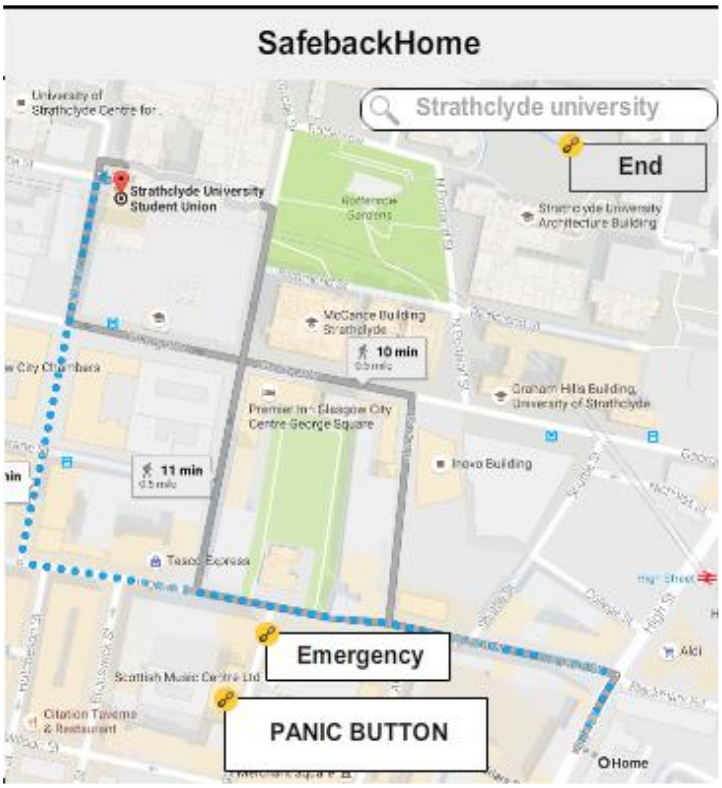
2016

Design Usable Systems



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Safe Back Home Application

12/4/2016

Contents

High fidelity prototype link:

https://app.mockflow.com/view/Df5f120e7d96b8a29fdade8bc188d8d90#/page/5A9FF2E301252681C7E1AFAB383C6A7E

Introduction

Crime and fear plays a significant role in the urban life in a pedestrian context. Communication Technology (ICT) can be used to significantly alleviate the fear in the urban life in a pedestrian context after the onset, and increase personal safety. Staying safe out at night is very important, for young people. Many children and teenagers feel very anxious walking out at night, especially in areas like main roads, car parks, commercial spaces highways and parks. The physical and social parts within one's local environment, and the presence of a familiar male was produced an especially strong sense of comfort (Blom and Viswanathan, 2010) Being out at night in areas with increased rate of crime is very dangerous and since almost everyone carries a cell phone with him nowadays, it's very easy to communicate in an emergency situation with the police or some relative. ICT are also used to monitor and share information of individuals. Privacy concerns arise from surveillance in general, and especially unwittingly surveillance. Nevertheless thirty nine of the 43 participants interviewed in the after dark phase of a research reported that mobile social networking platforms digitally mediated a sense of emotional support and security and 29 participants reported that they would trade privacy for the security.

This paper analyzes an application that gives a solution to this problem. The application broadcasting information about a youth's actions/location to parent with the youth's awareness, allowing parents to monitor teenagers (wittingly monitoring) without implications for parent-teen relationships, as the teenager decides when to share the location with the parent. The user can use this application in order to reach a specific destination and Keeping him safe during the transportation, selecting a person (Parent) to have an eye on him, minimizing the potential danger. The goal of *Safe Back Home* is to increase the safety by using technology the teenager or young people already possesses. The app allows the user to select a starting and ending location and be monitored based on their estimated position. Their movement is tracked on the parents' device. The person who decides to use the application could be of any age or gender, but the application is intended to be used especially by teenagers. For that reason, there is an emergency button to call the parent (or the police) and send the location in case of an emergency. Teenagers and kids should feel safe while walking alone especially at night and the parents can have an eye on them during the transportation, and observe them in real time by the trace on the maps, which will be shown on their device. The parent should have also installed the application on his phone. The app allows students to be tracked through estimation of his or her walking speed and time. The teenager supplies the ending location of the trip, and he can see in real time his location on the maps, as well the directions in to reach his destination. In case of an emergency the teenager could press the panic button which enables an alarm sound, in order to keep in distance an attack. If the user

feel anxious he has two options. The first one is to call the police, and the second one to call the parent. In case he calls the police a message is sent to the parent with the exact location of the teenager. Once the user reached safely its destination, he can press the end button and an SMS will be delivered to the contact: "The user has reached safely its destination". The application also provides navigation by generating the best route for the user.

Literature Review

There are a large number of studies concerning technologies that can be used in order to reduce crime during night, and increase personal safety. However, since the focus of this topic is the role of mobile technologies and applications of reducing fear and crime especially at night, what will be reviewed are the factors that inducing and reducing fear at night, that will help gathering more information for the development lifecycle of a personal safety mobile application for teenagers. Fear experienced in the darkness plays a significant role in the urban life in a pedestrian context, and Information and Communication Technology (ICT) can significantly alleviate it. The quality of life is significantly reduced by the experience of fear thus we are going to examine factors that reducing and inducing fear. One of the most important roles to prevent crime and increase safety is the mobile devices and the ability to call for help. When more advanced technologies are used and mobile applications provide increased safety and monitoring, privacy issues arise. High-tech devices, like driver monitoring systems and Internet usage monitoring tools, are promoted as useful or even necessary for good parenting of teens affecting domains such as privacy, trust, and maturation. Technological advances in mobile technology have produced a new class of systems that aim at providing support to tasks and interactions of humans in physical space, recording user's location. Finally after the examination of many examples of issues arising from safety technologies, specific applications with various safety features and mobile technology will be examined.

