#cleanwaterToAll

A web application to participate in "Provide Access to Clean water" NAE challenge

Abstract:

Provide access to clean water is one of the NAE 14 grand challenges for engineering. Lack of clean water is responsible for more deaths in the world than the war. Today, it is being a critical problem about the availability of water for drinking in many areas of the world.

"*World's water supplies are facing new threats; affordable, advanced technologies could make a difference for millions of people around the world"*

And so are the engineers in different fields working collaboratively to provide sophisticated methods to meet the water availability and the water quality the society needs. However, there arises the questions of where the clean water is available in plenty or what are the areas the engineers need to adopt their technologies for purification.

Proposal:

As a software engineer, developing a web application which marks the areas that possess clean water on a geographical map and maintains the necessary data that the other engineers would need, could contribute to the challenge. The application is controlled by health organizations or local water authorities from different regions across the world, who can indicate the clean water areas once they take necessary steps to purify water.

The water authorities or health organizations might not be able to cover all parts of a region for water quality check. The common people can contribute by reporting any issue like water wastage, leaking faucets or problems with unclean water areas around them, to the authorities through this application. Also, they can find the safe drinking water areas around them as a prevention of health issues. The application overall is like a water survey tool with the interaction between common people and the water authorities/health organizations, enabling to keep track of all the details on a single platform, updating the details every now and then.

"It's not that the world does not possess enough water. Globally, water is available in abundance. It is just not always located where it is needed. For example, Canada has plenty of water, far more than its people need, while the Middle East and northern Africa — to name just two of many — suffer from perpetual shortages. Even within specific countries, such as Brazil, some regions are awash in fresh water while other regions, afflicted by drought, go wanting"

Technologies used:

Front end – HTML5, CSS, Bootstrap, Flexbox, ReactJS

ReactJS is a JavaScript library used for building user interfaces specifically for single page applications. It allows us to create fast, scalable and reusable user interface components which can change data without reloading the page. It uses the Virtual Document Model to compute the changes and update the browser accordingly. It uses the one-way data binding for flow of data through components.

Database – Firebase

Firebase is a Backend-as-a-Service — BaaS. It is a real time database which utilizes WebSocket (just a single socket connection can sync all the data automatically) rather than HTTP calls to get and sync data. This makes the connections faster and updates are received almost instantly. The built-in authentication system minimizes code size. It is a fully featured app platform with google APIs (which is very much needed for this application) integrated with it.

Workflow:

