Summer Research School `22

Bob

The Smart Buoy

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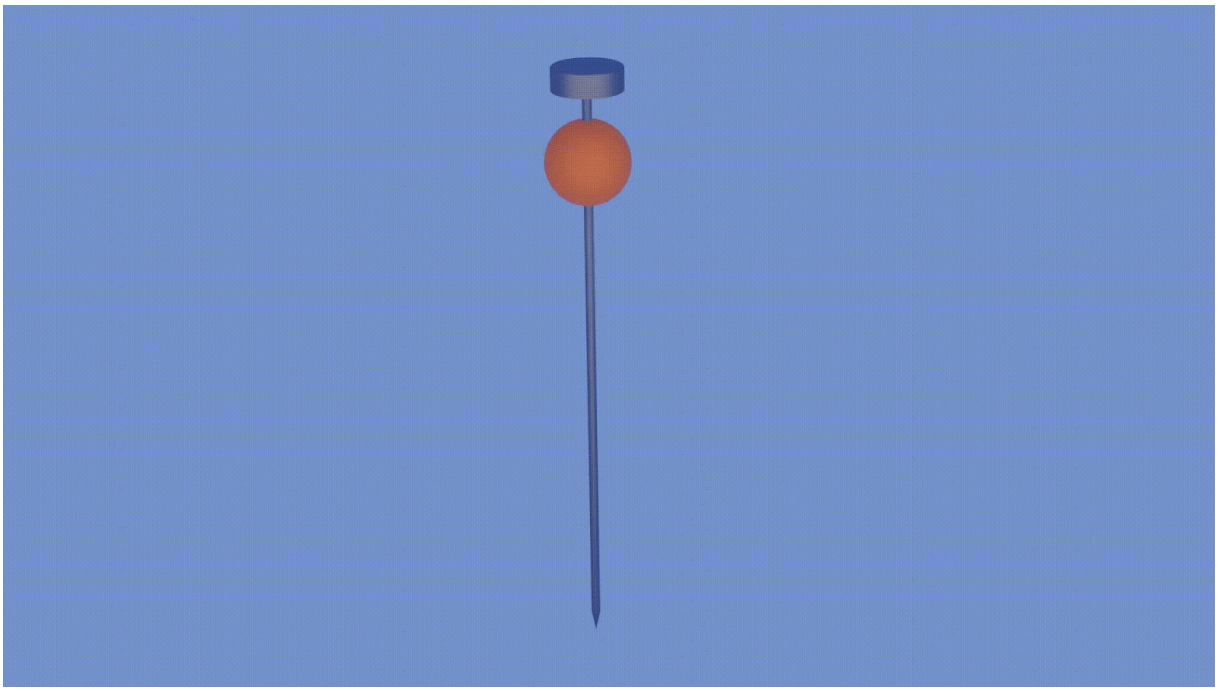
Summary

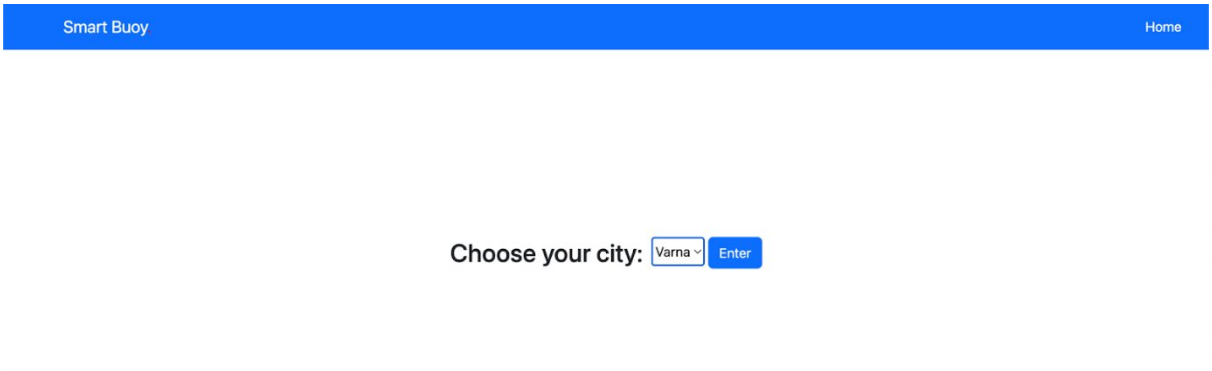
Our project “Bob” is a smart buoy with sensors that will be connected online to a website and a mobile app. “Bob” is designed to house many different features such as a thermometer, a water velocity and direction sensor, a battery, and a solar sensor. The buoy will provide an opportunity for easy access to information related to the safety and swimming accessibility. It can also save lives if implemented in wild beaches where there are no lifeguards by automating the process of measuring the safety level of the beach. This can warn or prevent people from visiting dangerous beaches and notify people of which beach they should visit and avoid which staves off the problem of visiting a beach and then realizing the flag is red meaning you can’t swim there. “Bob” can be used by many governments to make their beaches safer.



