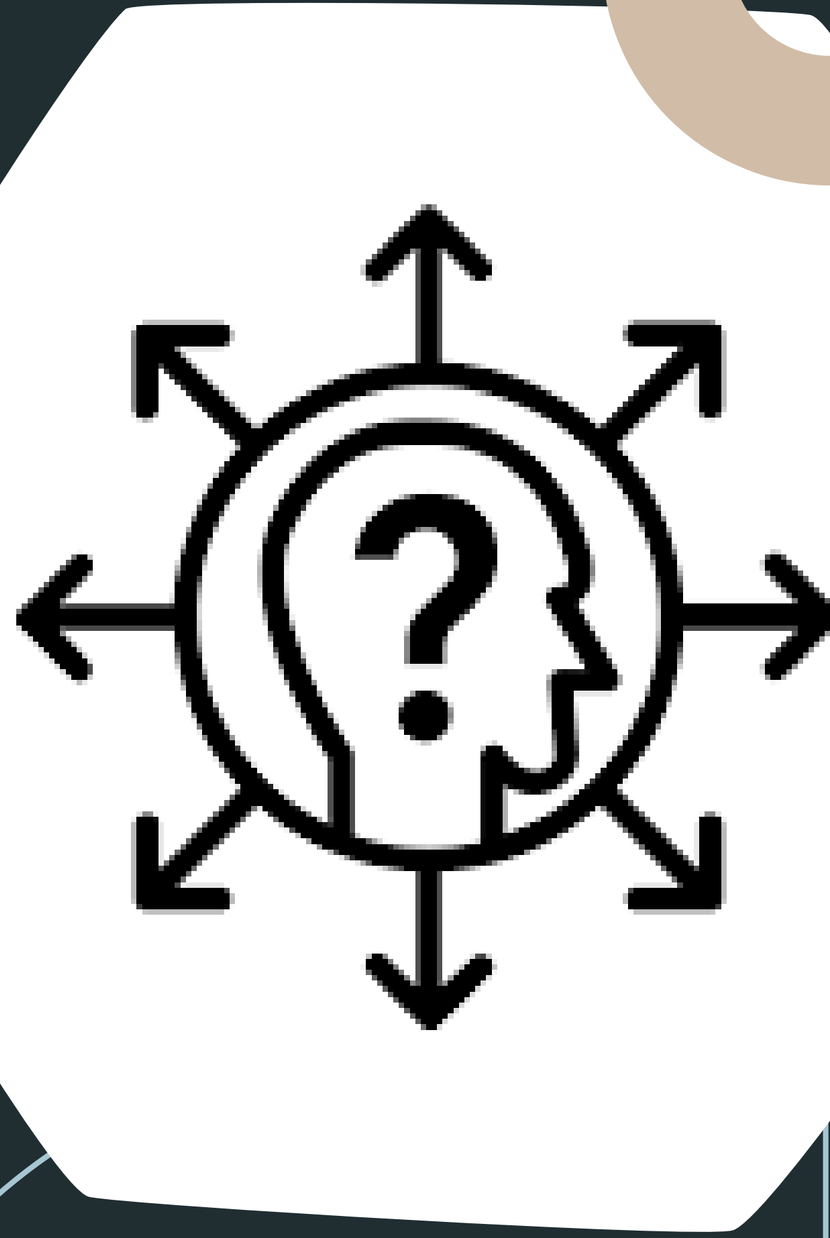
CONTROLLED WEATHER BALLOON

Introduction

Weather balloons play a crucial role in atmospheric research, providing essential information about weather conditions, temperature variations, humidity, and pressure across the different layers of the atmosphere. Our system aims to enable balloons to adjust their vertical position in order to take advantage of the different wind currents available at various altitudes, thereby significantly increasing the precision and effectiveness of targeted atmospheric observations.

Problem

- Wind dependance
- Lack of Control
- Reduction in effectiveness



Solution

Develop a position control system for weather balloons based on altitude adjustment. By controlling the altitude, it becomes possible to take advantage of wind currents to guide the balloon toward a target location. In the initial phase, the focus will be exclusively on developing and testing the altitude control system. The solution integrates the use of a microcontroller (ESP32), which communicates via Wi-Fi to control the balloon’s altitude by either releasing ballast or venting air from the balloon.