Finds an issue

the issue

Reports

to the engineers

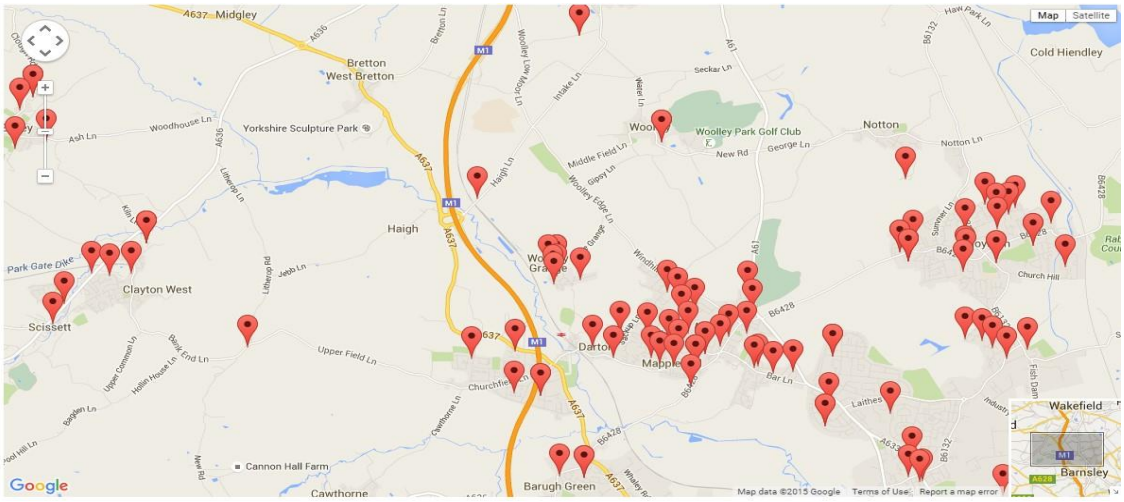
Cascades the report for purification

Analyses the problem

work is done

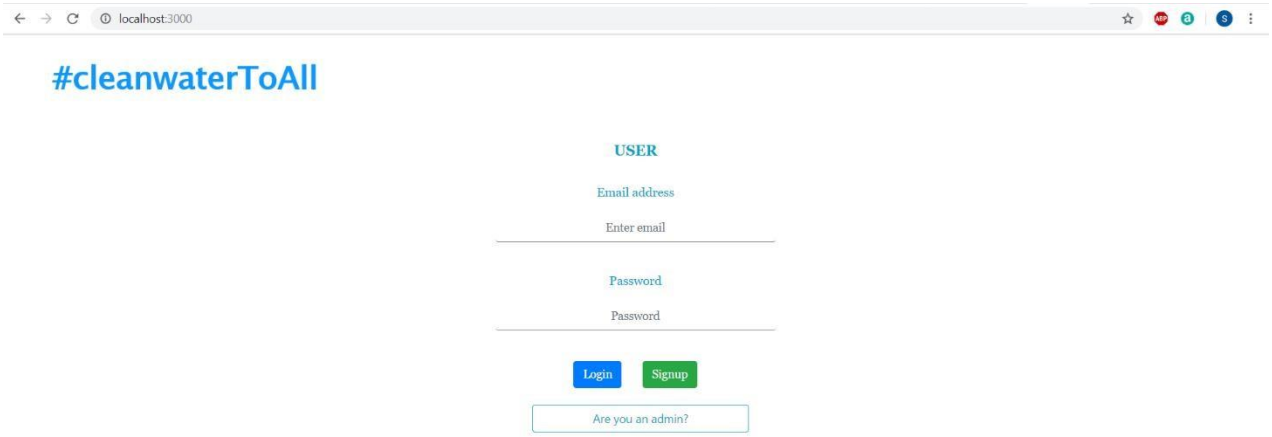
Gets notification from then when the

Marks the place for clean water on the map so it is viewable by user as well



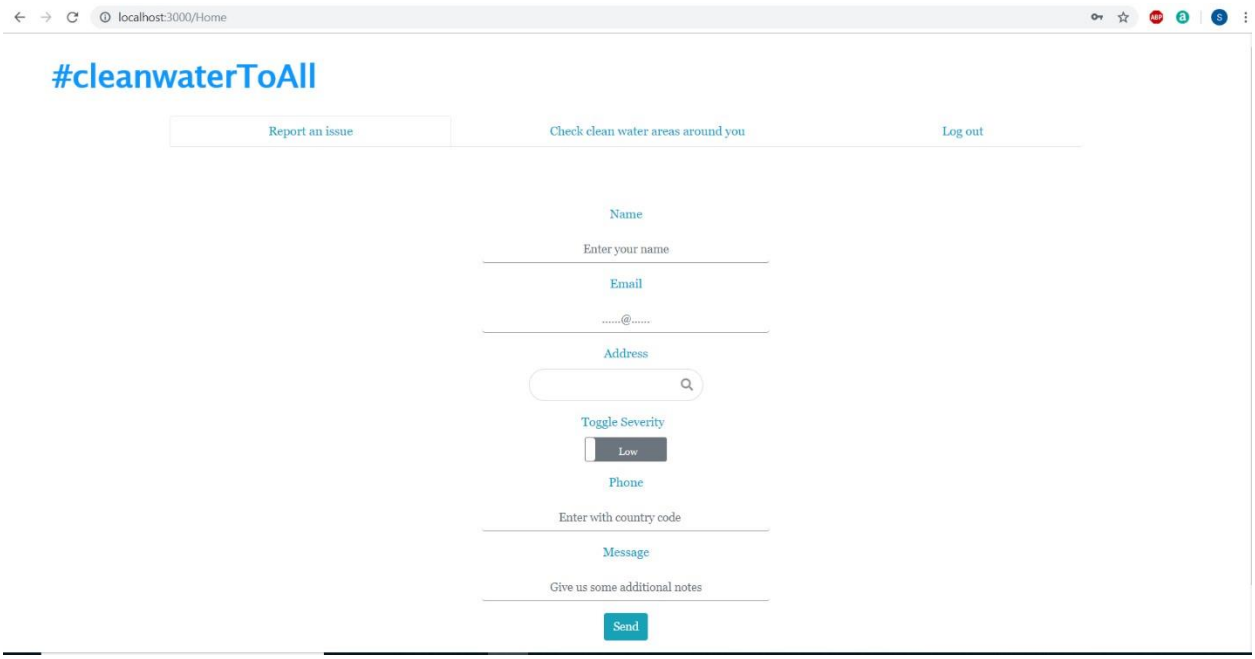
Modules:

User login and signup: The landing page of the application has user login and sign up with “Are you an admin?” button to direct to admin login

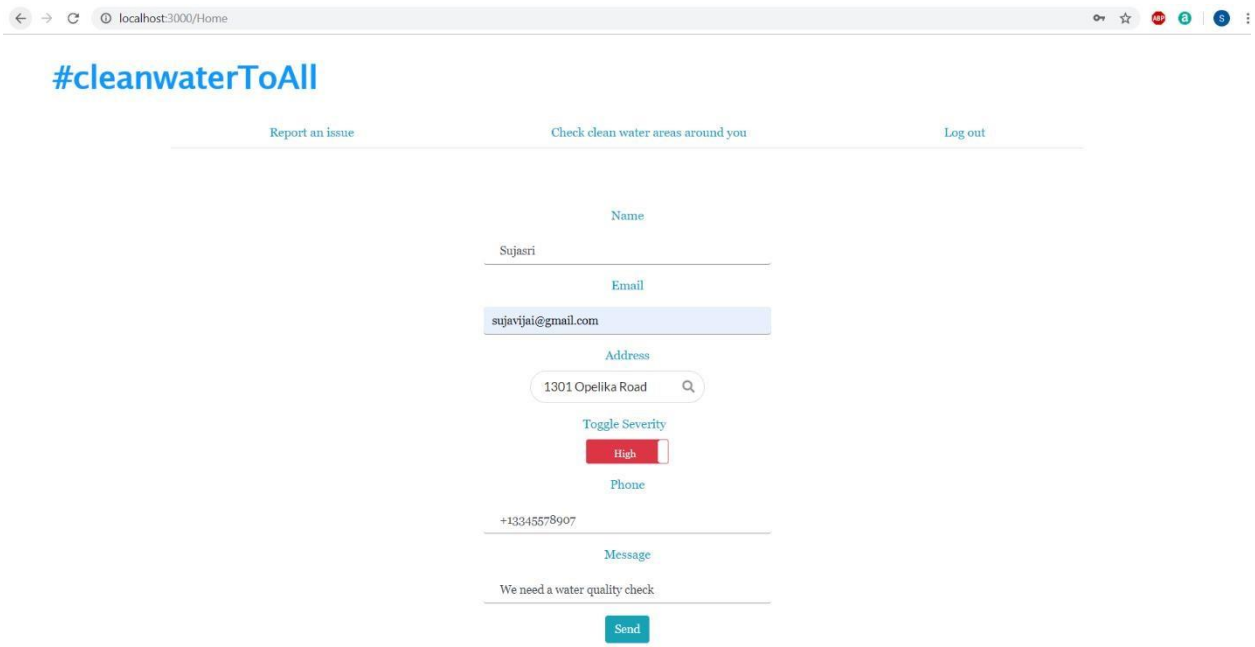


User Dashboard:

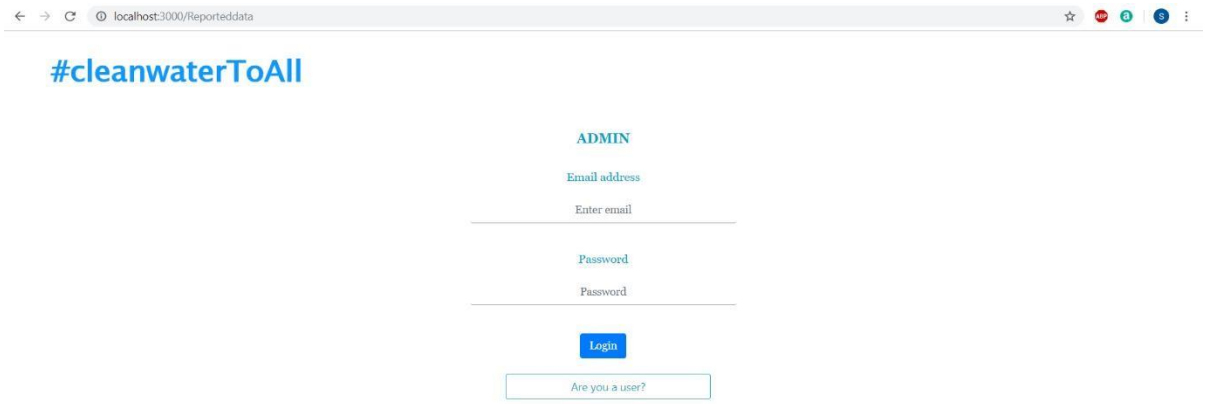
1. *Report an issue:* Once logged in, the user can report to an issue by filling out the form in “Report an issue” tab.



The form requires user to enter name, email, the address that needs care, severity of the issue (either low or high), phone number and a note to brief the issue. The address is a search bar which auto completes the search dynamically so that user can send a valid address to the admin to be marked on the map. It uses the Google Places API. On clicking the “Submit” button the details entered get saved to the database.