Software

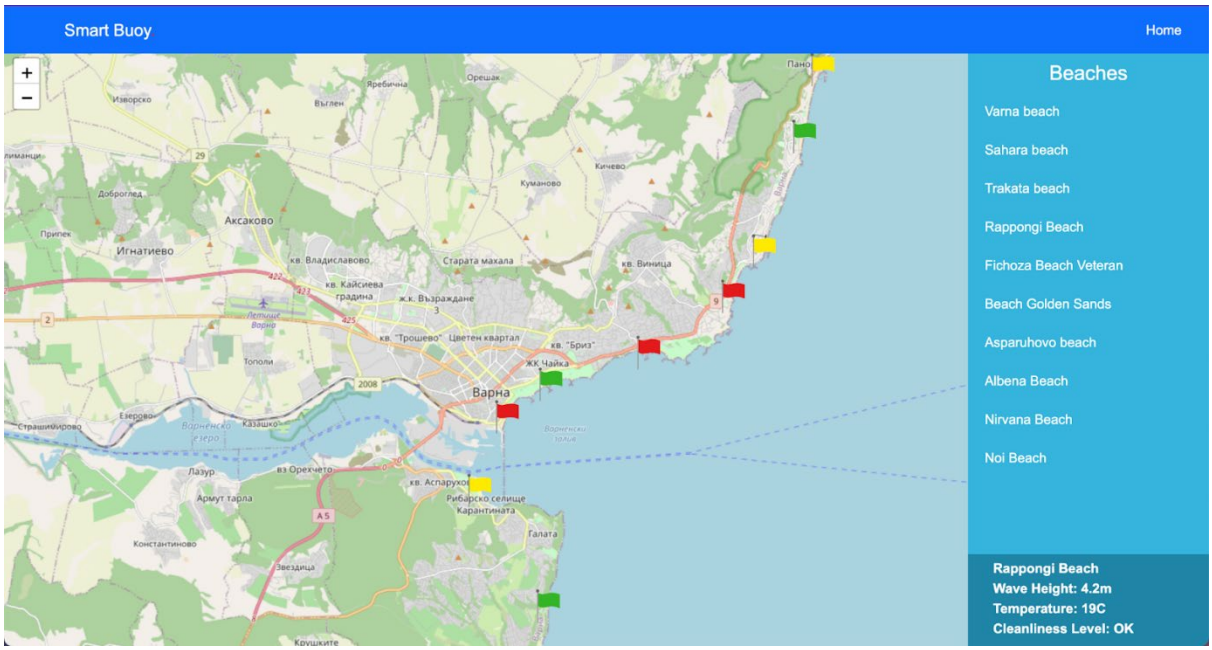
We are making a website and mobile application to make the visualization of data easier and present it to customers.

