



**T.C.
MARMARA UNIVERSITY
FACULTY OF ENGINEERING**

COMPUTER ENGINEERING DEPARTMENT

CSE497 – Project Specification Document

**Push-to-Talk Application for Drivers via Wi-Fi
Direct**

Group Members

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1. Problem Statement

Nowadays, people need more and more real time information about lots of things, especially about traffic and road conditions in their daily lives. Even if navigation applications try to provide such informations, they cannot be fast enough to be able to provide real time informations. However, our project can be a solution for this problem by providing people to communicate each other instantaneously in a specific range via Wi-Fi Direct technology.

2. Problem Description and Motivation

Most of the people check the traffic conditions on their routine routes before getting on the road. If they are lucky, then there will not a traffic jam on their route but what if traffic condition goes bad, then these people will need to learn the reason and how much time will take this problem, to decide to change or not to change their routes. However, people usually cannot have these kind of informations instantly.

In this project, our goal is to provide that real time information to needy person from someone who is already in traffic jam inside a specific range without any cost thanks to Wi-Fi Direct technology. So, people can talk each other without taking any risk by only speaking rather than looking at the screen, which is the action that you have to do in most of the navigation apps to get information about the traffic while driving. Also, our project can help drivers who are in trouble on the road to get assist from someone nearby.

So, our biggest motivation is the demand for the instant information about the traffic, which is needed by drivers. And there are some sub benefits of our project, which supports our motivation, such as being free for communication, usability for not only being informed about traffic but also calling help when needed.

3. Aims of the Project

- The main goal is to make safe and clear communications between drivers in a specific range by using Wi-Fi Direct, VoIP and SIP Technologies via Android Smartphones.

- To create free and reachable communication between drivers in specific distance without paying to any GSM company.
- To supply informations about traffic, location, road, accident to drivers.
- To provide help between drivers. While drivers are driving their vehicles, sometimes they may have some troubles and they need some help. Thanks to our project, they can call help.
- To make a social environment. Sometimes, drivers may not want to trip alone and seek a friend to accompany with them. By using via this application, drivers can find people to come along with them.

4. Related Work

There are a lot of projects to related works with our project. However, due to the special procedures about communications of countries, we can reach a few application in this field.

VoicR: This is a push to talk mobile application. Drivers can communicate a lot of drivers at the same time. Firstly, drivers or users set the distance to specify their range. Then users push the button and hold this button for a while to record their short message. After this process, they can send their messages to other drivers in their range over the different radio channel. To provide the swarm, intelligent, safe and clear communication between users, this application uses an Internet of Everything (IoE)-style publication and subscription network technology. [1]

Yet, we could not install and analyze this application because of the fact that this app is not available in Turkey. However, we sent an email to get more information about the VoicR application. Now we are waiting their reply.

CB Radio Chat: This is a voice chat application that requires internet connections (WiFi, 3G, 4G, EDGE or GPRS) for audio transmission (max 11MB per hour). There is no needs to registration for using this application. Users can also make conference call. [3]. It is similar with VoicR application as usage. People firstly choose a radio channel and then hold to button to record their voice message.

Voxer Walkie Talkie Messenger: This is also voice chat application. However, different from other two application we mentioned on the above, people can send image, video or share files via Dropbox application, they do not have to make live chat.

Even though not being available internet, voice message can be sent later. Another and important difference is end to end encryption. Voxer is the only Walkie Talkie application has the end to end encryption. [4]

