

**MARITIME BORDER MONITORING
INTERN PROJECT REPORT**

SUBMITTED BY

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2018202036

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TO

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Internship for First years



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BONAFIDE CERTIFICATE

This is to certify that this project “**MARITIME BOUNDARY MONITORING**”, is a bonafide work of “**K.PAVITHRAN (2018202036)** and **K.SHEIK ABUDHAHIR (2018202051)**” who carried out this project under my supervision.

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Abstract:

Maritime is a sea border between two countries. As sea border is very hard to monitor there is a lot of violations in vessels/sea vehicles border crossing. It is mandatory to regulate the sea traffic and restrict the unauthorized maritime border crossing. By currently available methodology it is hard to monitor the maritime and very difficult to restrict the unauthorized trafficking in maritime. This maritime issue is an international problem. And different countries are developing a different methodology to protect their maritime from the unauthorized access.

This system comprises of modules viz Geo-fencing Android application, Raspberry Pi embedded system which contains motor controller, NEO6M Global Positioning System (GPS) module and a JavaScript web application. Geo-fencing Android application will provide Graphical User Interface (GUI) using Google Map Application Programming Interface (API) and tracking using GPS. The embedded system in this system comprises of NEO6M GPS used to get the latitude and longitude, L293d Motor driver to control servo motor, Raspberry Pi used to calculate the distance between the current location and border location. Raspberry Pi will also update the boat location to the firebase for tracking purpose. A web application used to track the Android and Raspberry Pi separately, this application is runs on JavaScript. This system is developed using Android Studio, Python 3 and JavaScript.

INTRODUCTION

1.1 MARITIME BORDER MONITORING

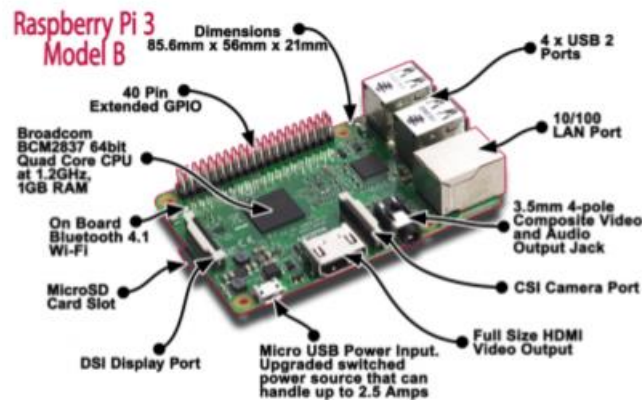
Maritime borders are the virtual boundary set between two countries. These boundaries have latitude and longitude of points in the sea/ocean. A straight line will be drawn between these points to make it look like a boundary in maps. Different countries follow different methods to protect their maritime. Still, there is no efficient way to protect the maritime as it is on the land. In Land, by fencing the border area protection is possible. In water, it is not possible to physically fence the whole area. It is very difficult to find the border in maritime. There is no real-time tracking system or back-end control room to regulate the traffic in water. A lot of applications and embedded based system is introduced to control the unwanted crossing of the maritime. Drones and different machines are deployed in maritime to monitor the border regularly. Due to extreme weather in the middle of seas and oceans, it is not possible to maintain a machine which is able to overcome all these issues alone.

Unlike Air traffic control there is no system to control the water traffic. This leads to security issues and international border problems. If we can able to track down each and every vessel in the water then it is simple to control its actions in the maritime border. This method will lead to better safety in maritime and casual border crossing will be avoided.

HARDWARE COMPONENTS:

2.1 RASPBERRY-PI:

Raspberry Pi is the credit card sized computer with low resource and high performance for the small task. Due to the low in size, it is very cheap compared to the other computer. Though user can't able to install watchdog, this is still can do a lot more than just a computer. Because of low in the size, it can be placed anywhere. For the better, it also has the GUI to manipulate. Using GUI, user can code and test the functionality before directly implement it in the project module. Raspberry Pi will need a monitor and other external devices like mouse and keyboard to manipulate. Because of low in cost, this computer will not have all these components. Raspberry Pi is very small in size, due to this property it can be placed anywhere.



2.2 GPS:

Global Positioning System (GPS) used to position the objects depends upon their latitude and longitude which is used to position the objects in the world. These latitude and longitude are also known as coordinates. These coordinates are the key to track or position an object. In this project two types of GPS are used, one which is embedded in the Android system. which is used to track the android phone and another which is a Neo6m V2 module. This module will be configured with the Raspberry Pi to communicate the current location of the vessels in the water. Both of these will stream the data to the Firebase Real-time database. GPS has the capabilities to work without the Internet as it will directly communicate with the satellite instead of routers and nodes. There are nearly thirty satellite which directly communicates with GPS module.

