SMART INDIA HACKATHON 2019

Team Name: BroCode$

Problem Statement Title: Automated Adverse Road Condition Detection
Problem Statement ID: UK1
Organization: ARAI
Complexity: Complex
Category: Software
Technology Bucket: Smart Communication
Organization Type: Industry Personnel
Nodal Center: NIT Patna

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Description:

The road conditions like potholes, unmarked speed breakers and oil spills shall be detected by a system using cost effective sensors like accelerometers, infrared sensors, laser sensors, vision based sensors. The output shall be a system architecture and software algorithm for identification of the above road conditions.

Solution:

A simple, modular and cost effective solution for real time mapping of adverse road conditions on a maps based User Interface which has navigational capabilities. The solution consists of a mobile application and a physical gadget that can be connected to any bluetooth enabled device through the provided app.
The system's architecture consists of the following components:

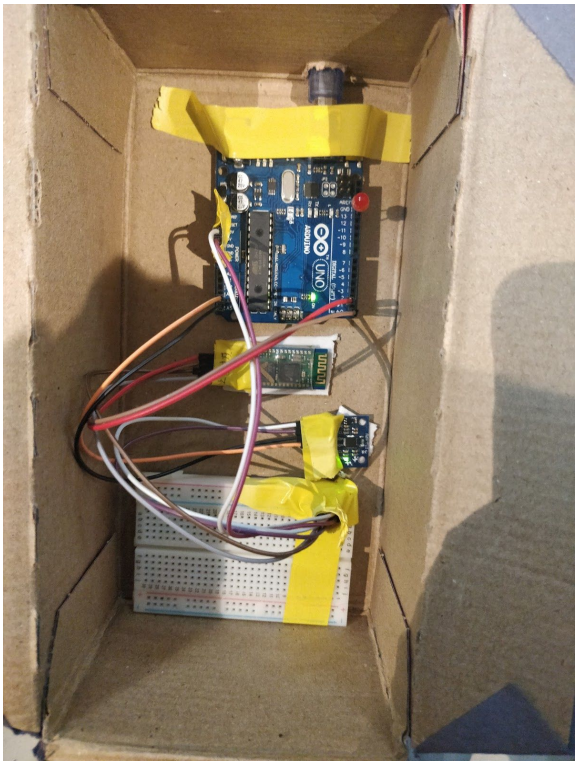
Hardware:

The below described sensors are connected to an arduino uno. The whole setup is presented to the user as a gadget which can connect to the application running on a smartphone.

Sensors:

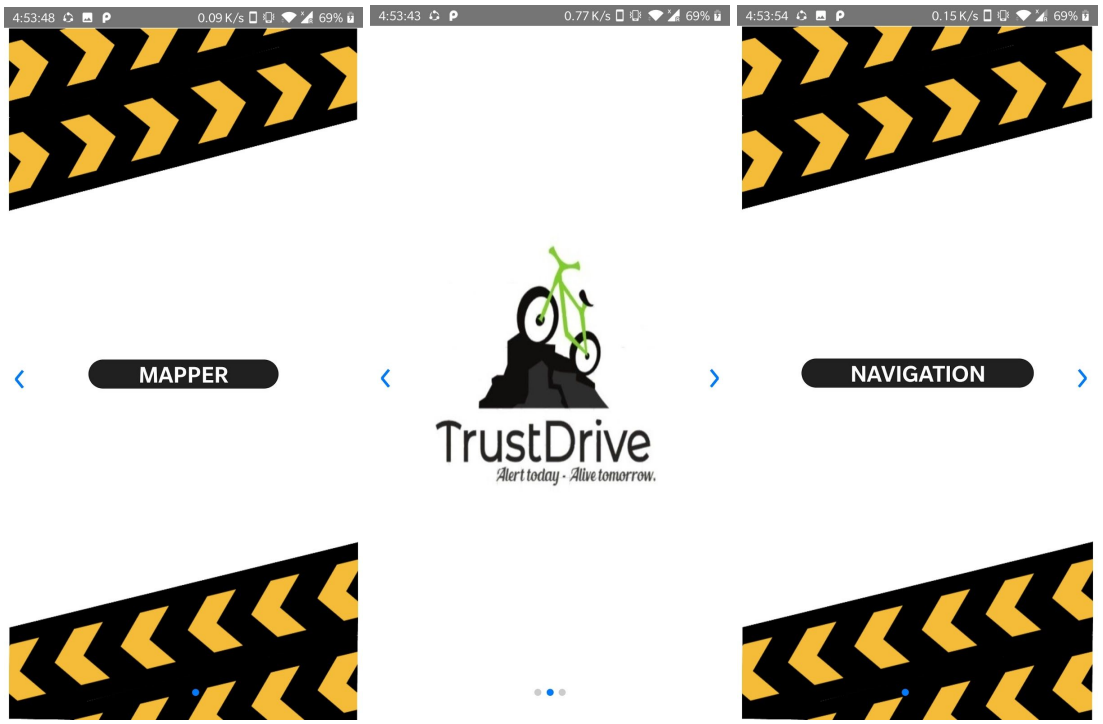
- Accelerometer and Gyro sensor
- Bluetooth Module
- Arduino Uno