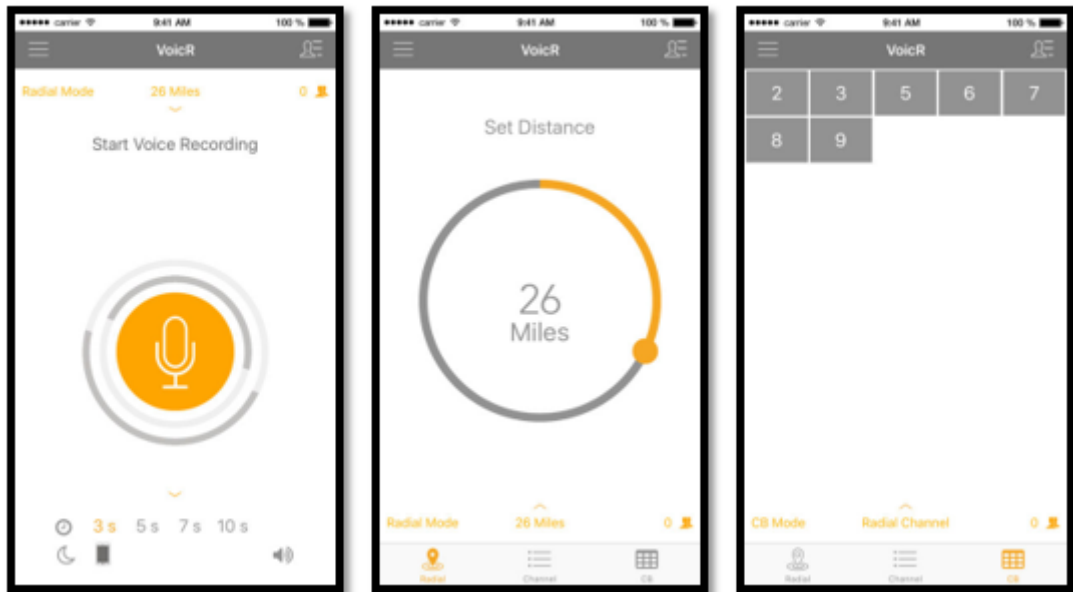


Figure 1: Screenshots of VoicR Application [2]

As we compare our project and the other applications that are mentioned on the above, there are some differences. These are:

- In our application, unlike Voxer application, in our application people can not share any file. They can make only live voice chat.
- Unlike CB Radio chat, registration is required.
- Unlike VoicR, there is no swarm communication. Only two people can make communication. Firstly, user should send a request to connect another user then they will communicate each other. We will use SIP (Session Initiation Protocol) and VoIP (Voice over Internet Protocol).

5. Scope of the Project

Our project will have several phases and it will have a cumulative structure. We will start simple and on each step we will improve until we reach our goal. At first step, our goal is to connect two peers and provide a clear communication between

them. By this step, we will have a knowhow about usage and management of Wi-Fi Direct technology.

When we complete the first step successfully, we will try to manage a communication in a multiple peer environment. In this step our major goals are managing the connection according to distance and range, managing the peers that will be talking and listening instantly.

In the third step, we will work for adding some extra features to our project, such as streaming some information and accident risk and statistics about the road which is the driver is currently on.

In all of these steps, the main technology that we will use is Wi-Fi Direct and even if it is a good technology, it has some disadvantages and the most important one is its short range, unlike the citizen band. Because of the legal constraints for the usage of citizen band in Turkey we decided to use Wi-Fi Direct technology.

6. Success Factors and Benefits

If we can realize the statements below, then we can say that we reach our goal on this project.

- Connecting peers each other in a specified range and make all peers visible to each other if they are in the range.
- Providing a stable connection between peers as long as they are in the specified range.
- Preventing the congestion by using a good algorithm.
- Creating an optimised connection strategy to decrease power consumption.

At first, we will test all of these statements in a down scaled environment and if our project can pass the test, we will test it in real environment. When all of these statements are realized then the benefits of this project will be;

- Providing a free communication to get and share real time informations about traffic and roads between drivers.
- Being a platform to call and get help on the road from nearby drivers.
- Additionally, being a social platform to make friends or to plan an activity.