Beneficiaries

- Meteorological and Climate Research Institutions
- Universities and Academic Research Centers
- Private Weather Forecasting
- Aviation and Air Traffic Control Agencies
- Government Civil Protection and Emergency Services
- Environmental Tech Startups

Competitors

Balloon Ascent Technologies LLC

Developed the HAB Pilot

World View Enterprises

Created the Stratollite

Team

Duarte Antunes

Francisco Coelho

João Oliveira

Rodrigo Santiago

Advisor and Coordinator

Coordinator

Luís Caldas de Oliveira

Advisor

Carlos Diogo Henriques

Struggles

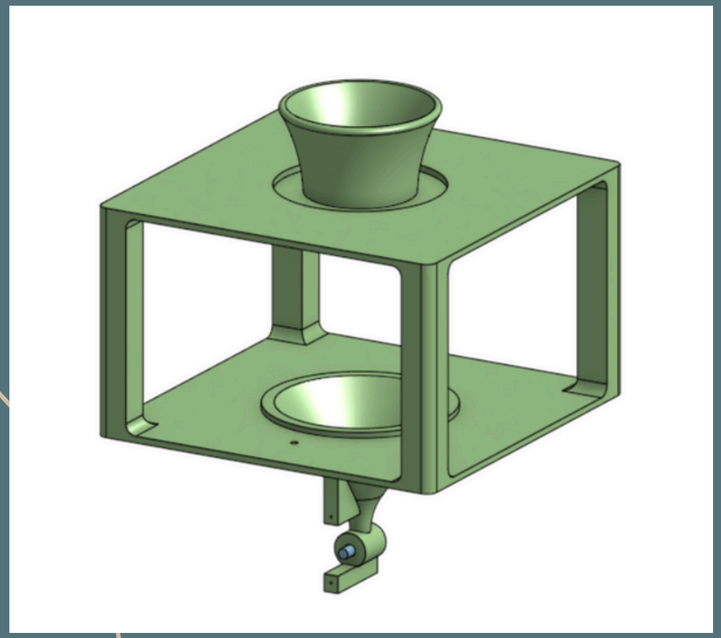
Technical

- Difficulty in defining with precision the scope of the project
- Difficulty in defining what ballast system was going to be used
- Balancing coursework with other commitments

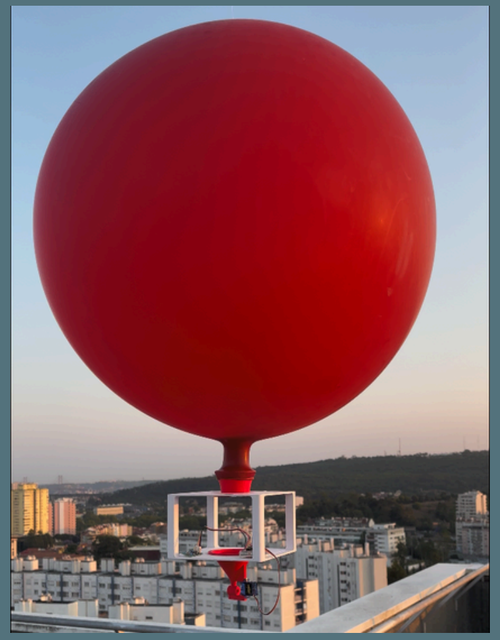
Pratical

- Development of the 3D models
- Quality of the 3D printed models
- Difficulty in developing the prototype due to weight limitations

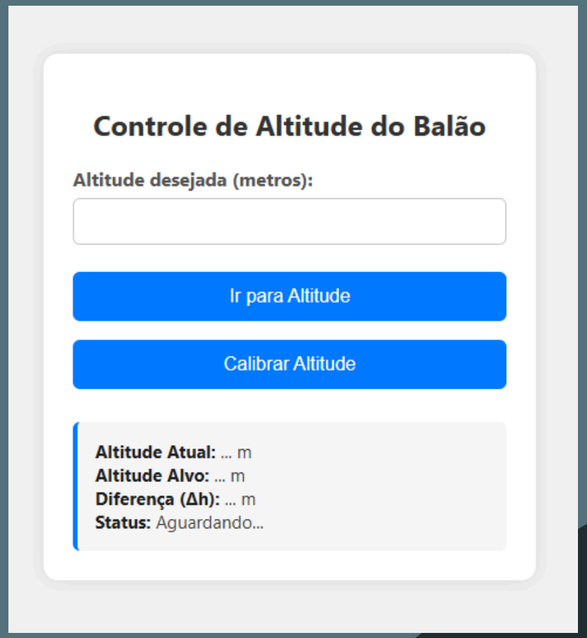
Results



3D model for the prototype



Prototype



WebApp

Contribution of each team member

Duarte Antunes	Francisco Coelho	João Oliveira	Rodrigo Santiago
Contribution on interviews	Contribution on interviews	Contribution on interviews	Contribution on interviews
Search required material	Search required material	Search required material	Search required material
Website development	3D modelation	Test 3D model	3D modelation
Software Development	Test 3D model	Software Development	Test 3D model

Costs and Benefits

Costs

- 1 Valve
- 2 Batteries
- 1 Barometer
- 1 Regulator
- 4 Transistors
- 1 Servo Motor
- BBs
- Latex Balloons
- 3D printed models
- 1 ESP32
- 2 Screws
- 1 Bread Board

Total cost: 141,64€

Benefits

- Improved Atmospheric Data Precision
- Cost-Effective Alternative to Other Platforms
- Extended Mission Efficiency
- Lighter materials

Links

Project landing page: https://project.dxvox.com/

Project blog: https://blog.dxvox.com/