2.3 DESKTOP COMPUTER:

Desktop computer act as the monitor which monitors the complete usage of our raspberry pi module.

2.4 BREADBOARD:

A breadboard is a solderless device for temporary prototype with electronics and test circuit designs. Most electronic components in electronic circuits can be inter-connected by inserting their leads or terminals into the holes and then making connections through wires where appropriate.

2.5 RECHARGEABLE BATTERY:

A rechargeable battery, storage battery, secondary cell, or accumulator is a type of electrical battery which can be charged, discharged into a load, and recharged many times, as opposed to a disposable or primary battery, which is supplied fully charged and discarded after use.

SOFTWARE COMPONENTS

3.1 RASPBIAN OS:

Raspbian is a free operating system based on Debian optimized for the Raspberry Pi hardware. An operating system is a set of basic program and utilities that makes raspberry pi to run.

3.2 PYTHON:

Python is a wonderful and powerful programming language that's easy to use (easy to read and write) and with Raspberry Pi lets you connect your project to the real world. Python syntax is very clean, with an emphasis on readability and uses standard English key words.

3.3 ANDROID STUDIO:

Android studio is the official integrated development environment for android application development. It is based on the IntelliJ IDEA a java integrated development environment for software, and incorporates its code editing and developer tools.

3.4 FIREBASE:

The Firebase Real-time Database is a cloud-hosted database. Data is stored as JSON and synchronized in real-time to every connected client. When you build cross-platform apps with iOS, Android, and JavaScript SDKs, all of your clients share one Real-time Database instance and automatically receive updates with the newest data. The firebase real-time database can be accessed directly from a mobile device or web browser, there is no need for an application server. Security and data validation are available through the firebase Real-time Database Security Rules, expression-based rules that are executed when data is read or written.

TECHNOLOGY

4.1 GEO FENCE:

A geo-fence is a virtual perimeter for a real-world geographic area. A geo-fence could be dynamically generated—as in a radius around a point location, or a geo-fence can be a predefined set of boundaries (such as school zones or neighborhood boundaries). The use of a geo-fence is called geo-fencing, and one example of usage involves a location-aware device of a location-based service (LBS) user entering or exiting a geo-fence. This activity could trigger an alert to the device's user as well as messaging to the geo-fence operator. This info, which could contain the location of the device, could be sent to a mobile account or an email account. Geo-Fencing is the emerging and most trustful android technology for many purposes, by using Geo-fencing, the cramped place can be made red color which boat should not pass through. This method will create a virtual circular area concerning the coordinates providing as a restricted area with the radius of the circle. Any number of a circle with different coordinates can be created.

4.2 GOOGLE MAP API

Google Map API is used to provide the Map GUI for the Android application. To use Google API and its functionality first register in Google Cloud Platform. In Google Cloud Platform lot of API which is free to use is available. Before selecting the necessary API, make sure that correct project is selected which will use Google Map API. Once selected go to library tab then search for the Google Map Android API. Select Google Map Android API. Enable the Google Map API, now the API is configured for the selected application. In credential-tab API key is an available copy that to use in Android studio

MODULE DESCRIPTION

5.1 ADMIN MODULE (Web App)

5.1.1 MONITOR BOATS

This page contains map activity to monitor the movements of boats in sea. Coordinates of each and every boat is fetched from firebase real-time database. So each and every movement of boat is monitored by coastal guards.