7. Methodology and Technical Approach

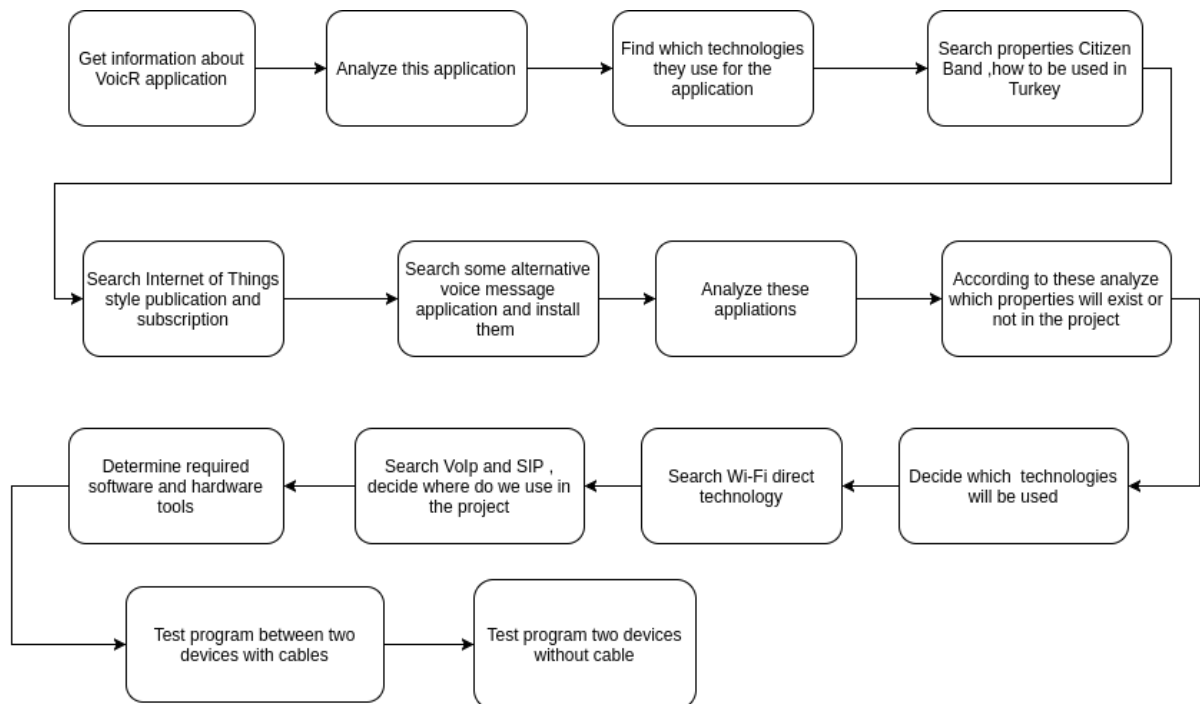


Figure 2: Flow Chart of the tasks

Our project is very similar to VoicR application, for this reason, we started to search this application. They use Citizen Band to communicate over different radio channel, in the specification document of the VoicR application, IoT (Internet of Things) style publication and subscription technologies. Firstly, we seeked some information about Citizen Band like which frequency ranges are used, whether Citizen Radio Band is public or not in Turkey.

In the VoicR web site, there is a few information about this project, hence, we decided to send an email to get more information, still we are waiting for an answers. After making some search about VoicR, we began seeking alternative voice message application, however these applications did not work properly. Up to far, we did all these steps. Now we are studying on VoIP (Voice over Internet), SIP (Session Initiation Protocol) Wi-Fi Direct Technologies. After, we get required software and hardware tools, we are going to try our programme between two devices with cable, later, we are going to try two devices without cable.

We are planning to following tools on the below in order to finish our project:

Software requirements:

- Android studio
- MySQL
- JIRA
- Git

Hardware requirements:

- Radio cable for smartphones
- Rasperry Pi
- Android smartphone

8. Professional Considerations

Our project includes following considerations:

- ***Methodological Considerations/Engineering Standards***

Agility project management will be used. Tasks we assign will be written JIRA which is project management tool, the project will be developed in Git environment. VoIP, SIP, Wi-Fi Direct technologies are going to be used. API level of

Android should be 9 or more to able to use VoIP. To initialize the communication between users, we will use SIP (Session Initiation Protocol).

