Software Requirements Specification

for

EmergensUI – Automotive UI

Version 1.0 approved

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Revision History

Name	Date	Reason For Changes	Version
EmergensUI	Oct 4, 19	First documentation released.	1.0

1. Introduction

1.1 Purpose

The purpose of this documentation is to provide further information about our product, **EmergensUI**, an Automotive UI based on the android platform. This document will go into depth of usage, benefits, features, security and other requirements of the software. This document is to be maintained and updated as further progress of the software is made or changed.

1.2 Product Scope

The software portion of **EmergensUI** will be utilized by employees of emergency medical services that aims to improve their communication and decrease the time wasted during medical emergencies. The software will be designed to help employees:

- Decrease the time required to communicate between each other
- Prepare for specified medical emergencies
- Access a secure database containing sensitive information
- View sensitive patient medical information
- Transfer sensitive patient medical information

1.3 Intended Audience and Reading Suggestions

This document will be utilized by the internal IT management of different hospital locations that have purchased a license and maintaining their database of patients and employees. This documentation of **EmergensUI** provides thorough specifications of the software including software requirements and functionality. It will provide information through a broad description of the software, explain the target audience, several software features and the requirements of the application as a whole. It is recommended for the reader of this document to grasp the concept of the software before reading forward into the features and requirements. Specific information such as conceptual software information can be found in **section 2**, individual software features are explained in **section 4**, and software requirements can be found in **section 5** in this document.

1.4 References

References will be supplied if needed during future revisions.

2. Overall Description

The software, **EmergensUI**, an android based application was created to ease the communication and transfer of medical information of patients to specialists and hospitals to prepare for any scenario. The system will be able to provide certain employees with specific patient information according to their specialization. This application will be used alongside an online database server throughout the whole system to provide its services.

2.1 Product Perspective

EmergensUI is an application that allows the communication between medical professionals and paramedics, transfer of patient information, GPS information for specific scenarios. All information on patients will be kept on a secure online database which requires medical staff to log in. The GPS functionality will be available upon detection of a medical service vehicle.

2.2 Product Functions

The main functions of **EmergensUI** consists of:

- Verification
- Authorization
- Encryption
- Communication
- Data Transmission
- GPS Navigation

On start of application, verification takes place whether through account login or bluetooth connection to a medical service vehicle. This step gives authorization to specific users to access certain information such as decrypted sensitive information or GPS navigation. The application allows logged in users to communicate with one another to share data. A non-user can still access the application; however, most features are hidden until logged in. On detection of a non-user, application should still be able to function as a navigational tool.

2.3 User Classes and Characteristics

Access within the **EmergensUI** application changes upon login and gives authorization to certain information. The authorization differentiates these users into different classes and gives them access privileges according to their class. The users of this application are known to be different employees within emergency medical services; thus, within the application we have split the access levels according to the same titles within the field. The

user classes that currently exist within the app are, non-users, paramedics, nurses, and doctors. Where non-users have the least access to features, whereas doctors have the most access. The main objective of the application is to create an environment that eases the communication between the users, such as those in the medical field. Thus, in terms of satisfaction, we aim to please those that are within that spectrum.

2.4 Operating Environment

The **EmergensUI** is an android based application. It is designed to operate on any android device that is compatible under **Android SDK version 21**, widely known as **Lollipop**. Due to strict compatibility requirements, vehicles that are driven under Emergency Medical Services would have to implement a digital dashboard that is capable of running Android OS, specifically an operating system that is at least **Lollipop** or higher.

2.5 Design and Implementation Constraints

There are regulations implemented in the working environment in the medical industry that our application is constrained and have to abide throughout the functionality of these features. Regulations such as doctor-patient confidentiality and keeping sensitive medical history out of reach of those that should not have access is a must throughout the usage of this application. Thus, the design and implementation of the application aims to secure the sensitive information of these patients within an online database that should be able to keep information encrypted and only allow medical employees whom are users to gain access. These security protocols should be constantly kept in place to protect both doctors and patients from breaking this regulation. Our design keeps in mind the different user classes and would allow sensitive information to be transferred to one another only if required and access has been granted. The application should abide to Canadian regulations and have the ability to translate itself between English and French.

