Detecting Covid19 Infected Persons In the surrounding areas using Armor Application

Ms. Saisindhu Jammula, *Graduate Student, Department of Computer Science Pace University*,

Mr. Anil babu Tota, *Graduate Student, Department of Computer Science Pace University*,

Mr. Anivi Reddy Yarabolu, *Graduate Student, Department of Computer Science Pace University,*

Mr. Bharadwaj vemulapally, Graduate Student, Department of Computer Science Pace University,

Mr. Sahith Chowdhary Narukulla, Graduate Student, Department of Computer Science Pace University,

Mr. Sai Nikhil Reddy Tamma, Graduate Student, Department of Computer Science Pace University

Abstract-- **Our product is focused on COVID-19 safety Protocols. It is designed to ensure that people are adhering to social distancing guidelines. Ultimately, it can help make people and the community safer from the virus. This is a tracking app that uses a smartphone's GPS and Bluetooth features to track COVID-19 case. Bluetooth technology enables users to assess their risk of being exposed to the COVID-19 virus if they have been within six feet of a confirmed case. It is also able to detect specific locations that are deemed 'infected areas through location data analysis, and crowd sourcing. this data so it is easily accessible for decision making purposes. The idea behind the app was to make people aware of their risk and give them the tools to protect themselves from contracting the virus. We developed a product that would be a cost-effective measure for protecting profits and human life. The idea for our product is based on the idea of "control" to prevent COVID-19 from spreading. It would be an app that uses Bluetooth and GPS capabilities to track COVID-19 cases and would also provide alerts in case it detects COVID-19 in an area. This product was designed to be inexpensive, effective, providing information necessary for the public's awareness of where the virus is being spread. We designed this app as an incentive to prevent someone from spreading the virus as they can see how close they are getting near people who have contacted it.**

Keywords: depression, machine learning, natural language processing, facial expression, early detection.

I. INTRODUCTION

In Wuhan, China, in December, the 2019 Corona virus disease (COVID-19) was discovered. Following then, the virus spread rapidly around the world. As of March 2022, records show that COVID-19 had infected about 520 million people, and that more than 4 million people had died as a result of the illness. The COVID-19 respiratory syndrome is an acute respiratory illness characterized by a persistent cough, a high-grade fever, and breathlessness. The rapid spread of COVID-19 caused the World Health Organization (WHO) to classify it as a pandemic. Numerous healthcare systems throughout the world have been affected by and put to the test because of the enormous number of cases that want for medical attention.

Overall, the COVID-19 pandemic has posed several difficulties for patients and healthcare institutions. Since it was found that the virus is more active in social settings, public authorities and governments implemented lockdowns and quarantines to stop the infection's spread among the populace. To stop the infection from spreading, the quarantine, stay-at-home, and social isolation policies were put into place. According to research, many healthcare systems were susceptible to such a pandemic because it exacerbated already-existing problems such staff shortages, a lack of personal protective equipment (PPE), the capacity of intensive care units (ICUs), and hospital bed shortages. The current healthcare systems face new challenges as a result of this unique circumstance.

According to the health officials, human interaction is the primary factor contributing to the pandemic's spread. To prevent the spreading, it is therefore necessary to maintain the necessary spacing with some effort. In addition, implementing a Contact Tracing technique that is automated and protects privacy might be helpful to stop the spread.

Modern cell phones are not only used for communication; they can also detect movement, proximity, direction, and other environmental cues. At the same time, nowadays practically everybody uses a smartphone. Considering these realities, we suggest a method for leveraging smartphones to foster social estrangement. We propose a strategy for using smartphones to promote social alienation considering these facts.

Bluetooth Low Energy, more commonly known as BLE, is a technology created as an Android application that is used for proximity detection. It will trade Bluetooth Low Energy (BLE) beacons with neighboring devices, calculate the separation between them, and alert the user if the closeness is too close. Using a pre-trained deep neural network, the direct distance between two devices is calculated based on Radio Signal Strength Indication values. The users' devices retain the proximity data as transformed information that cannot be used to immediately re-identify the contacts.

Safety Protocols for COVID-19 are the focus of our product. It is intended to make sure that people follow the rules for social distance. In the end, it may contribute to increased community and individual viral safety. This tracking application tracks the COVID-19 case using the GPS and Bluetooth capabilities of a smartphone. Users can evaluate their risk of contracting the COVID-19 virus if they have been within six feet of a confirmed case thanks to Bluetooth technology.