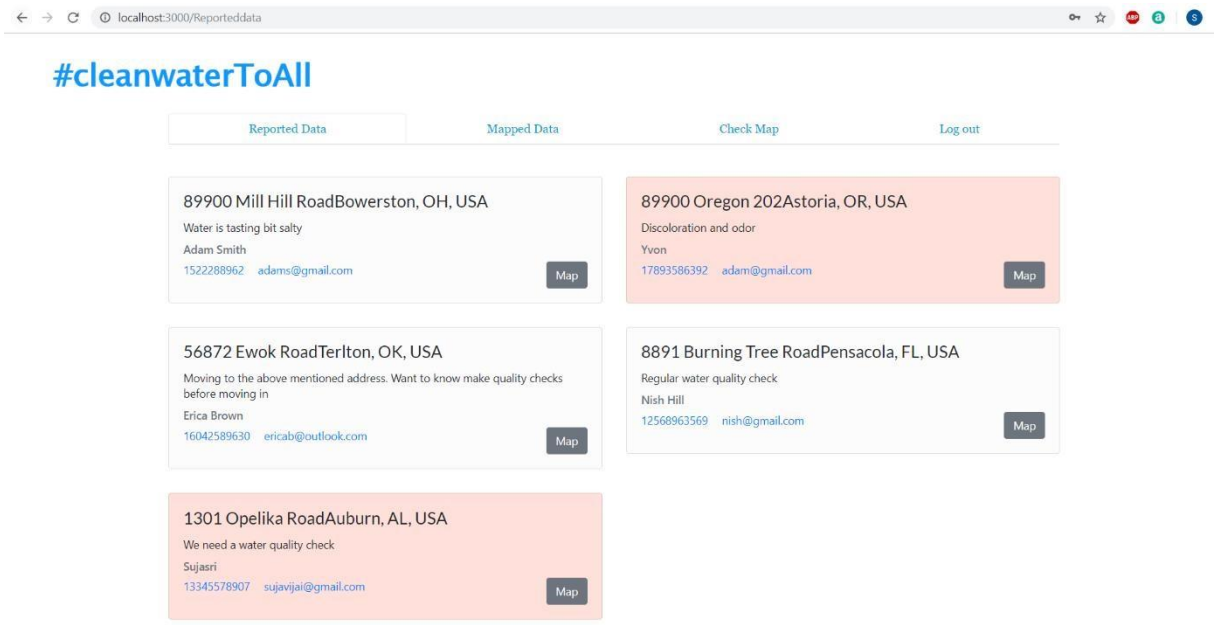


Admin login: On clicking “Are you an admin?” from the landing page, the admin login appears. It has the “Are you a user?” button to navigate to the user login and sign up



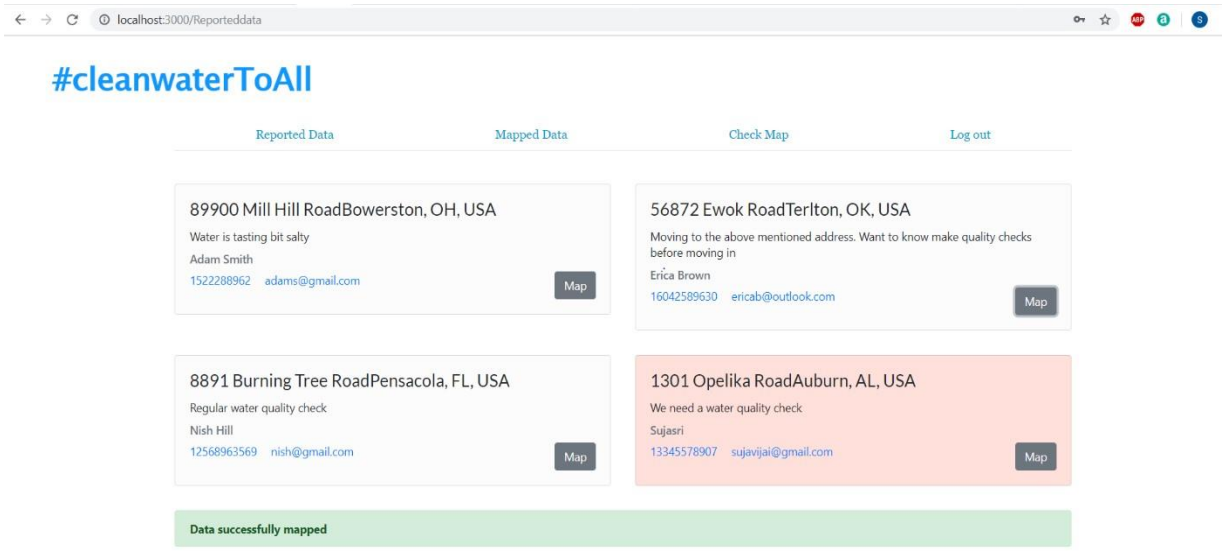
Admin Dashboard:

1. *Reported Data:* Once logged in, the admin can view the details submitted by each user in the tiles displayed. The color of the tile determines the severity the user enters. This is to enhance readability for admin so that when scrolling through a large amount of data it can highlight the areas that require immediate attention. Admin must notify engineers about the issue in the submitted areas and once the engineers have solved the problem, they notify the admin back.