2.6 User Documentation

Upon the completion of this documentation, there is currently no other user documentation that is readily made available that offers tutorials on the usage of the application; however, one will be offered upon the complete release of the application. This documentation will be available on GitHub after the product has been thoroughly tested. Currently, several design templates and this SRS documentation are available within the company’s GitHub.

2.7 Assumptions and Dependencies

Several assumed dependencies and flaws may arise during the developmental phase of the application. In terms of dependencies, we would have to assume that our future online database is capable of holding large amounts of information and keeping them encrypted so non-users will not be able to access sensitive information. This factor can also be seen as a flaw due to the severe consequences of not being to uphold the doctor-patient

confidentiality regulation. Not only will the sensitive information of patients be affected but the contact information of those within the database will be breached. The next dependency that our application will be utilizing is a third-party application or system. The navigational system that is designed by Google that is utilized by most android devices is our main dependency for our GPS feature included. We intend to use this navigational system alongside the sensors within the digital dashboard to provide a clear reading of the geographical location of the vehicle and provide a route to the nearest medical facility. Another crucial constraint is if the digital dashboard within the ambulance is not capable is running an android operating system; however, for this project we will assume that they are.

3. External Interface Requirements

3.1 User Interfaces

The application of **EmergensUI** will contain regular UI elements such as login textboxes, buttons and lists to help navigate through the software. There will be two different interfaces that it will main function on after the verification of the user. It will either be in Doctor/Nurse user mode or Paramedic driving user mode. These two user interfaces function similarly but different from one another.
The driver interface will provide basic vehicle information such as speed and currently location; however it will also include the current patient's health status. By displaying such information to the driver, it will allow the driver to make better decisions when navigating through traffic. Within the interface, there is an integrated algorithm that navigates the user to the neaest hospital.
The doctor and nurse interface functions differently than the driver interface. Within this mode, it will allow the verification of the user through a login screen to allow access to further screens with sensitive information. This is used to identify and classify each user to their roles and authorize them to access certain sensitive information. This also acts as a security tool to prevent access to unauthorized users that try retrieving medical information within the database.
The screen post login, grants access to the user's own profile interface that contains a list of patients that they have access that helps them constantly check the health status of a patient. In addition to the patient list, there will be a collaborative contact screen of the users within the current hospital facility that eases the communication between different departments.

3.2 Hardware Interfaces

There are three main hardware components within the digital dashboard that will enable the ambulance to communicate and transfer data to the application; however, these are features made available to paramedics. The mobile functionality will remain constant throughout most android devices owned by users within the medical industry. These three

hardware components consist of a heartbeat sensor, GPS sensor and velocity sensor. These three components will be used to gather vehicle and patient information for the application to transmit back to the driver. The patient's heart rate will be gathered by the heartbeat sensor, vehicle's digital dashboard will gather speedometer and odometer readings from the velocity sensor, and the software will use the GPS sensor to retrieve geographical reading of the location of the vehicle. As long as the vehicle and mobile devices are running the **Lollipop** android operating system, it would meet the hardware requirement of the software.

3.3 Communications Interfaces

Data transmission is one of the crucial features of this application. Data retrieved from the sensors within the ambulance may be used to update patient information within the online database through TCP/IP protocols that allow for encryption upon sending; however, retrieving information will use the same protocol but decrypt such information. The act of encryption and decryption allow for a more secure process in keeping sensitive patient information safe

4. System Features

This section of the document will further explain the key features and functionality of the system as a whole. It will go through one feature per subsection and give a brief description, priority, software response, and functional requirements of each feature.

4.1 Emergency Notification System

4.1.1 Description and Priority

This feature uses sensors within the ambulance or hospital to retrieve vital information of a patient constantly. Upon a potential fatal emergency situation, the application should notify the nearest hospital or doctor of the situation. This would allow for the hospital or doctor to have a quicker reaction time to an emergency case and improve the survival rate during those scenarios. This feature will be given higher priority of 7-8 due to its capability in improving the communication of medical faculty.

4.1.2 Stimulus/Response Sequences

Use case scenario:

> Upon the detection of a patient's vital information through the heartbeat sensor within the ambulance, the software would create a route and send notification to the nearest hospital. This would allow for the paramedic to drive the shortest route and have the hospital prepare for the arrival of a patient during emergencies. When the

software detects that the patient's vitals are deteriorating, it would further notify the hospital and paramedic of the situation elevating to a higher level of priority.