Architecture:



Software:

The proposed software to address the problem in hand is a combination of an algorithm running on the Arduino and a Mobile Application which runs in two modes. Initially the user is presented with a landing screen with a logo. Then the user can select one of the modes by swiping left or right.

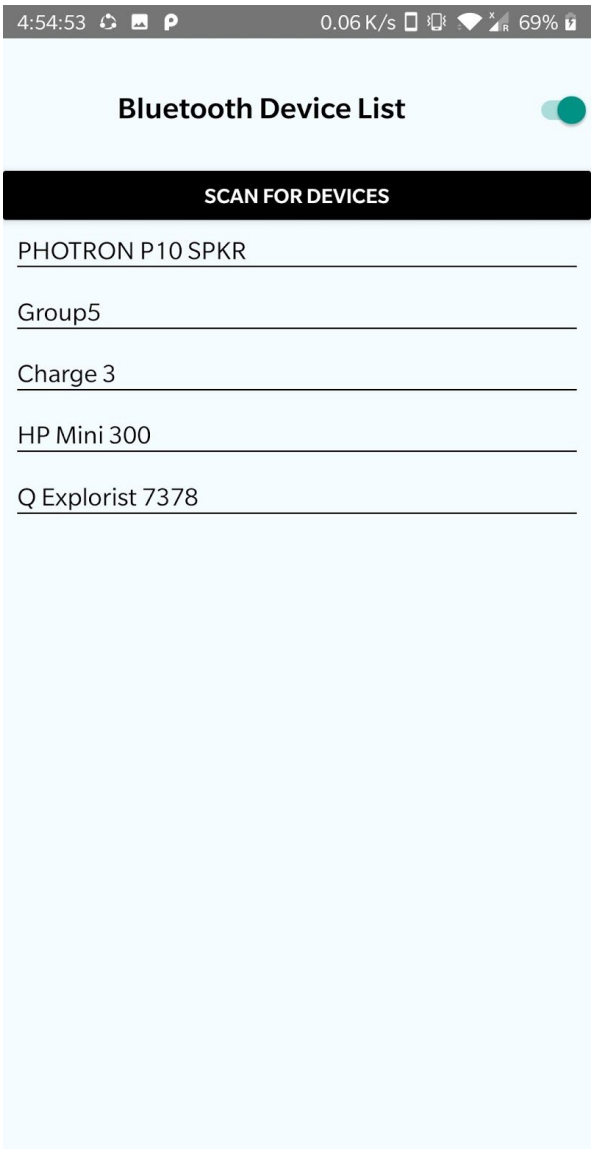


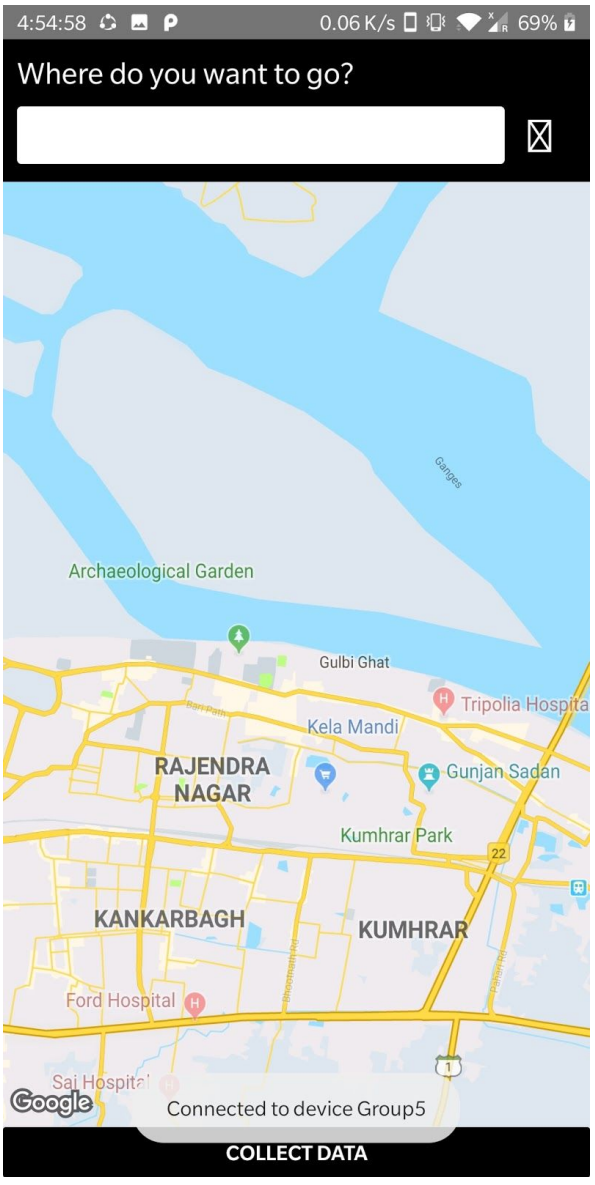
The application was built on **React Native** and **Firebase** and the packages used were:

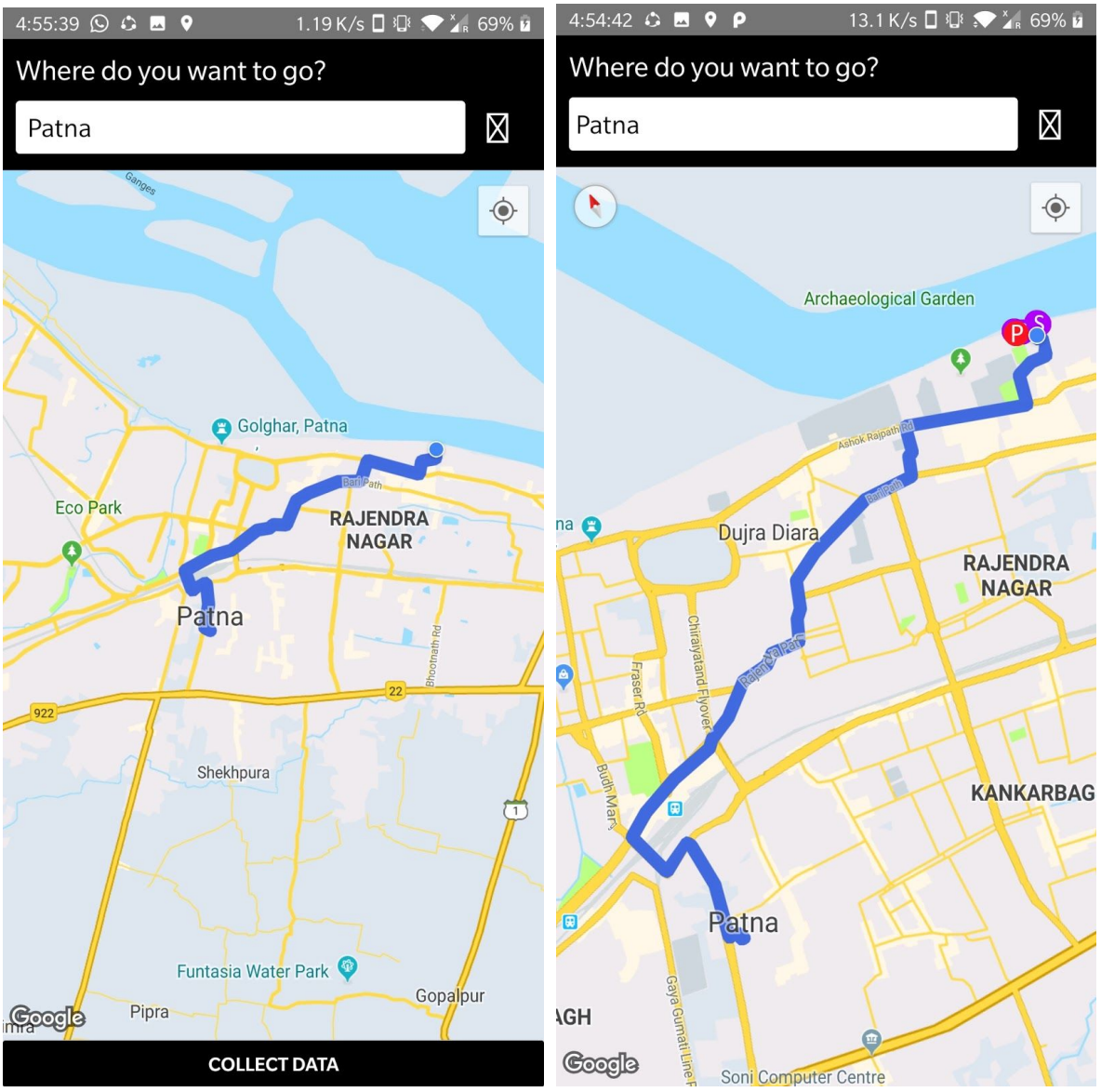
- react-native-router-flux
- react-native-firebase
- react-native-maps
- react-native-maps-directions
- react-native-bluetooth-serial
- react-native-swiper

1. **Mapper Mode:**
   - Initially the user is presented with an interface to connect to gadget.
   - As soon as the phone is connected to the gadget the user is automatically redirected to a maps based interface.
   - The user can enter his destination, then a route to the destination is computed and displayed on the screen.
   - Once user presses the **collect data** button, the phone keeps listening for abnormality data from the arduino.
   - The algorithm running on the Arduino board continuously keeps monitoring the sensors data and performs analysis for abnormalities.
   - Whenever an abnormality is detected the arduino board sends a message which describes the abnormality to the mobile application via the bluetooth module.
   - Once a message is received by the smartphone via bluetooth it tags the message with its current location and uploads this information to a centralised database.

- This location is tagged on the map interface along with the type of abnormality.