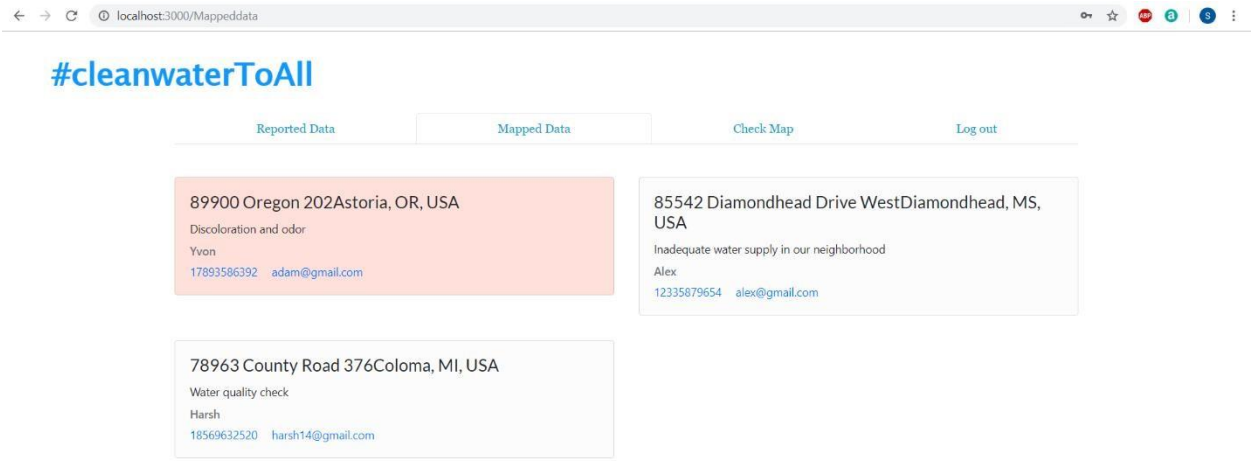


Upon receival of notification, admin can mark the place on the map by clicking “Map” button of the corresponding tile. It places a marker on the corresponding address extracting the

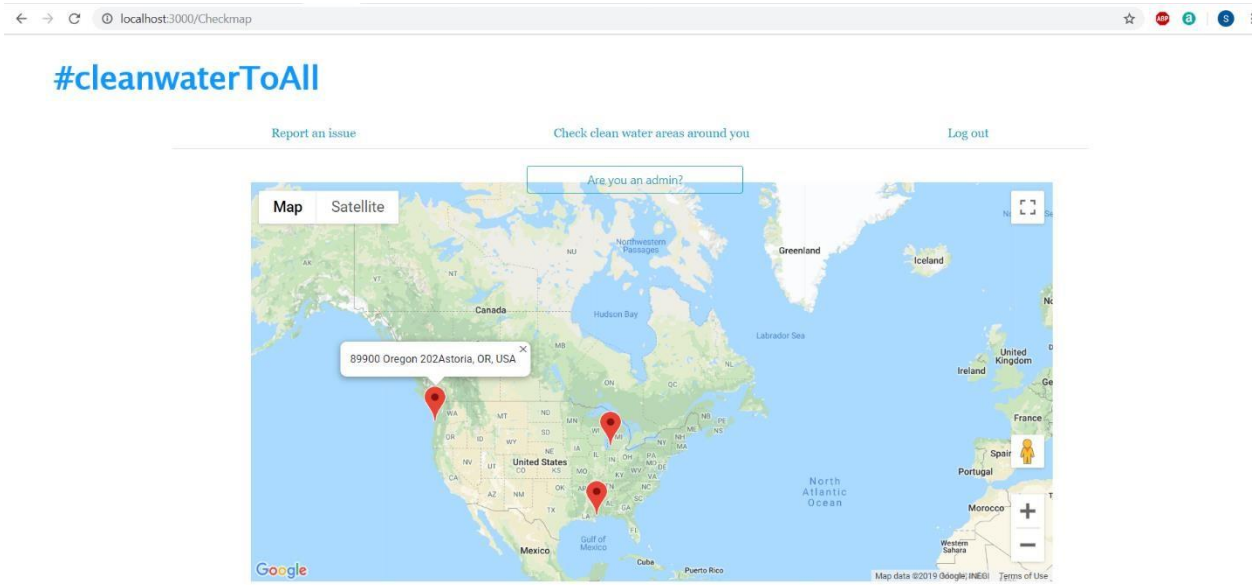
geographical co-ordinates, using Google Places and Maps API. It also gives an alert that the data has been mapped. This action removes the tile from “Reported Data”.