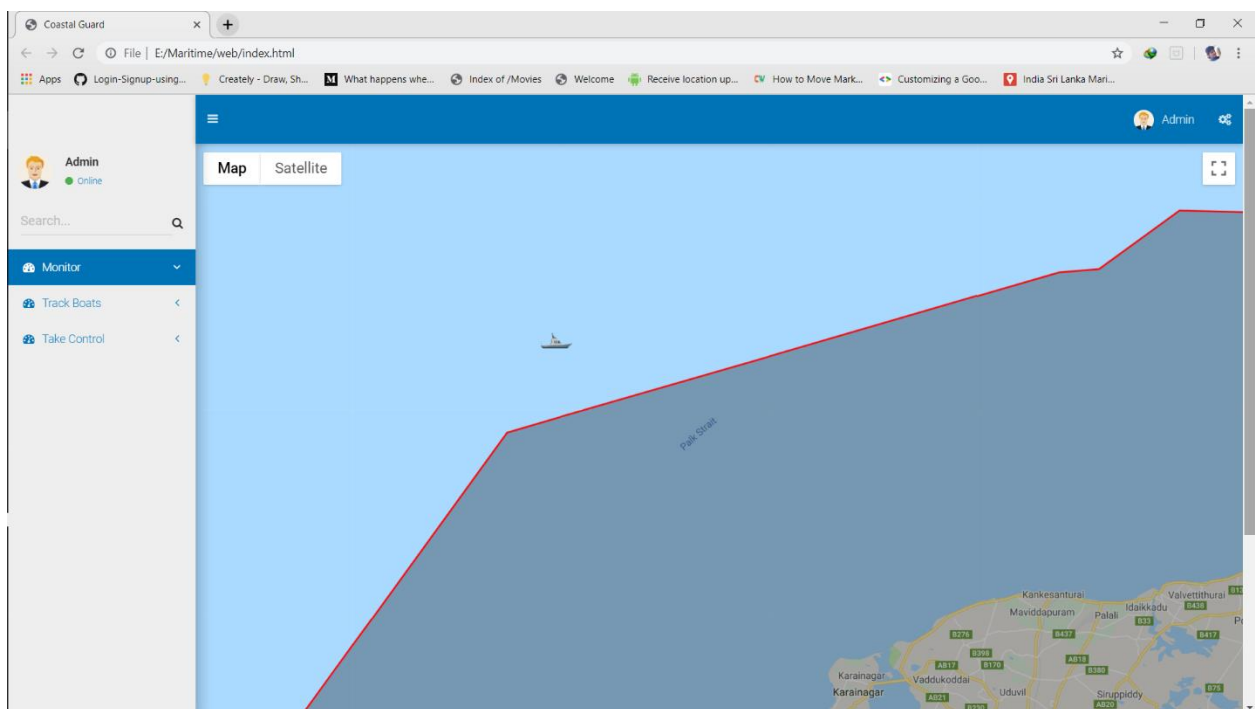
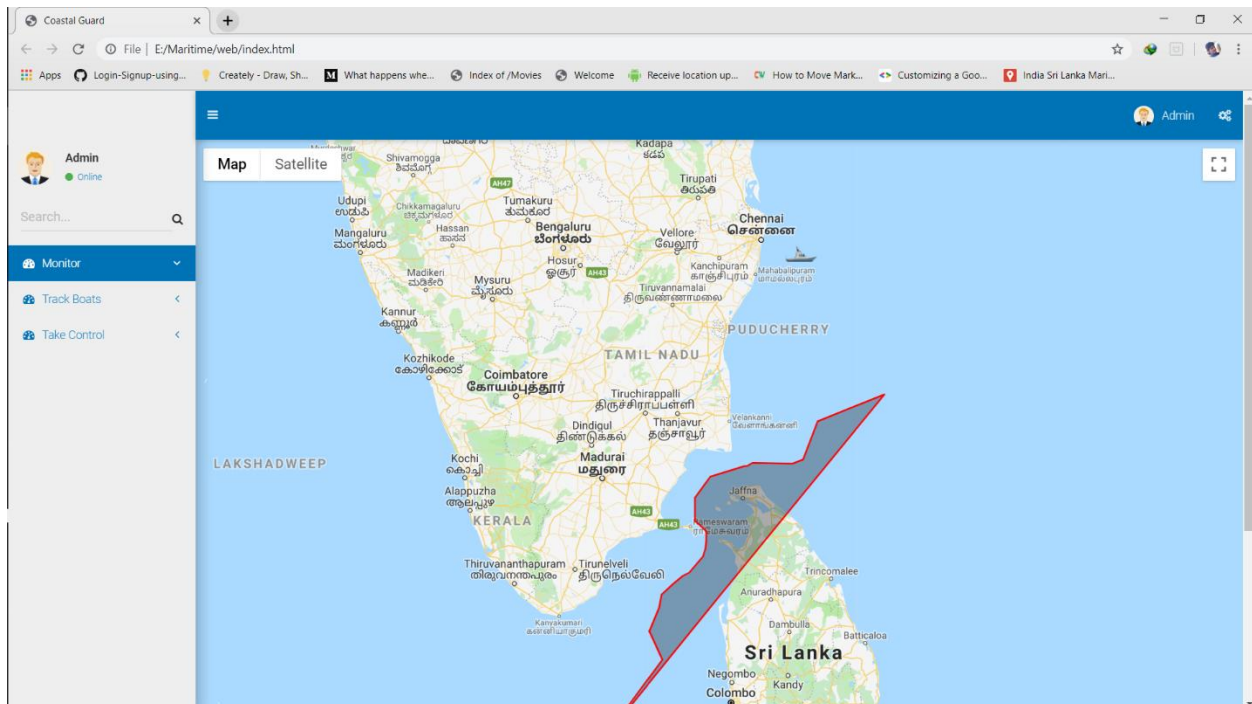
5.1.2 TRACK BOATS

This page contains one textbox it requires boat Id. If admin want to track any single boat, they will enter the particular boat Id in the textbox. Suddenly the details and location information of the particular boat is shown.