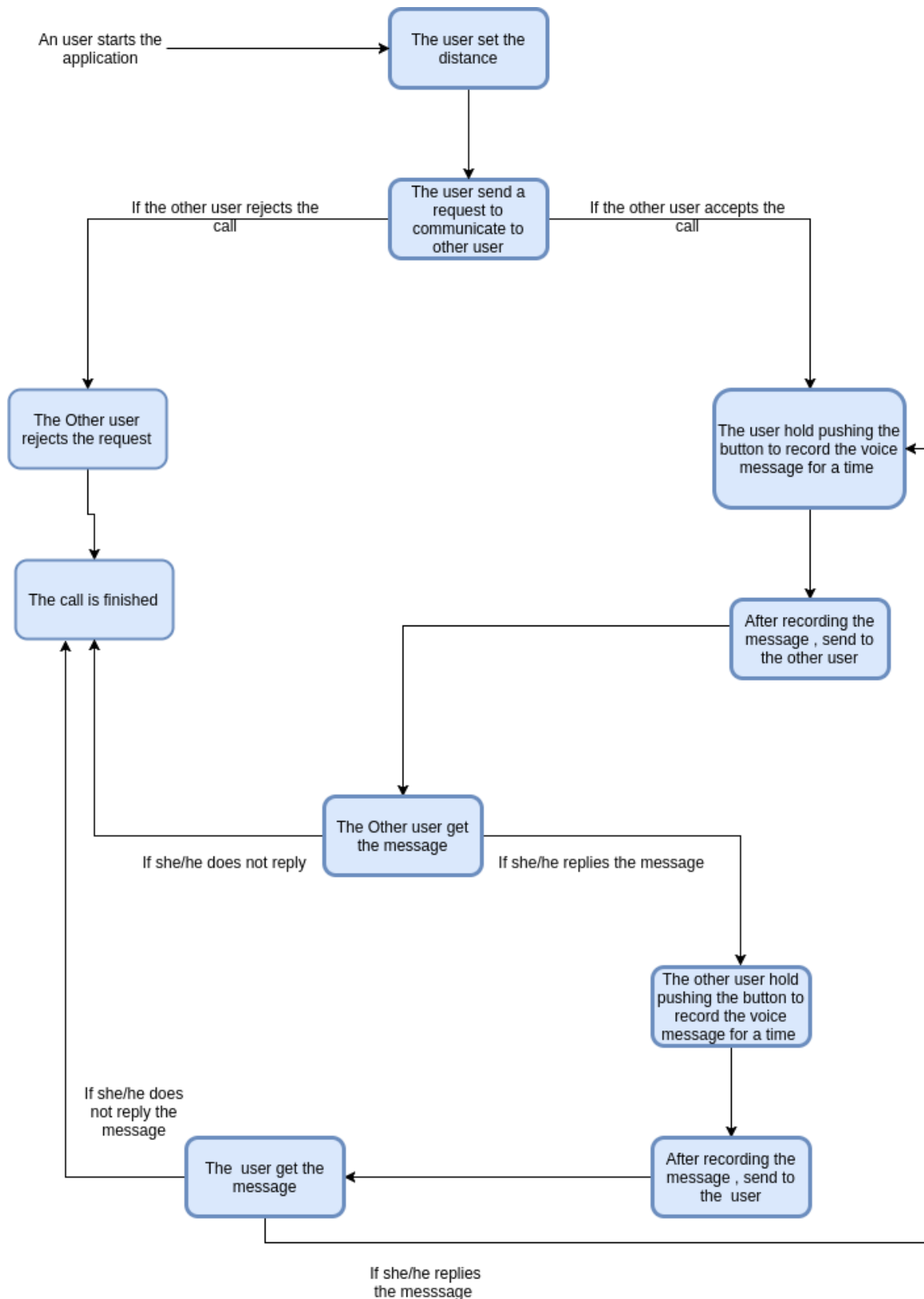


Figure 3: Block chart of the our Project

- ***Societal/ethical considerations:***

The main goal of our project is to help people in traffic. Sometimes, mobile phones may be out of services, they can not call help when they need in traffic. Due to using Wi-Fi direct technology, people do not need to connect a GSM company. Hence, people can benefit free communication. In VoicR application, when the driver passes front of a store, an adverts of this store is published. Sometimes, people may not want to listen adverts. For this reason, unlike the VoicR application, we do not make adverts publish not to disturb them and unlike some applications, we are not going to share our user's informations.

- ***Legal considerations :***

For this project, there is no required specific permission we have to take. We are going to follow IEEE standards.

9. Management Plan

Our task phases are divided into twelve types. As we explain in the following phases:

- **Phase 1:** In this phase, we decided which project will be done.
- **Phase 2:** After we decided our project, we started making searches about our project. We looked different applications which are similar to our project and analyzed them.
- **Phase 3:** According to our analyze result, we determined which technologies, standards, protocols, algorithms will be used in our projects.
- **Phase 4:** From our decisions in phase 3, we examined required hardware and software tools for our project. Necessary programs, environments are going to be set.
- **Phase 5:** After phase 4, we are going to start studying tutorials of technologies for our project.
- **Phase 6:** In this phase, we are going to prepare our presentation of the project.