Fear plays a significant role in the urban life in a pedestrian context after the onset of darkness; hence Information and Communication Technology (ICT) can significantly alleviate it. In Night and Darkness: Interaction after Dark (March, Swan, and Alex, 2008) the need to consider night and darkness as a starting point for designing ubiquitous computing were suggested. This is a challenge that has recently been discussed in a study that was conducted on 200 females (Blom, and Viswanathan, 2010).In this, study, the need to relieve the fear which were sounded both in India and the U.S, especially in a pedestrian context after the onset of darkness in an urban context was identified, as well as the investigation of a mobile communication system to help meet this need was described. ComfortZones, a mobile service falling in the domain of urban safety and security was designed based on user research conclusions into personal experiences of fear, circumstances in which they occur, and behavioral strategies. A high fidelity prototype was developed and tested in a field trial in India. Most of the representations took

place in open environments – main roads, car parks, commercial spaces highways, parks, etc and was concluded that security associated services and interfaces should be able to distinguish between light and dark spaces as well as day and night, because the onset of darkness changes one's orientation toward the surrounding space.

The quality of life is significantly reduced by the experience of fear in urban populations. It was found that Factors and places inducing fear and are commonly reported as uncomfortable, are dark urban spaces, parking lots, alleys, parks. "I was walking out at night, it's the time when it's not bright, it's not dark, but this is when you start feeling a bit uncomfortable." – Female I, Bangalore (Blom and Viswanathan, 2010). Contexts of possible accident or theft while on transit, or being robbed at an ATM, and an unfamiliar male presence considered particularly threatening, was a strong driver of fear in both populations

On the other hand, the factors reducing fear were examined. Familiar indoor environments, essentially one's home or personal car, were recognized as safe environments keeping strangers in distance. The physical and social parts within one's social environment and a familiar outdoor environment, like security guards small shop owners, and drivers which have been in the neighborhood for a long time, was found to lessen the fear and give a sense of safety. Also, Signs of access to authority, such as an office alarm, are reducing fear and generate a sense of security. The appearance of a familiar male was also produced an especially strong sense of comfort. Mobile devices and the ability to call for help if required provided also a comforting diversion from the immediate physical environment. Phone calls and text messages alleviated the fear of the participant as well as the concerned party. During the study was asked from the participants to imagine a "magic device" and what could do for them in an uncertain situation. The responses were very similar with the most common idea of some form of an alarm that could scare off a potential attacker, or send out a silent signal to the nearest point of authority. While we want to be guarded, we do not necessarily want to be watched, hence serious concerns emerge about the way in which technologically mediated attempts to ensure personal safety are tightly linked with surveillance and the erosion of privacy. In a research that was conducted in order to understand what characteristics of user activity and interaction could be enhanced by technology(Satchell and Foth, 2010) thirty-nine of the 43 participants interviewed in the after dark phase of the research stated that mobile social networking platforms digitally mediated a sense of emotional support and security. In order to achieve this, 29 participants reported that they would trade privacy for the security.

High-tech devices, like driver monitoring systems and Internet usage monitoring tools, are promoted as useful or even necessary for good parenting of teens. An Important research has been conducted by Omputing Czeskis who examines the possible technology to enable parents to observe teenagers (unwittingly monitoring) and implications for parent-teen relationships,

touching domains such as privacy, trust, and maturation (Czeskis et al., 2010). Omputing recognizes two technological trends that could have notable implications for parents and their children. The first is "remote parenting" technologies that allow parents to watch their children's activities from distant; the second involves mobile phone safety applications that take advantage of the extensive use of mobile phones to improve a person's physical safety. Technologies like GPS jackets and key rings, teens via in-car cameras that record their behavior while driving are lately on the market. Mobile applications which set warnings when the phone enters an unreliable area, or allow users to photograph their surroundings in case something untimely happens at which time the photographs would be delivered to the police. Thus, industry has started to market innovative mobile technologies that monitor children with the stated purpose of enhancing their physical safety.

Mobile phone developers face many challenges determining what solutions and feature sets to implement while deploying mobile phone parenting safety technologies. For instance, should such technologies transmitting information about student actions to parents without the student awareness, monitor children secretly, or should children be aware when information about their activities is presented to their parents? What type of information about the child should be managed? Are there some types of information that technologies should not manage? And who should have access to this information and under what conditions? The application u-safe is a hypothetical mobile phone application and free service developed to receive and store potential evidence and forensic information (Czeskis et al., 2010). Once installed on a mobile phone, u-Safe allows the user to send text messages and photographs to a u-Safe server. In turn, u-Safe holds this information for six months and will only release it under a court issued warrant. Without a warrant, even users cannot reach or investigate the information they have sent to a u-Safe server. U-Safe scenario also describes a situation in which technology is designated to be used to help protect someone's safety prior to their notifying law enforcement, for the purposes of making it feasible to respect the rights of others (who may or may not be acting with criminal intent) while also making the user feel more protected. More generally, it seeks an answer for a problem frequently faced by teenage girls (and women more generally), namely situations in which they feel uncertain but that aren't yet doubtful enough to notify the police.

The technological progress in mobile technology has produced a new type of systems that intend at providing assistance to tasks and interactions of humans in physical space, reporting user’s location. The systems that plan to use location in order to register user’s movement and to use the produced data for extracting valuable knowledge define a new area of research that has technological as well as theoretical foundations. In a research (Bloom et al, 2010) ,was concluded that security correlated services and interfaces should be able to discriminate between light and dark spaces as well as day and night because the onset of darkness changes

one's orientation toward the surrounding space. Safe-return service (Lee et al., 2015) is an application that allows users to be aware of and to prepare for possible dangerous situations in real time. In order to limit crime this application allows users to be notified of, and therefore handle, possibly dangerous situations encircling them in real time, importing the locations of public offices (e.g., hospitals, fire stations police shelters) from the Smart Safe Return system provided by MOSPA, and using the CCTV video data provided by a portal website. Online RSS of also used to obtain danger-related real-time data. Likewise Cu safe (Watson, Hammond, and Pressly, 2008) is a software tool that utilizes Google Maps to provide increased safety for students on campus. The software tool, Clemson University Safe (CU Safe) is split up into three modules that can be utilized by technology the student already owns. The goal of CU Safe is to increase the safety of students by using technology the student already possesses. It is scalable so other campuses can easily integrate it with minimal setup requirements. This application allows the user to select a starting and ending location and be observed based on their estimated position. Their movement is tracked on a Google Maps page. A student can be monitored en route to their destination on Google Maps. A mass text-messaging (SMS) web application called CU Safe Alert is also implemented to this application allowing students to intentionally provide their cell phone number in order to receive SMS messages in emergency situations. Students who associate can choose to receive alerts via text messages or email, depending on the threat of the emergency.