5.1.3 TAKE CONTROL

This page contains one textbox it requires boat Id. Using this page to take the control of any boat at any time. Coastal guard take the control of the boat whose are not obey the notification alerts.

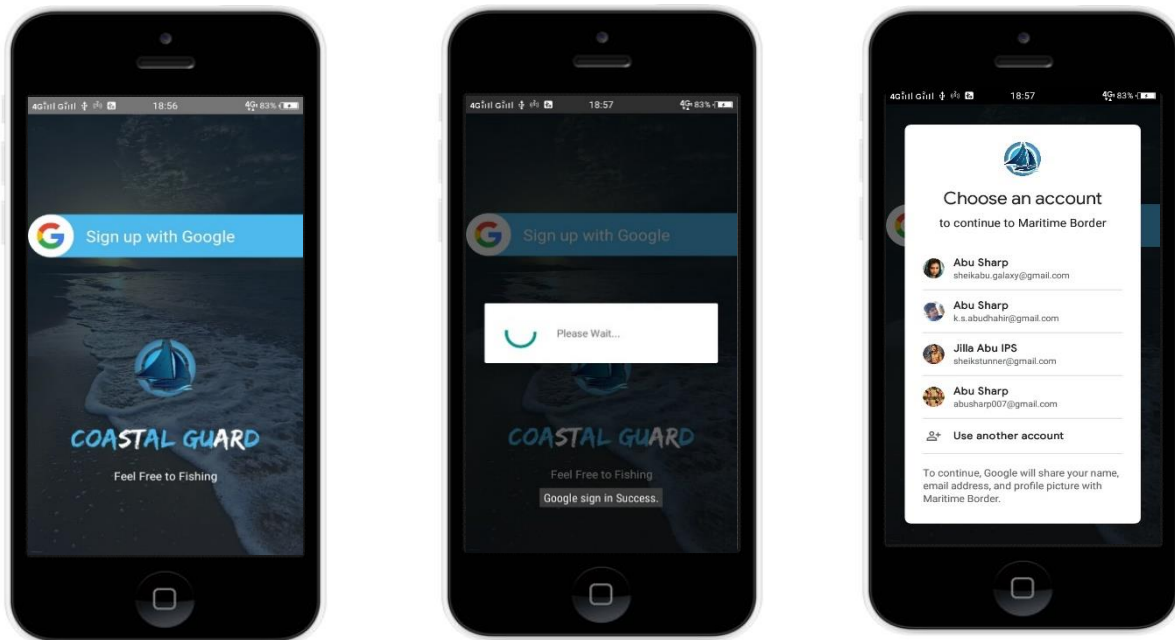
5.1.4 SCREEN SHOT



5.2 CLIENT MODULE (Android App)

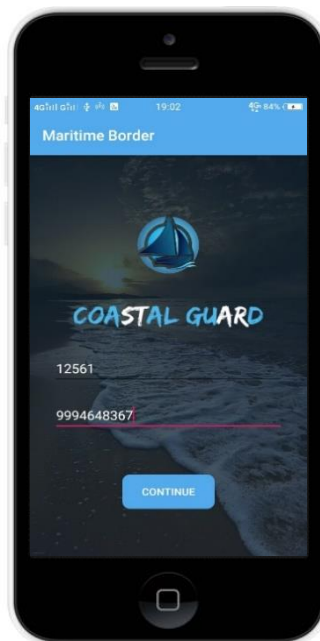
5.2.1 SIGN UP GOOGLE AUTHENTICATION

Each and every user must sign up with google authentication to use this application. After sign up user mail id is stored in firebase and firebase created the unique user identification key for each user which is associated with his mail id.