Through crowdsourcing and the analysis of location data, it is also able to identify areas that are infected areas. This information so that it is readily available for use in making decisions.

The purpose of the app was to inform users of their risk and equip them with the means of preventing virus exposure. We created a device that would serve as an economical safeguard for both financial gain and human lives. Our product's concept is centered on the notion of a "control" to stop the spread of COVID-19. It would be an app that tracks COVID-19 instances using Bluetooth and GPS technology and sends warnings if it finds COVID-19 in a certain location. The purpose of this device was to tell the public about the locations where the virus is spreading while being affordable and efficient.

Social Distancing has increased in frequency during the past two years as a result of the Covid-19 pandemic outbreak. Interpersonal communication is the main factor driving the pandemic's spread, said worldwide health officials. It is therefore vital to maintain the required spacing with some effort in order to prevent the spreading. To further stop infection, creating an automated Contact Detection phase with privacy protection would be helpful. Smartphones of today are used for more than simply communication; they are also capable of detecting a wide range of environmental cues (such as movement, proximity, direction, etc.). Additionally, almost everyone uses a smartphone these days. Think on these details A mobile app that may alert users when a person is approaching from a closer distance than is recommended solves the problem.

II. LITERATURE REVIEW

Bluetooth Low Energy is a standard designed by the Bluetooth Special Interest Group (Bluetooth SIG) for wireless personal area networks. It was designed with the aim of supporting Internet of Things (IoT) applications by using low-cost and low-power devices. BLE is used in many real word applications now a days. For example, AJ. Aljohani (2021) developed a model for identifying covid 19 risks in university indoors and class environments. Similarly, M.J. Keeling provided a study on the Efficacy of contact tracing for the containment of the 2019 corona virus.

The significant number of medical and personal mobile devices supporting this technology is making it possible for hospitals to better engage with their patients before, during and after each visit. According to a 2013 eClinicalWorks Survey, 93% of healthcare professionals believe mobile apps can improve patient experience and outcomes.

Although, Bluetooth Low Energy (BLE) is the most used communication method in medical devices and sensors. Security and privacy are important, especially in healthcare technologies that can impact morbidity. There is an increasing need to evaluate the security and privacy of healthcare technology, especially with devices and sensors that use Bluetooth Low Energy due to the increasing prevalence and use of medical devices and sensors. Therefore, more robust security analysis is needed to evaluate security and privacy aspects of medical devices and sensors that use Bluetooth Low Energy.

III. PROJECT REQUIRMENTS

The objective of this project is to develop a mobile application called "Armor" that can scan for covid 19 infected persons in the surrounding area covered by Bluetooth. The app then Alert the user if there are any risk in his/her surroundings.

1) Functional Requirements

The following are the functional requirements for the Armor app:

1. User Authentication: The app should allow users to create an account and log in with their credentials. The app should also store user data securely.
2. Services: The app should use BLE service and Cloud fire store for managing Bluetooth beacons and storing users' data.
3. Mobile OS: The application should support both android and Ios mobiles.
4. Users input: The app should allow users to update their covid 19 infected status in the app.
5. BLE service: The app should Exchange anonymous beacons (containing a unique key) and save local anonymous data about people whom they

encountered (contacts) and classify the proximity of a nearby device using BLE RSSI values.

6. User Alerts: The app should 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.

2) Non-functional Requirements

The following are the non-functional requirements for the Armor app:

1. Performance: The app should not take more than 3 seconds to load the initial screen.
2. Efficiency: The app should be able to scan for covid 19 infected persons in the nearby area and should be able to alert the user.
3. Security: All the app data should be secured and be encrypted with minimum needs so that it's protected from the outside environment and also from internal attack.
4. Compatibility: The app should be compatible with both Android and iOS devices running on the latest operating systems.
5. Scalability: App should be able to adapt itself to increased usage or able to handle more data as time progresses.
6. Screen Adaption: The application should be able to render its layout to different screen sizes. Along with automatic adjustment of Font size and image rendering.