All in all the Communication Technology (ICT) can be used to significantly alleviate the fear in the urban life in a pedestrian context after the onset. Many studies have been conducted regarding the role of communications systems, and how they affect the fear experienced, as well as the safety they provide and the factors or places that induce or reduce fear. Darkness in places like urban spaces, parking lots, alleys, parks, as well as factors like possible accident or theft while on transit, and an unfamiliar male presence considered particularly threatening. On the contrary factors like familiar indoor environments, primarily one's home or personal car, identified as safe environments as well as signs of access to authority generate a sense of security keeping strangers in distance and decreasing fear, hence increasing the sense of safety. ICT technologies like Phone calls and text messages appear to be very effective in alleviating fear too. In addition many privacy concerns arises about the way in which technology used to ensure personal safety, including specific monitoring technology, and mobile phone safety applications that allows parents to monitor teenagers (unwittingly monitoring), and which raises many implications for parent-teen relationships. Mobile phone developers face many challenges determining what solutions and feature sets to implement while deploying mobile phone parenting safety technologies, like if should such technologies broadcasting information about a youth's actions to parents without the youth's awareness. Therefore there are many applications on the market, which provide personal safety issues, like Cu safe, a software tool that utilizes Google Maps and mobile technologies that are mainly used to capture and

monitoring user's location like gps and geolocation, and provide increased safety for students on campus. Likewise Safe return is another application that allows users to be aware of and to prepare for possible dangerous situations in real time (obtaining danger-related real-time data). Furthermore there are many applications that trying to respect privacy issues like u-safe app, a hypothetical mobile phone application that portrays a situation in which technology is intended to be used to help protect someone's safety prior to their notifying law enforcement (collect and store potential evidence and forensic information), with the goals of making it possible to respect the rights of other.

Market/product analysis

The main problem the application is trying to solve is the personal safety issue, which encounters young people, especially students or undergraduates when walking alone at night, or travel with people who they don't know. The application is going to help them, ensuring that the parents or police will be notified in case of an emergency. The users of the application will be mostly young people, students, and teenagers but it also can be used from people with special needs, like disabled persons, and women who feel vulnerable. The customers of the product will be parents of the children, families, or maybe School organizations. The purpose of the application use is the reassurance of personal safety. The competitors in the market are many, offering many services that are mandatory to be included in the application, but most of them are not targeting specific age group. Services like Maps (Google maps), SMS notifications, GPS tracking, panic alerts, Intended destination, Emergency contacts are being offered by the competitors and should be implemented in the application too. The Unique feature that the application is going to implement is an emergency button which will be assigned to a parent's mobile phone device. Most of the applications in the market offer an emergency feature which informs the police about an incident or an upcoming threat. This specific application directly connects the teenager with the parent's mobile device, sending the exact location or calling the parent the parent explaining the situation, by pressing the emergency parent button. This feature makes the application unique, targeting in teenager's age group. The main limitations with the system's success are some technical issues like GPS accuracy and battery drain from GPS usage. This is a problem that all competitors face and it's hard to be solved. Most of the flaws in the available applications in the market are associated with GPS reception. Also the limited functionality in terms of contacts that can access the user location is the privacy concerns that arise from the monitoring functionality. The teenager decides who is going to monitor him. Only the teenager can send an invitation to the parent to monitor him. This limited functionality targets to issues of privacy that may a teenager has, using this application.

Product review table

Product/Service/App	Producer/Company	Cost	Main Features	Flaws
Companion	Companion, LLC	free	Maps Directions Emergency button	Can't change predefined police number Tracking issues Connectivity issues
BSafe - Personal Safety App	BSafe	free	Maps Share locations automatic alarm Fake Call Alert button Directions	Error messages Location issues False alarms
OnWatch	SmartTek Systems	$0.99 Per month	Maps countdown set Panic button Location share Connected to 24h monitoring station	No reviews yet
Watch Over Me	Smartwatcher Technologies AG	€.1.09	Smart watch support Talk function	Location issues

Definition of target Users, main tasks, stakeholders Analysis

The stakeholders for the Safe back home application project are:

The customers (Students/teenagers, Families/Parents, School organizations). The main customers are the teenagers and the parents. The teenagers need an application that will make them feel safe when they walk alone especially at night while the parents can have an eye on them during the transportation. The teenagers need to have the absolute control of the application and be monitored by parents only when they permit it.

Software developer team (analysts, designers, programmers, testers, quality assurance representatives, maintainers, trainers, project managers).The developers need information like what type of information about the child should be managed. For instance, should specific technologies broadcasting information about a youth's actions to parents without the youth's awareness monitor youth secretly, or should youth be aware when information about their activities is provided to their parents? Also user requirements and information about specific behaviors are important.

Personas

Name: Katie

Age: 17

Occupation: Student

The user of the application is a teenager or undergraduate student girl. She lives in a big city with increased rate of crime. Katie's social life is more intense during weekends when the schools or university are closed. She usually doesn't drink alcohol, except specific occasions. She finds difficult to avoid isolated areas at night, when traveling outside and she is very vulnerable. She needs to avoid taking unnecessary shortcuts at night that are out of the way and could be potentially dangerous, and have easy access to parents in case of an emergency. She also uses to travel with people that she doesn't know (when taking a taxi, a bus, or a car) to go back to home or to travel to a specific destination. She loves technology and gadgets and has a smartphone with android OS and internet connection. She needs her parents to know that she is safe, when going back at home late at night.