1. Website



First Page

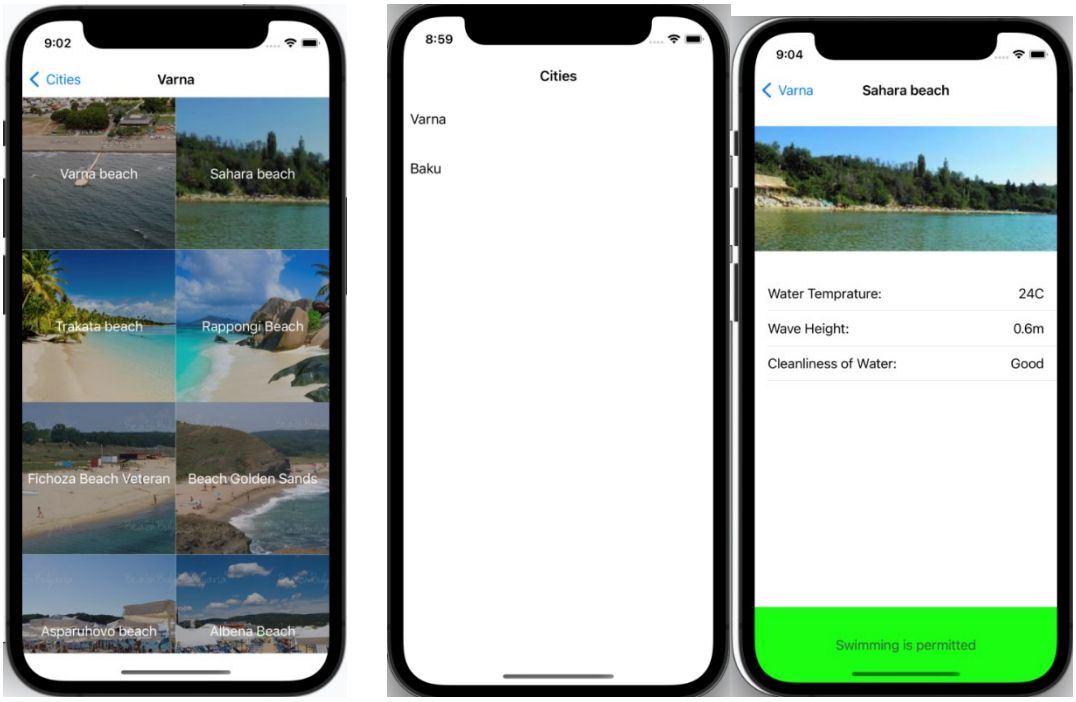
Users are able to choose the city where they want to go swimming on the opening page. Then they are redirected to another page where they can see the beaches in that city.



Second Page

In the menu section, the user can select the desired beach, and get informed about the status of the beach. In addition, users can choose the nearest possible beach from the map and read data about the chosen beach - wave height, temperature, and cleanliness level of water. The flags showing the location of the beach also change colors based on whether it's safe to swim at (green), safe but with caution (yellow), or no swimming (red).

2. Mobile Application

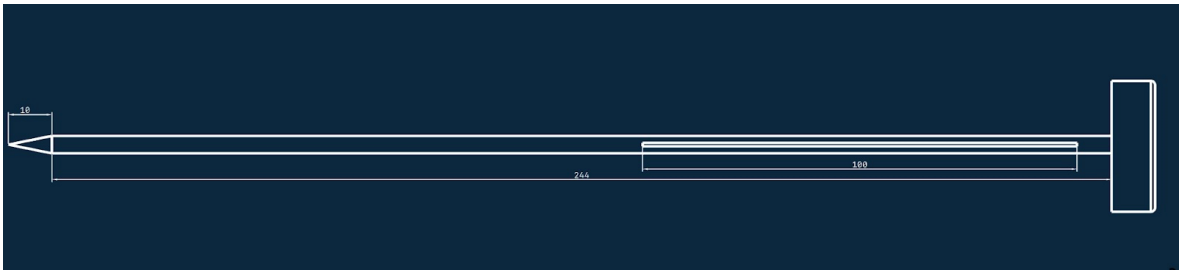


First Page *Second Page* *Third Page*

Users are able to choose the city where they want to go swimming on the first page like the website. Then they are redirected to another page where they can see the beaches in that city with a photo of every beach. Users can see the data collected on the desired beach on the third page. In addition, data is evaluated by AI, and the status of the flag on that beach is automatically set up. This information is also presented to the users.