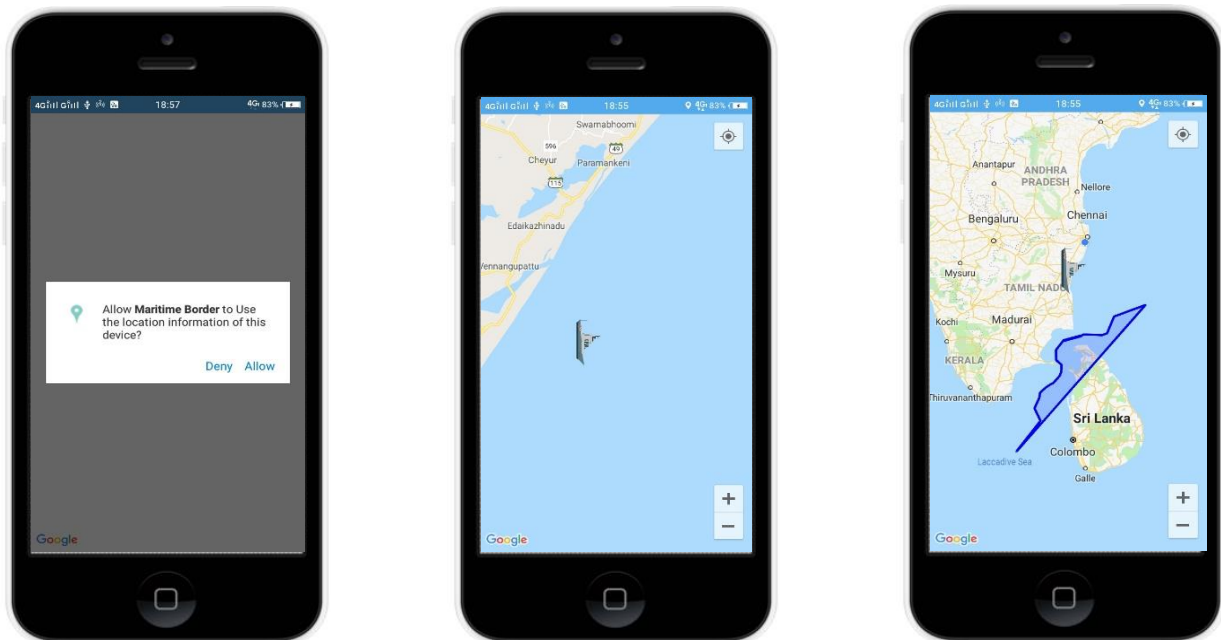
5.2.2 INFORMATION GATHERING

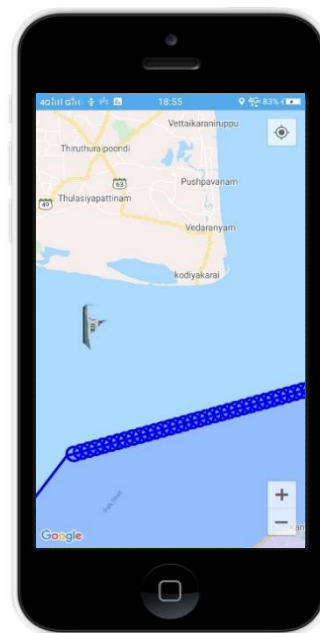
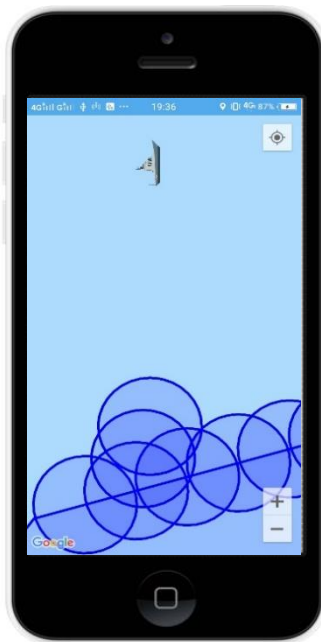
In this page we can get some details like boat id and mobile number of the user. After sign up with google this page will appear. Users must enter their boat id and their mobile number.



5.2.3 MAP ACTIVITY

After entering the details user have to click continue button, then the map activity is open and get the current loaction information of the user. The users location information is updated in firebase by every 2 seconds interval. Using this firebase data, admin can monitor each boats. In this activity we use fence of fencing concept. Maritime boundary contains some geo-fences, user goes near to the fence application send one notification to the user. But user don't consider the notification then again goes near to the fence suddenly increases the fence towards user side and send complaint message with particular boat id to coastal guard.





Maritime Border



Alert :

18:55

If you want to live you have to turn your boat otherwise you will die

Maritime Border



Alert :

18:55

Now you are in safe zone, Start fishing