Task analysis:

0. In order to go back home safe (Teenager):
1. Register with your mobile phone/name/gender
   1.1 Enter your mobile phone number
   1.2 Select teenager
   1.3 Press submit
   1.4 Validate your mobile phone number (insert code)
   1.5 Press submit
2. Start route
   2.1 Select destination /home button
   2.2 Press start button
3. Feeling anxious
   3.1 press emergency button
   3.1 Call parent
   3.2 Call police
4. Emergency situation
   4.1 Press panic button
5. End route (Safe back home)

0. In order to setup Contacts/parent (Teenager):
1. Press settings icon
   1.1 Press contacts tab
   1.2 Enter contact numbers
   1.3 Press submit button

0. In order a parent to accept a contact (Parent):
   1.1 Register with your mobile phone/name/gender
   1.2 Enter your mobile phone number
   1.3 Select Parent
   1.4 Press submit
   1.5 Validate your mobile phone number (insert code)
   1.6 Press submit
   1.7 Accept user (Teenager)

Use cases

1. Before

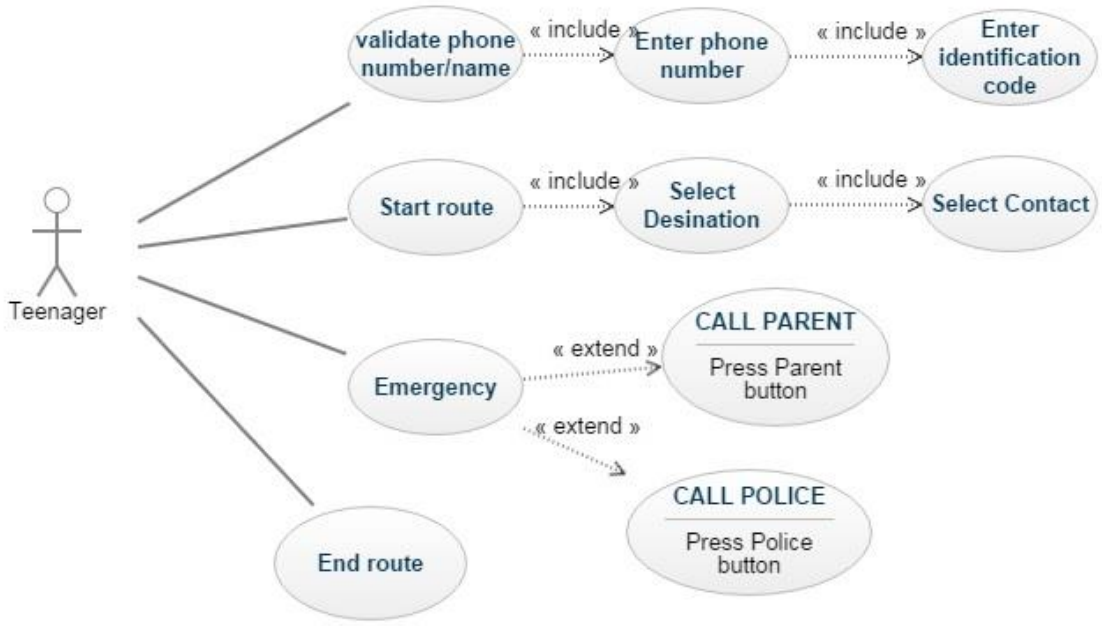

Figure 1 Main use cases - Teenager

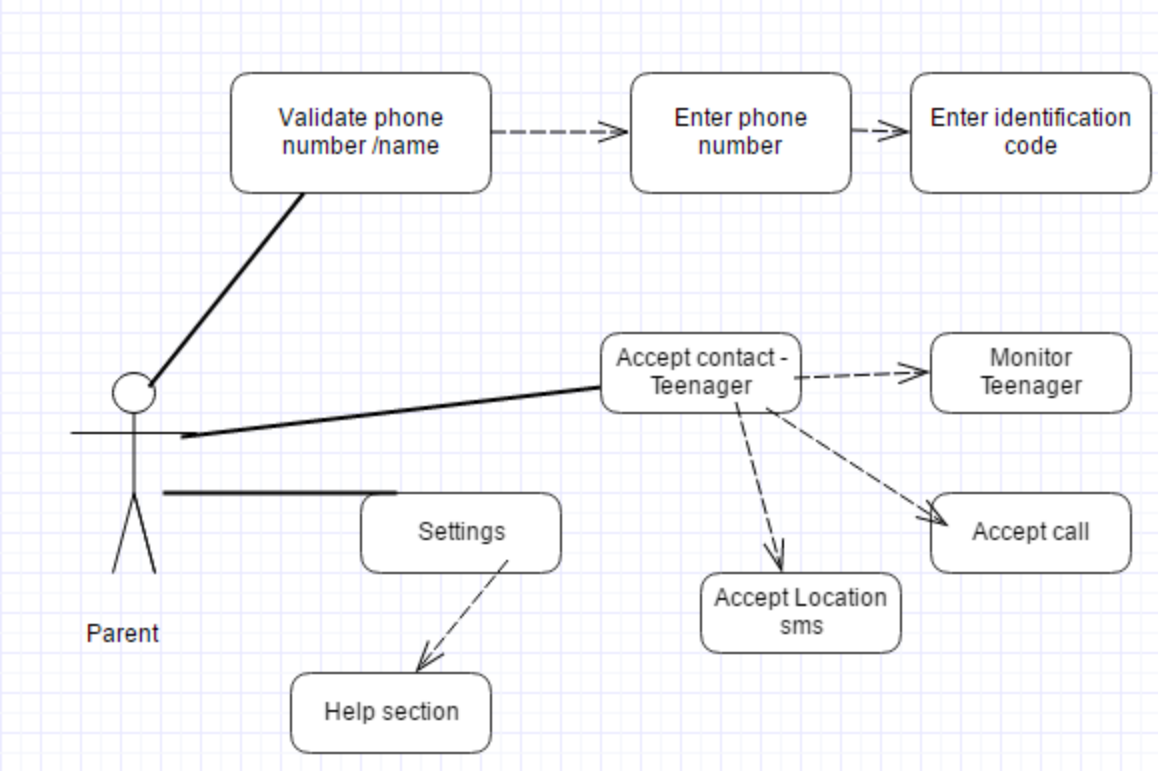

Figure 2 Main use cases- Parent

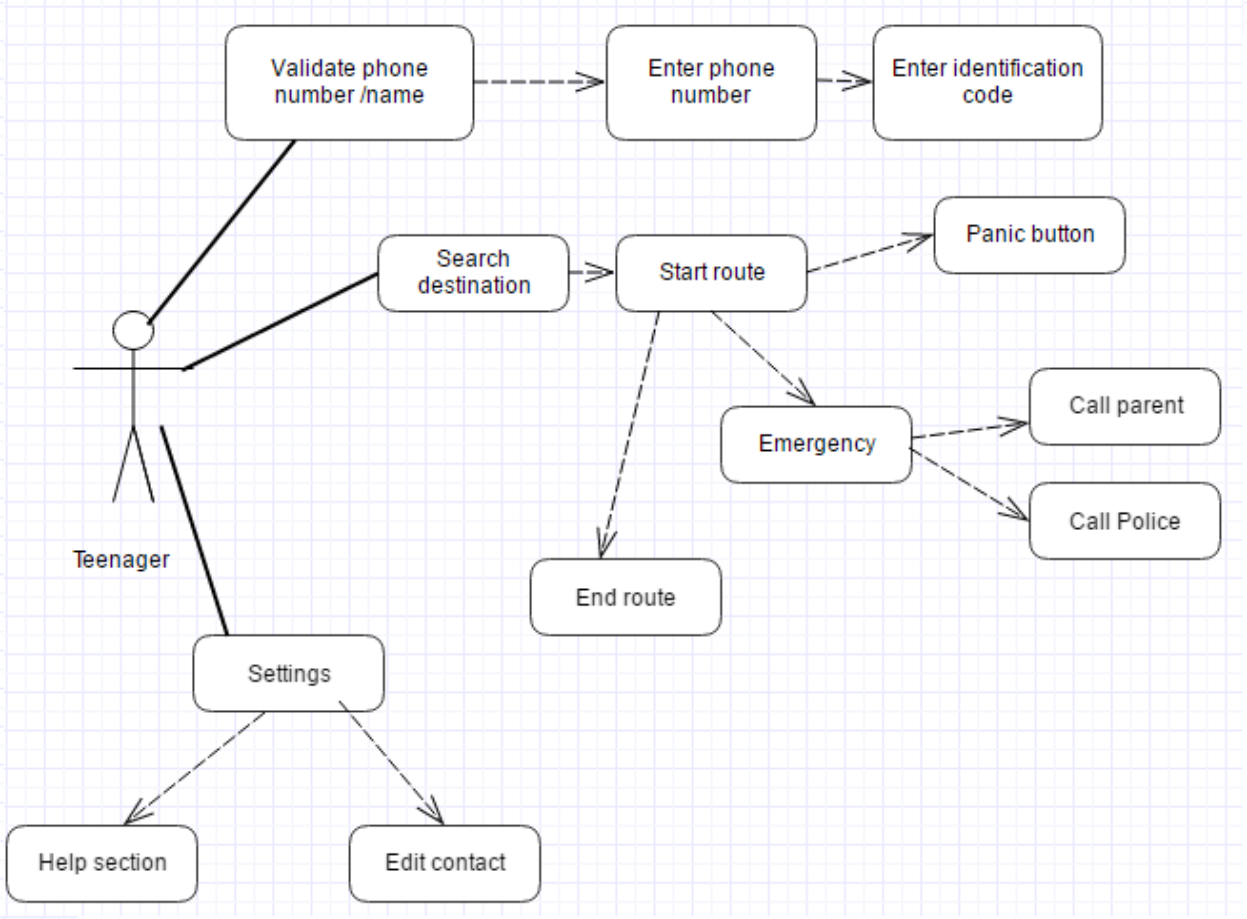

Figure 3 Main use cases- teenager: After user testing - Analytic evaluation

Requirements

Main functionality of the application:
A teenager after has installed the application to his phone has to register with his mobile phone and his name. The registration of his mobile phone takes place after the submission of the verification code he receives to his phone by a SMS. After the registration process is completed, the user is on the main screen. He has the option to search for the destination address, or press the home button (his personal address is saved in the system).Then he presses the start button to start the route. He can see his current location on the maps, as well as the directions. Then he can press the panic button in case of an emergency to enable the alarm/loud noise. An SMS is sent to the parent at the same time with current location and the information that he has pressed the panic button. The same applies if he presses the emergency button and calls the 911. The second option from the emergency menu is to call the parent. When the teenager has reached its destination he can press the end button to terminate the route. From the main screen he can navigate to the settings menu if he clicks the settings icon, and edit the police number, his home address, or search for help/Faq.