4.1.3 Functional Requirements

REQ-1: Heartbeat sensor and monitoring system (application)

- Software must be capable of reading in crucial current health information of the patient and relay that into the app, this is both software and hardware requirement. Data must be precisely shown and grasped into the software.
- Software must be able to detect if connected to some sort of ambulance or paramedic device to implement this feature.
- The monitoring system must be able to detect if a patient's vitals are dropping and send out notifications.

4.2 Other features (TBD)

5. Other Nonfunctional Requirements

5.1 Performance Requirements

There are specific performance requirements for the software in order to function optimally for our clients that may potentially implement this system. In order to maintain optimal usage, the sensors within the ambulance must be able to grab accurate data and transfer that data into the software at close to real time. This transfer rate must be close to within at least a second or two to retain accurate readings of the vehicle and patient. This quick transfer rate creates an environment in which the users can react in a reasonable amount of time. As long as the sensors are able to grab and transfer such data within two seconds or less, the software can be deemed as successful. The patient's data must also be encrypted during the time of transfer and decrypted upon retrieval. This is to make such data legible to the user but illegible once inside the online database to prevent leaking sensitive information. In order to maintain this functionality, the mobile device must be constantly connected to the internet, whether through WiFi or through mobile internet.

5.2 Safety Requirements

Due to the system being most reliant on software based functionality, there are minimal safety requirements that need to be followed. In terms of the hardware, most of the sensors would be built into ambulance vehicle, encased within the dashboard. Most of the safeguards would already be in place to prevent any harm from usage. Safety precautions of different mobile devices would depend on other manufacturers that created those devices.

5.3 Security Requirement

The main security requirement of **EmergensUI** is the encryption of sensitive data being held in the online database. The software will implement encryption processes during the transfer of any data being sent towards the database. There will be a secondary security process that will be implemented to authorize certain users into the application to give access to certain individuals to certain sensitive medical information of patients. This authorization and verification process will make it so unrelated users will incapable of accessing sensitive health information of patients and contact information of medical employees. In the case of someone trying to use injection techniques to extract data from the database, a prepared statement within the program will allow the prevention of this scenario. To ensure that access is only given to specific individuals within medical facilities, a dedicated and trustworthy IT department is required to supply login information.

5.4 Software Quality Attributes

The **EmergensUI** should be able to run on any device platform that runs the Android OS, Lollipop or higher. This software should be able to adapt to any screen resolution in terms of usage. Screen resolution should not affect its usability. Labels and instructions within the application should be made clear as possible. This means that each feature should be easily comprehensible and easy to use upon viewing. The application should be relatively easy to maintain by the IT department of each of our clients and their users. It will provide a user-friendly experience that will bring ease and convenience of the communication feature between users. The application should robust enough to the point where it can handle multiple communicative routines at the same time by multiple users on the network. While handling communications, it should also be able to withstand large amounts of data storage to hold within its database. Maintenance will constantly be done to help maintain the application's reusability and reliability, updates should be released monthly to reduce future bugs that may arise.

5.5 Business Rules

The main business rule for **EmergensUI** is to restrict access patient information to user classes of nurses and doctor roles within hospitals. This can be done through the main IT department of these facilities. The IT department can verify the role of these users and implement them into the system with new login information. The software will first verify the user and check the class of their role. It will then check if the patient they are looking for is within the database, if they are then it will process to verify and authorize if the user has access to these files; if they don't however, it should show a cautionary symbol and alert to indicate that the file is private. However, if the patient doesn't exist within the database, it's the IT department's job to implement the patient to the list along with basic information. Other specific health information would then be updated if doctor has access to their files. Usually paramedics are meant to take patients to their main hospital facility; however, due to the fact that there is a system in place to monitor patient vitals, the system would be

able to navigate the paramedics to the nearest hospital to prevent the patient's health from deteriorating further.

6. Other Requirements

As development continues on the **EmergensUI** project, there may be other database requirements, internalization requirements, legal requirements or other objectives and goals that may be added to the documentation. However, this section remains a placeholder until further features and requirements are announced.