- **Phase 7:** After the presentation, we will begin writing the A.D.D (Analyze and Design Document) of our project.
- **Phase 8:** The phase 8 and yhe phase 9 are test processes. We are going to test our application between two devices with radio cable, after we finish coding.
- **Phase 9:** Differ from Phase 8, we will test our between devices without radio cable.
- **Phase 10 (Optional):** This phase is optimal, due to fact that if we have extra time. If there is extra time, we are going to add some extra features like end to end encryption and road analyzer. End to end encryption means, crypted communication between users thus a bad guy can not sniff the communication. Road analyzer is a feature that people can see some warnings about roads while they are driving their vehicles.
- **Phase 11:** In this phase, we are going to prepare poster and video presentations.
- **Phase 12:** It is the last phase of our project, we will prepare and submit the CSE 498 Project Report.

	September	October	November	December	January	February	March	April	May	June
Phase 1										
Phase 2										
Phase 3										
Phase 4										
Phase 5										
Phase 6										
Phase 7										
Phase 8										
Phase 9										
Phase 10										
Phase 11										
Phase 12										

Figure 4: Gantt chart for Management Plan

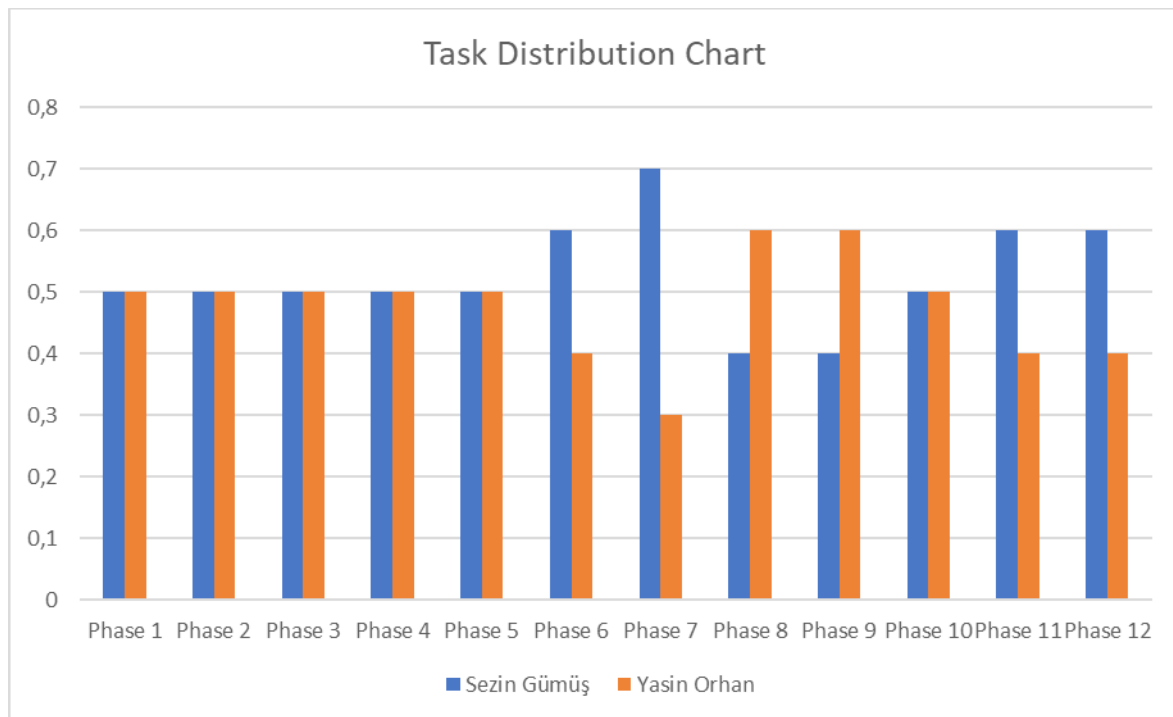


Figure 5: Task Distribution Chart

- **Risk management:** In this project, maybe, we may not to do end to end encryption properly, due to the some legal procedures. A third person can reach the communication between two people. (Like man in the middle attack). We can make basic encryption and apply so many times.

References

[1]: <https://www.continental-automotive.com/en-gl/Passenger-Cars/Interior/Software-Solutions-Services/VoicR>

[2]: <https://itunes.apple.com/us/app/voicr/id1190121214?ls=1&mt=8>

[3]: <https://play.google.com/store/apps/details?id=com.plugmind.cbtest>

[4]: <https://play.google.com/store/apps/details?id=com.rebelvox.voxer>