Requirements

Most of the requirements came from market analysis stage and the Literature review. There are some extra requirements which gathered after user testing, and Analytic evaluation and presented after the main requirements section.

Functional

- Provide user registration with mobile phone, name
- Provide accept contact functionality (Parent mode)
- Sending SMS messages to Parent contact
- Send SMS messages with confirmation code
- Sending location by SMS (URL/location link)/SMS messages
- Provide accurate location (GPS) on maps
- Provide phone call to 911
- Provide voice call functionality (Parent contact)
- Provide navigation with maps
- Generating best route
- Detect Position should be able to detect continuously the current position of the user

- Update Route is able to update the route (shortest) continuously according to detected position of user and dead ends. If encountered with a dead end the system can re-
- Calibrate a new route to the end destination.
- Provide application settings functionality (Edit contact etc)
- Terminate route / send SMS to Parent
- Provide Selection ability of contact/911
- Provide selection of transportation mode
- Android o/s on the smartphone
- Provide Selection of route
- Provide Search for location on maps
- Support Google Maps android API
- Cross platform compatible and works on most mobile browser (URL with map)
- The device should be sound enabled
- GPS receiver enabled (location)
- Internet (GSM) mobile access

After user testing:

- Provide panic Button functionality (loud noise when is pressed)
- Store home/ personal address
- Provide help section, with information for the user

After Analytic evaluation:

- The system should, validate, and not accept wrong mobile phone numbers and inform the user to correct it after the submission with a message.