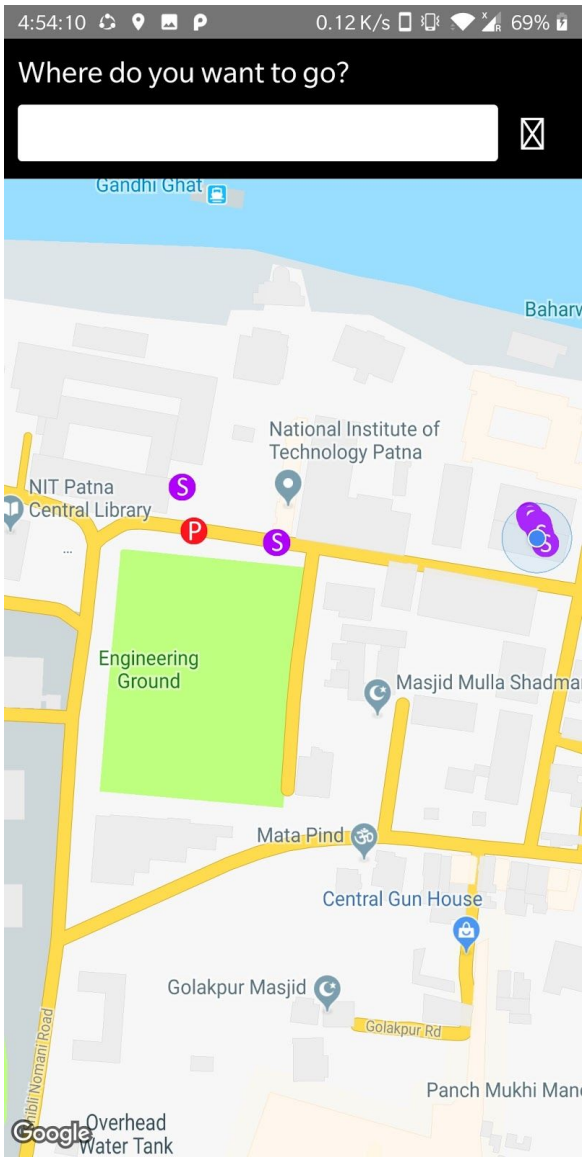






2. Navigation Mode:

- In this mode, the user is presented with an maps based interface.
- The database is scrapped for locations and type of abnormalities by the mobile application, then this scrapped information is tagged on a map interface.
- The user can enter his destination, then a route to the destination is computed and displayed on the screen.
- The above tagged map interface is presented to the users in this mode around his current location.
- The abnormalities tagged on map interface are represented with different icons.
- The user is alerted whenever he is in the vicinity of an abnormality.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Where do you want to go?
Gandhi Ghat
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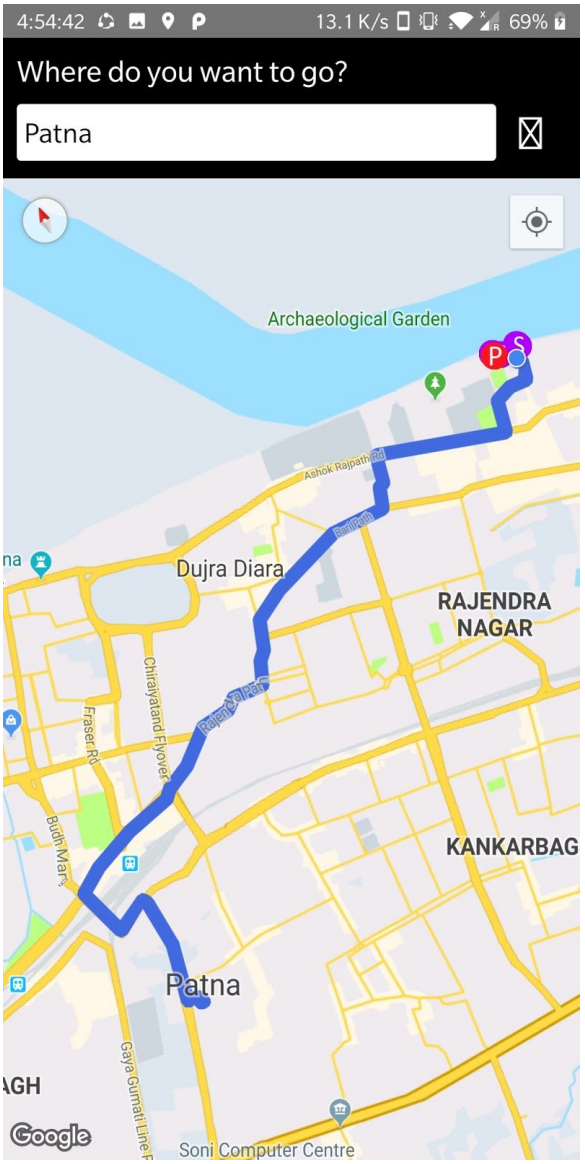
NIT Patna Central Library
Engineering Ground
Masjid Mulla Shadma
Mata Pind
Central Gun House
Golakpur Masjid
Golakpur Rd
Overhead Water Tank
Google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Chirayatand Flyover
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