2. *Mapped Data:* The removed tile from “Reported Data” tab appears in the “Mapped Data”. This gives the details of all the places marked on the map. Since the mapped data could be growing, it will be removed from the cache after a specified time.

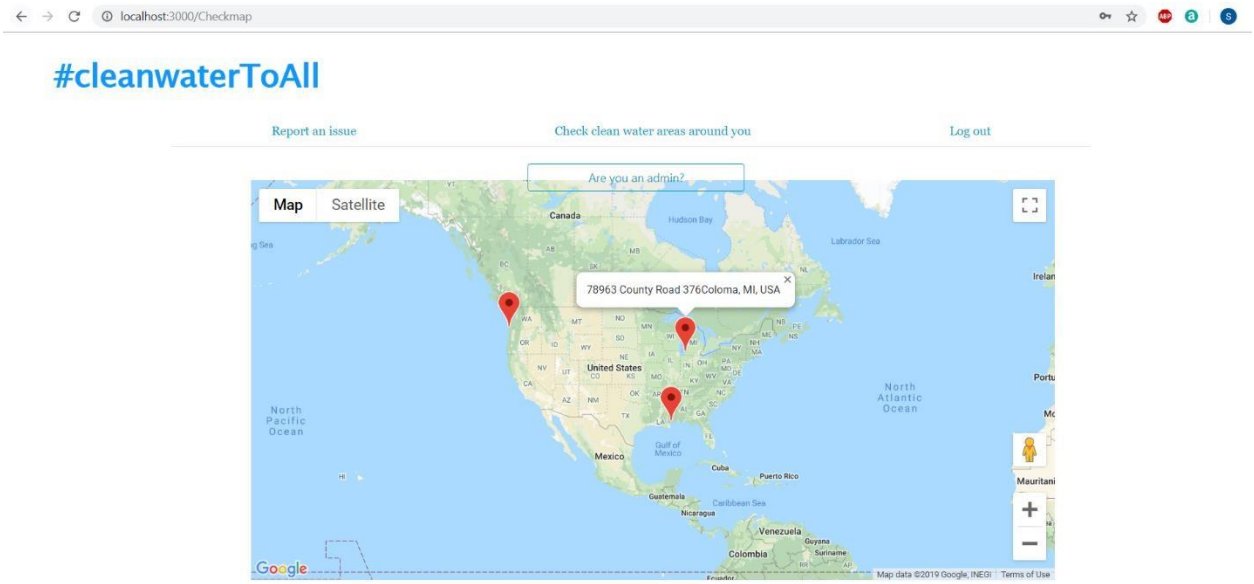


3. *Check Map:* It displays the map with markers placed on the clean water areas from “Mapped Data” tab. When the marker is clicked, an info window pops up with the address.



User Dashboard:

2. *Check water areas around you:* The user view of the same map.



Future enhancements and Conclusion:

- Notifications to admin in the admin dashboard whenever a new report from the user is submitted to the database.
- The module of admin sending the details to engineers who are nearby the reported area, via messaging/email, and the engineers notifying back the same way is to be developed with Twillio API collaborating with firebase.
- Implement the Speech to Text with Annyang JS library for visually impaired.

Hence, this application enables to spot the nearest clean water areas easily, to help people suffering with drought, and unclean water as well.

Reference:

1. http://www.engineeringchallenges.org/challenges/water.aspx