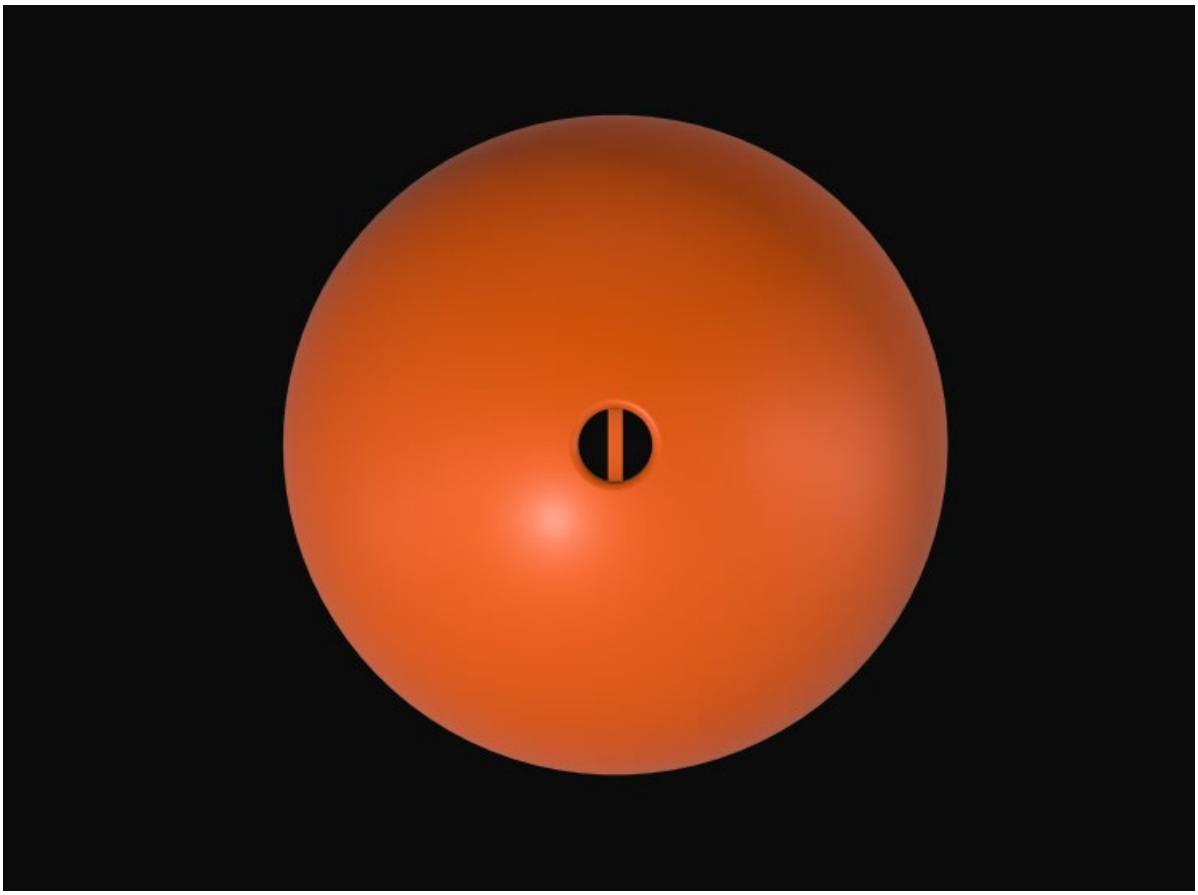
Hardware

To make Smart Buoy, we will use our own design modeled in a CAD software. Its length is 2.54 and its width is 0.3 meters. It consists of several main parts:
the Buoy,
the Stick,
and the Cap.
Most of these parts are movable and their movement is necessary for the movement of the Smart Buoy.



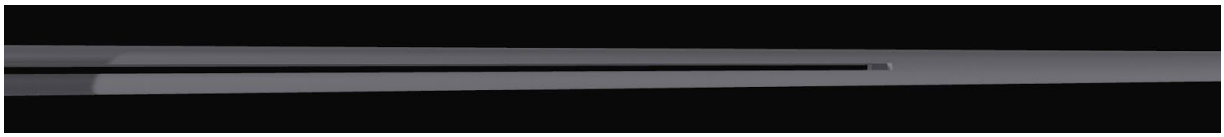
1. Buoy

This part is one of the most important parts of the Smart Buoy. The majority of the essential sensors, the thermometer, water pollution sensor, water velocity and direction sensor, are located inside that buoy. There's a thin stick in the middle of the buoy's tunnel to prevent the buoy from spinning around and ruining the calibration of the sensor.



2. Stick

The stick is the part which keeps the buoy in place. It also connects the buoy to the lid with the battery and solar panel.



3. Cap

There is a solar panel on the top of the cap. In addition, there is a battery inside this part that supplies the power to the whole Smart Buoy. Also, there is a micro-computer that sends data to the database located inside the cap.

Conclusion

1. Used technologies
    1. Mobile application
        Swift programming language;
        UIKit Library;
    2. Website
        HTML language;
        CSS language;
        JavaScript programming language;
        Leaflet Library;

2. Future development
    Building a real prototype of the buoy
    Pulling data from the prototype automatically
    Using user's location, provide notification when flag changes on the beach they are on.

Our project "Smart Buoy" will be one of the best ways to be informed about the nearest beaches easily. There is no other solution to this problem, it makes our project is the only way to save your time for choosing the perfect beach to swim with low-cost. The buoys that are used right now on beaches are quite old. It is the first time when buoys are modernized and digitalized.

6. Acknowledgements

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