NON FUNCTIONAL REQUIREMENTS

- The mobile application must be able to be installed on an Android device
- The system must comply with standards and regulations placed upon Android applications
- The system must not consume an unreasonable amount of memory
- The system must not affect the performance of the device or other applications running on it
- The system should send error reports to the technical team in order to facilitate bug fixing

- Language: The language should be localized to the preference of the user.
- Usability : the application should be easy to use
- Performance : response times
- Security: (sensitive nature, specifically with regards to the location tracking/ Encryption, for all data that is privacy sensitive)
- Modifiability: changes/modification of the application should be feasible
- Maintainability: easy to find bugs and fix the

Initial Designs/Low fidelity Prototypes

The main functionality of the application was described in the requirements section. The following two screens are the main screens from the registration process with the mobile phone number. The user enters his mobile phone with his name presses submit, and then is going to the next screen where he enters the SMS verification code.

Figure 4 *Registration to the application with the mobile phone number*

The following screens are the main screens of the application. In the first screen the user can search for a location and then by pressing the start button he can choose the contact that want to monitor him during the route (2nd screen)

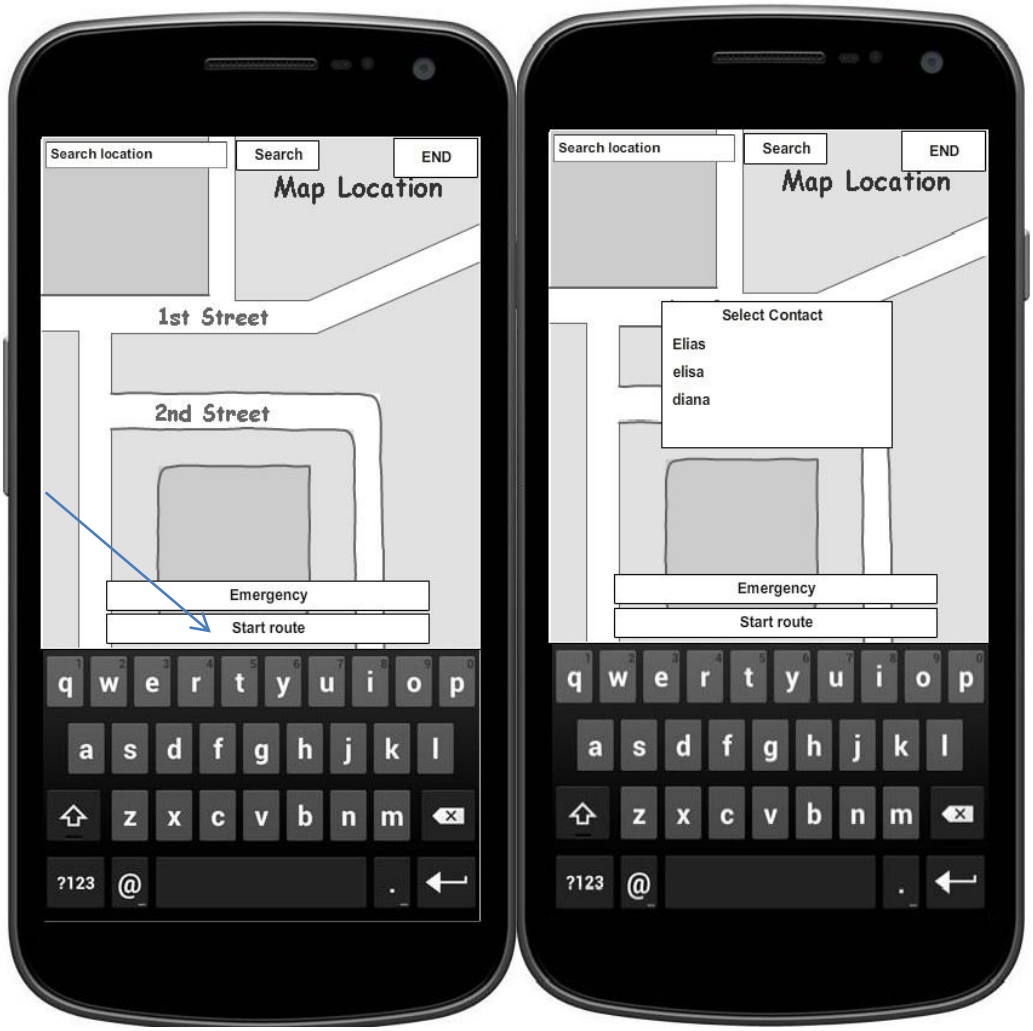

Figure 5 *Main screen of the application- Choose contact after start button is pressed*

The following screen shows the options that are displayed after the user has pressed the emergency button. He can call the 911 or the parent.

Figure 6 Emergency function

User testing

The first user is a 20 years old student at university of Strathclyde. Georgia lives in a residence and her main concern is safety during night, when walking alone, or when taking a taxi. She usually walks alone at night when she wants to go back from university to her flat. The test was conducted in an individual session on 20/11/2016, in a lab at Strathclyde University, and lasted 15 minutes. A Low fidelity prototype was used to illustrate the basic functionality of the application. A laptop was used to present the low fidelity prototype and design wireframes. The basic functionality of the program was described and the participant's answers, like navigational choices, comments, overall satisfaction ratings, questions and feedback were captured in notes.

The user asked to answer the following questions:

1. How easy it was to find the information from the home screen
2. Ease of use generally
3. Learn ability
4. What the participant liked most.
5. What the participant liked least.
6. Recommendations for improvement and extra services that the user wants from the application

Findings

The user found the overall interface satisfying and quite simple. It was easy to understand the application, and the user understands in depth the basic functionality. The user interface and the simplicity encouraged the user to use the hypothetical mobile phone application. The user wanted extra functionality for the application. She described the need for a panic button, with a loud emergency sound functionality, which could scare off a potential attacker and make her feel safe. She also expressed the need for a home button in the main screen which could save her personal home address and make it easier saving her personal address. She didn't like to have two different buttons for end- start route. She expressed the need for a bigger emergency button which would be accessible in case of an emergency and could enable the serene, as well as an about or help section that will explain the functionality of the program.