3) Constraints

The following are the constraints for the Armor app:

1. Performance Constraints: The app should be working on any device without any bugs and crashes and at the same time consumes less memory and less battery.
2. Time Constraints: To reach the project deadline, the app must be created and tested within a predetermined timeframe.
3. Cost constraint: The cost of creation and maintenance should be kept to a minimal, and the app should be created within the constraints of the given budget.
4. Scope Constraints: To efficiently develop the app, scope needs to be checked continuously and any changes to scope should be documented properly.
5. Device Constraints: The app should be developed using responsive design so that it can run smoothly on any device for all screen sizes and pixels.
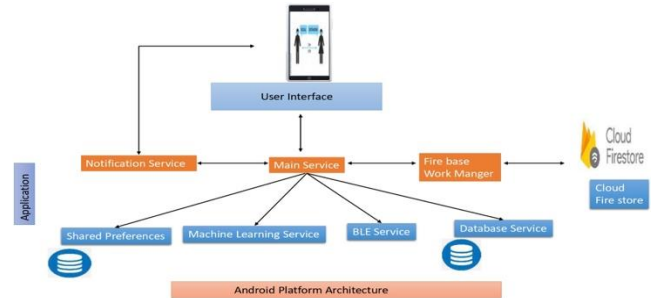
IV. SYSTEM DIAGRAM

Figure 4.1 Sequence Diagram

Sequence Diagram shows interaction between user and armor app. User interface is the entry point for the user to interact with the application. Main service manages the flow of the application and coordinates with other services. BLE services manages beacon advertising and scans for nearby devices. Machine Learning Service classifies the proximity of nearby devices using RSSI signal strength.

Notification Service Invokes different types of alert notifications based on the event. Data base Service stores anonymous data of recently contacted devices. Firebase Work Manager handles background tasks (ex. Periodically downloads the infected user's database and checks with local database). Cloud fire store stores anonymous data of the users who got infected.
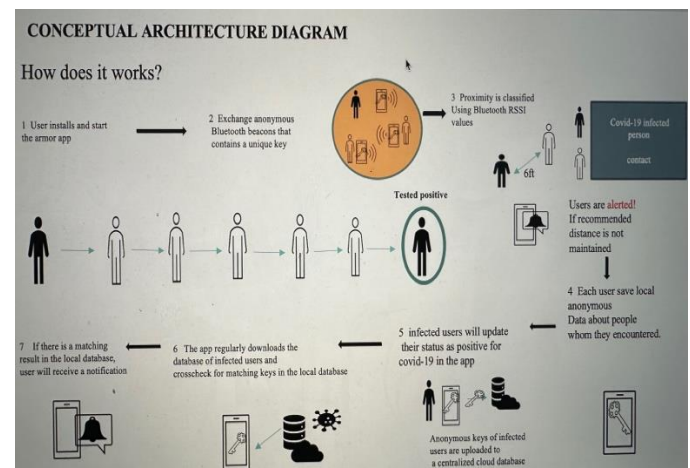

Figure 4.2 Conceptual Architecture Diagram

The Conceptual Architecture Diagram shown above represents high-level conceptual design of a system or software application. It provides an overview of the major components of the system and how they interact with each other to achieve the desired functionality. Users installs the armor app, and they exchange anonymous Bluetooth beacons that contains a unique key and then proximity is classified using Bluetooth RSSI values.

Each user saves local anonymous data about people whom they encountered then the infected users will update their status as positive for covid-19 in the app anonymous keys of infected users are uploaded to a centralized cloud database. The app regularly downloads the database of infected users and crosscheck for matching keys in the local database. If there is a matching result in the local database, user will receive a notification. Users are alerted if recommended distance is not maintained. This conceptual architecture diagram completely demonstrates how the app works.

V. Conclusion

Armor Application uses Bluetooth low energy signals and tokens to identify covid 19 infected persons in the surrounding areas. Social distancing notifications and digital contact tracing are two aspects of a smartphone application related to COVID-19.

The application uses Bluetooth signals to detect other users when they are within a set distance typically 6 feet or 2 meters—and informs the user to maintain their distance. The goal is to help users stay away from close contact and prevent the transmission of COVID-19.

Additionally, users can voluntarily notify the app of their COVID-19 status, which can then be used to alert other users who could have meet the infected person. This is accomplished through Bluetooth signals, which can establish when two users have been sufficiently close to one another for a specified amount of time. to prevent COVID-19 from spreading.

The goal is to make it easier to find and isolate potential cases. It is crucial to remember that user engagement and uptake, as well as the accuracy of Bluetooth signals and the notification system, may all have an impact on how well these features are received by users.

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