

# **SOCIAL DISTANCING REMINDER**

CS4472 - Mobile Computing

Project Proposal

**Group - NOVA**

## **Group Members**

170446L – T. K. P. Perera

170504N – P. A. J. Ranidu

## 1. Introduction

With the outbreak of Covid-19 pandemic, *Social Distancing* has become a more frequently heard term over the last two years. As per the health authorities, contacts among people represent the main cause behind the spreading of such a pandemic. Therefore, maintaining the required distance with some effort is necessary to limit the spreading. Apart from that, having an automated and privacy-preserving *Contact Tracing* mechanism would also be useful to prevent the spreading[1].

The smartphones that are available nowadays are not just for communication, but they can sense various aspects of their surroundings (movement, proximity, orientation, etc.). At the same time, almost everyone uses a smartphone these days. Considering these facts, we propose a solution to support social distancing using smartphones.

The proposed mobile application is developed as an Android application that uses Bluetooth Low Energy (BLE) for proximity sensing. It will exchange BLE beacons with nearby devices, estimate the distance between those devices and notify the user if the proximity is less than the recommended distance. The direct distance between two devices is estimated based on Radio Signal Strength Indication (RSSI) values using a pre-trained deep neural network[2]. The proximity data is stored on the users' devices as anonymized data which cannot be used to directly re-identify the contacts. Some of the other functions of the application are listed below.

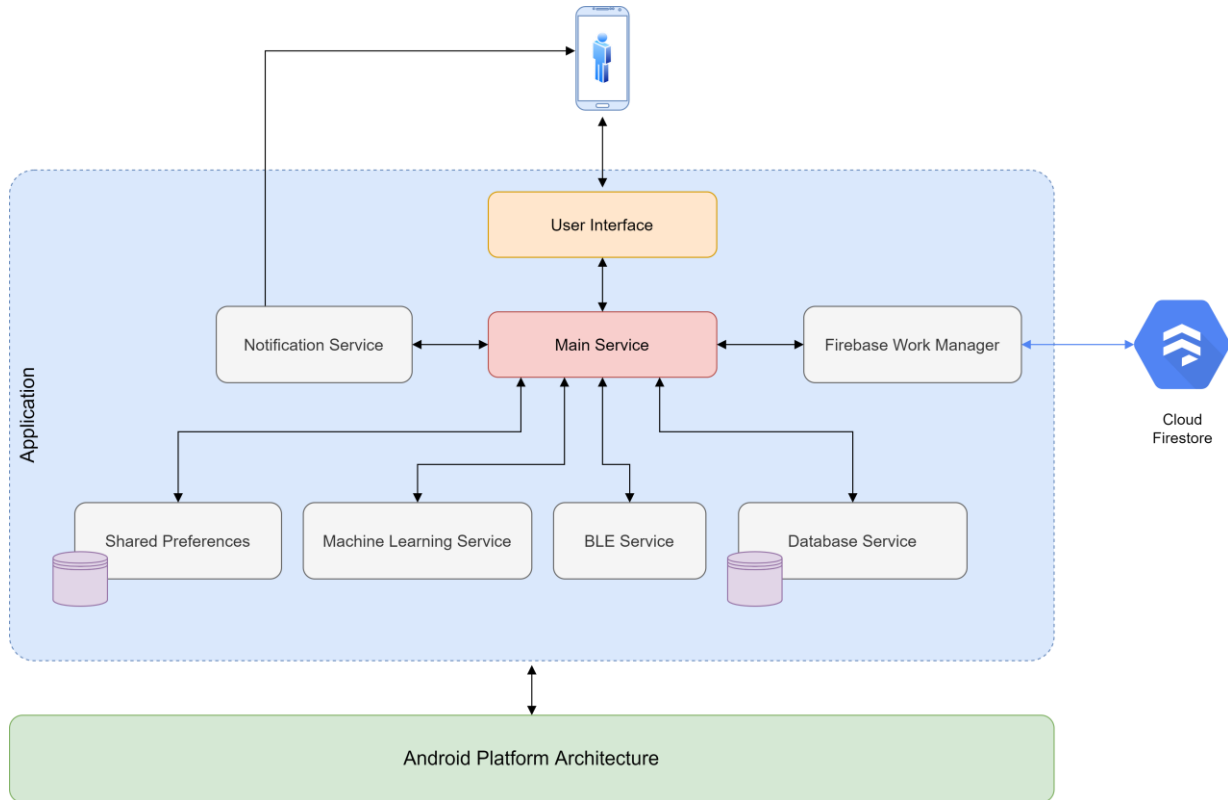
## 2. Use case(s) of the Proposed Application

- Social Distancing - Users will get notification alerts when the app recognizes another person is closer than the minimum distance recommended.
- Digital Contact Tracing - When a user becomes infected, he can update his status in the application. Users get alerts when somebody they have made contact has tested positive.

## 3. Requirements/functions of the Application

- Exchange anonymous beacons (containing a unique key) and save local anonymous data about people whom they encountered (contacts).
- Classify the proximity of a nearby device using BLE RSSI values.
- Connect with a cloud database to store users' updates on their status of infection.
- Alert if the user has been near an infected person. The application regularly downloads the database of infected users to check for matching keys in the local database.
- Whitelist known devices (family members) to prevent unnecessary notifications.

## 4. High-level Architecture of the System



- User Interface – Entry point for the user to interact with the application.
- Main Service– Manages the flow of the application and coordinates with other services.
- BLE Service – Manages beacon advertising and scans for nearby devices.
- Machine Learning Service – Classify the proximity of nearby devices using RSSI signal strength.
- Notification Service – Invokes different types of alert notifications based on the event.
- Database Service – Stores anonymous data of recently contacted devices.
- Firebase Work Manager – Handles background tasks (ex. periodically downloads the infected users database and checks with local database).
- Cloud Firestore – Stores anonymous data of the users who got infected.

## 5. Deliverables

- The Android mobile application which supports the above-listed functionalities.
- A user guide for the application.

## 6. References

- [1] J. Hopkins, “Digital Contact Tracing for Pandemic Response,” doi: 10.1353/book.75831.
- [2] “Using Bluetooth RSSI Values to Classify Proximity with Deep Neural Networks for COVID-19 Contact Tracing – Young Scientists Journal.” <https://ysjournal.com/using-bluetooth-rssi-values-to-classify-proximity-with-deep-neural-networks-for-covid-19-contact-tracing/> (accessed Feb. 07, 2022).