Redesign of the System

In the first place the need for a panic button means that we have to make changes in the user interface. A new button will be created with the serene functionality. This button should be

bigger than other buttons. The overall structure of the interface has to be changed. The start route button should only be accessible before the route started. The end route functionality should only be visible after the route has started. The search button doesn't needed as the search box functionality android component has implemented the search button functionality pressing enter. A home button will be created in its location, and a new tab in the settings tab with the home address settings will also has to be created.

Main changes:

- Panic button
- Home button(Personal address)
- Remove choose contact Functionality
- Help –about faq

Additional functional requirements:

- Provide panic Button functionality (loud noise when is pressed)
- Store home/ personal address
- Provide help section, with information for the user

High Fidelity Prototype

The prototype is middle high fidelity representation of the final product, which simulates user interface interaction. This simulation allows the user to experience content and test the main interactions in a way similar to the final product. In order to illustrate the SafeBackHome android application, the main design ideas from the low fidelity prototype with the functional and user requirements have to be implemented. For the high fidelity prototype the mock flow application is going to be used. This application is a suite of online tools and it bundles a wide range of design apps from Wire framing to implementation. In android OS a layout is a template or a portion of a screen, a type of view class which used to organize other controls (Darcey, 2010). Layouts are subclasses of View Group, designed to control how child views are positioned on the screen. Linear Layout will be a good choice for the design of the application. In order to create the high fidelity prototype first the layout should be created and then the widgets inside the layout. In the development process xml files will be used for the development of the user interface layout and components. The mockflow application represents each view of android OS with a page. For example after the user has verified his mobile phone number(2 pages verification) he can continue to the main screen of the

application(Main page). From there he can go to settings (tab), or to search for an address and start a new route (Main Functionality). After he has started the route he has the choice to press panic button, emergency button (call parent/911), or end button (End route). The main page (View) of the program according to the initial design and the requirements implements the maps, the search address button, and the settings option. Therefore the main screen is composed using 6 components. (2 icons, Search box, map image, Title box, and Layout builder).Each component can be connected with a link to another page (view) to illustrate the interaction. For example when a user presses the home button, the home location appears in the screen containing the start button. This is another view which is connected to the home icon. If the user presses the start button, the user is redirected to another page/view (route started) with emergency and panic button options. The main key components that are used are:

Buttons: the buttons can be pressed and redirect to another page/view of the application. In android application buttons add functionality to the application when pressed. Textinput: In android application is a text box "Edittext". Also components like labels(to display text-label),image(display the maps and the panic button functionality),Searchbox(search for an address),tab navigator(for the settings menu),Radio button(to display parent/teenager mode), and alertbox (display warning exit message) are going to be used. The mock flow application provides an html link with the High fidelity prototype, thus the user can test the main interactions using an html page.The following wireframe represents the structure of the views/pages.

High fidelity prototype link:

https://app.mockflow.com/view/Df5f120e7d96b8a29fdade8bc188d8d90#/page/5A9FF2E301252681C7E1AFAB383C6A7E

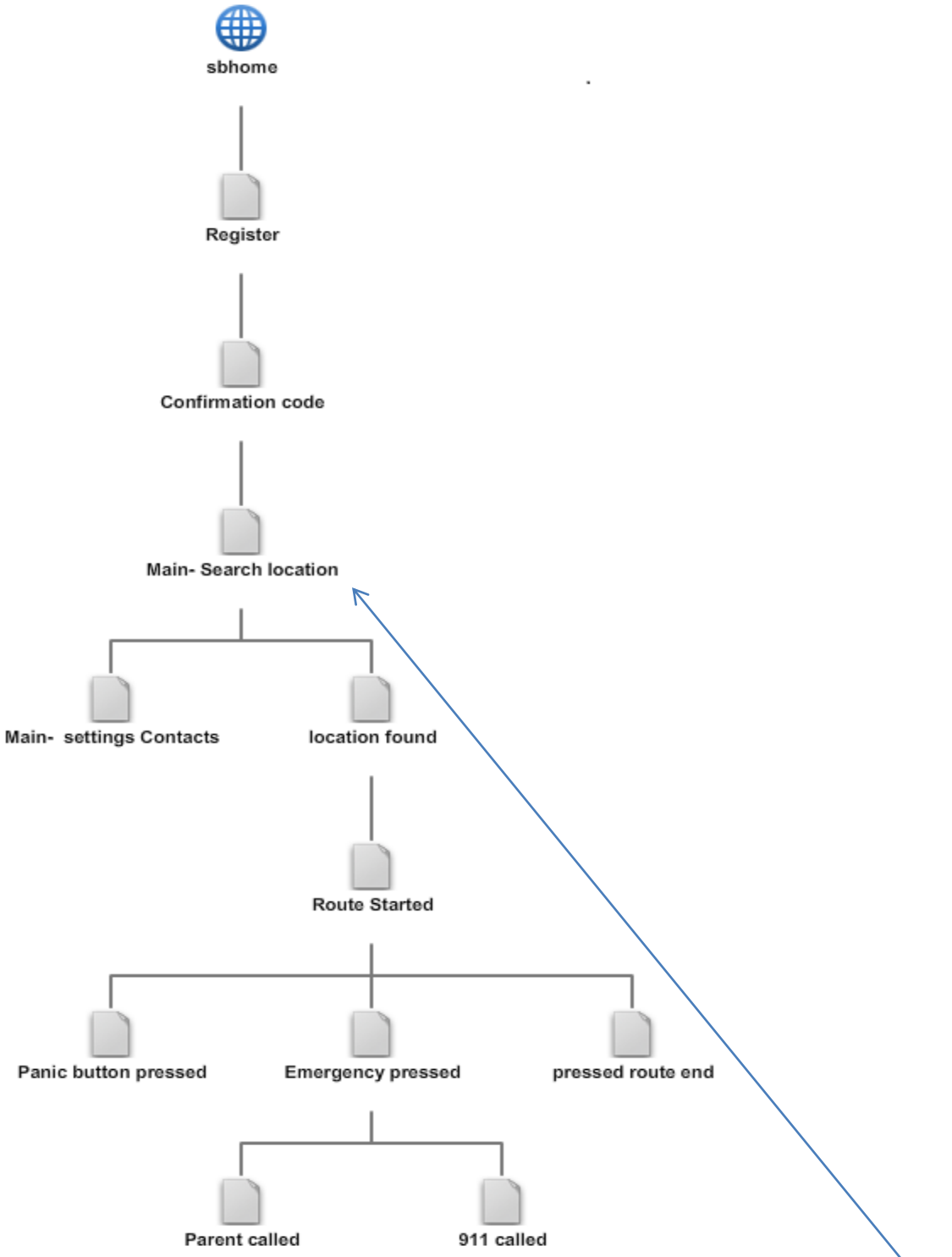

Figure 7 *: structure of the views/page*

Analytic evaluation

This evaluation will help recognize usability strengths as well as recognize areas on the application that might need usability improvement in reference to Jakob Nielsen's ten usability heuristics. () Heuristic evaluation method was used based on the Jakob Nielsen's ten usability heuristics. The evaluation took place in a Strathclyde university lab in 29/11/2016, and lasted 15 minutes. The evaluator was a M.Sc. student in Software engineering course.

1. Visibility of System Status (Feedback)

The system keep users informed about what is going on, through appropriate feedback within reasonable time. For example when start button is pressed, the button is disappeared, the button end appear and the main functionality of the application is been displayed. Also messages like, poor gps signal, or location on the maps give real time information to the user.

2. Match between System and the Real World (Metaphor)

The system speaks the users' language, with words, phrases, and concepts familiar to the user, rather than system-oriented terms. Follow real-world conventions, making information appear in a natural and logical order. For example the home button, has a home icon.

3. User Control and Freedom (Navigation)

Users often choose system functions by mistake and will need a clearly marked "emergency exit" to leave the unwanted state without having to go through an extended dialogue. The user can efficiently navigate to the application, with back button based on android OS basic functionality.

4. Consistency and Standards (Consistency)

Overall, the layout of the application follows pretty consistent standards and conventions. The basic buttons remain in the same position during the different views of the application.

5. Error Prevention (Prevention)

Error messages are a careful design which prevents a problem from occurring, and the application doesn't support it satisfactorily. The problem identified when pressing the end button. The application returns the user to the main screen without asking for "exit" confirmation.

6. Recognition rather than Recall (Memory)

The application provides user search history Minimizing user's memory load

7. Flexibility and Efficiency of Use (Efficiency)

An example is the home button, which auto fills the location of the user

8. Aesthetic and Minimalist Design (Design)

The application uses very little text (not too text heavy, highly visible, easy to understand)

9. Help users recognize, diagnose, and recover from errors (Recovery)

The application doesn't provide solutions for a "wrong" or "incorrect" mobile number in contacts.

10. Help and Documentation (Help)

A "how to" section is provided under the help button, however it doesn't support a contact form.

After completing the Heuristic Evaluation for the Safe Back Home application were found several usability strengths in reference to Nielsen's ten usability heuristics, and some weaknesses or areas to consider for improvement. One of the main problems was the absence of an error prevention message when a user presses the end button. Furthermore the application should implement a mechanism to prevent the user from errors, during the submission of mobile phone number. These two requirements are going to be transferred in the requirements section, and get implemented. The error message is going to be implemented, during the design process, to prevent error occurring. Concerning the "select from contacts" Functionality is not going to be implemented in this version. The application is designed for a specific scope and target group (Parents-teenager), and the select contact functionality raises the complexity of the system. So the person that will monitor the teenager will be only the parent, and his mobile phone number will be added in the settings menu.

Conclusion

The design approach that was taken, during the development of the system included the following stages:

1. Literature Review (overview of the existing literature related to the topic)
2. Market /product Analysis (compare the product with the existing competition)

3. Target users and main tasks (Stakeholder analysis, personas, use cases)
4. Requirements Gathering (Functional non-functional requirements)
5. Low fidelity prototype
6. User testing
7. High fidelity prototype
8. Analytic evaluation (Heuristic evaluation)

The stepwise approach that was taken was based on building the software application prototypes (Low fidelity-High fidelity prototype) which demonstrate the functionality of the product under development but may not really hold the precise logic of the original software. During this software development procedure developers making only the sample of the resolution to validate its functional essence to the customers, and make essential changes before creating the authentic final solution. Literature review and market analysis helped to understand the very essentials product requirements particularly in terms of user interface and Requirement Identification. The initial Prototype was developed, where the very essential requirements are showcased and user interfaces are presented. These characteristics may not exactly work in the same manner internally in the actual software generated and the workarounds are applied to give the same look and feel to the customer in the prototype generated.

The main benefit of this design approach is that it assists well in requirement gathering and the overall analysis. The literature review and market analysis gave a huge amount of information for the requirements gathering process. It also helped with the stakeholder analysis. Concerning the prototypes, the users get a greater understanding of the system being developed since a practical model of the system is illustrated. Missing functionality can be identified easily, as well as confusing or difficult functions. Also, quicker user feedback and involvement in the product is available leading to better solutions.

The main disadvantage of this design approach is the excess dependency of requirements analysis on the prototype. The requirements gathering process based basically on the prototype analysis. There is also a possible expansion of the scope of the system beyond original plans, as this methodology may raise the complexity of the system. For example the main scope of the program was to monitor the route of a teenager to his parent. During the development of the low fidelity prototype a function to add other person apart from parent was provided, which expanded and raised the complexity of the system. Also, Users may get discouraged in the prototypes and actual systems, and developers may attempt to reuse the current prototypes to build the real system, even when it's not technically achievable.

Future work and Recommendations

The original scope of the application is to provide safety services to teenagers. There are many more services that can be implemented in the application in a future work, which are based on many of the stages of the design approach. The “search contact” functionality which enables the user to select a contact from his contact list (instead of his parent) is something that most of the applications in the market provide, and could raise the complexity of the system with unexpected consequences. Something which is feasible and should be implemented in a future work is the ability to select a second parent inside the settings menu. Also many improvements to the overall user interface design could be implemented, like a more complicated help menu.

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