



# HelpSource: a mobile application for victims of criminal actions & terror attacks

## FINAL DESIGN & EVALUATION

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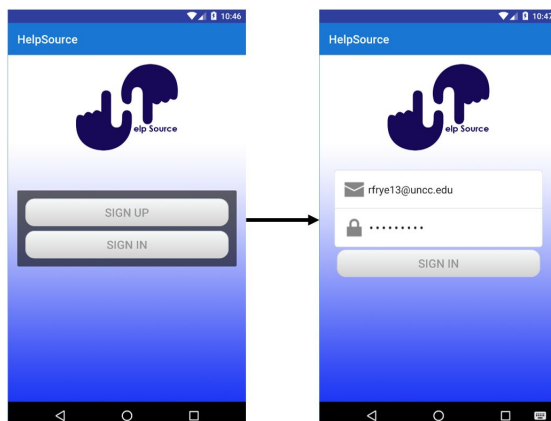
### Introduction - - - - -

We live in a dangerous world. Violent crime continues to be a threat in our cities and even in our rural communities, and all too often we hear of terrorist attacks in countries which have long been safe from these threats. Wouldn't it be nice if we had a simple application that made the task of getting help, giving help, and finding information when we need it as simple as pressing a few buttons? Whether you're being victimized by criminals, attacked by terrorists, or even when you just need a helping hand to change a tire, HelpSource provides a unified application designed to get help to you as quickly and easily as possible.

In this document, we present an analysis of our final design for HelpSource. In the Design Description, we'll examine the design decisions that we have made by taking a step-by-step look at the prototype we've developed. We'll guide you through the application and explain not only how to use HelpSource, but also why we made the many design decisions that make our application so simple and so powerful. When we've finished the Design Description, we'll provide a description of the evaluations we've completed for HelpSource. We'll provide the comprehensive task lists that we utilized in our user testing, and we'll analyze the feedback that we received from our users. By the end of this document, we're confident that you will fully understand our prototype and the evaluations we completed. **Please note that complete instructions for downloading the Android emulator and the application are included in Appendix A of this document!**

### Design Description - - - - -

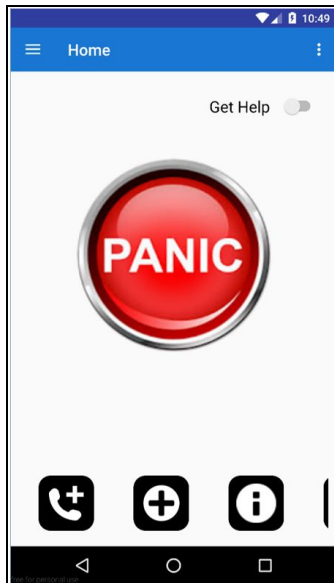
#### Getting Started



When you first open the HelpSource mobile phone application, you'll be prompted to "SIGN UP" or "SIGN IN." If this is the first time starting the application, you'll need to sign up for an account. Otherwise, you can just sign in. (NOTE: In the prototype, you can enter any user name or password to sign in.)

Image 1: Signing in to HelpSource

The sign in screen is simple and intuitive. The user is clearly prompted to either sign in or sign up. On the sign in screen, the user is prompted to enter the email address and password. The user is constrained to entering these selections before using the application. Upon entering the email and password and selecting “SIGN IN,” the application opens to the home screen, where the user is presented with the selections shown in Image 2.



From the home screen, the user can access the three primary HelpSource functions. With the “Panic” button, the user can request help from local authorities and from any nearby HelpSource users who are willing to provide help to others in need. See the Getting Help section of this document for more information about this function. The user can also toggle the “Get Help” switch to notify the HelpSource servers that he/she is available to help other users. See the Giving Help section of this document for more information about giving help to other HelpSource users. Image 3 shows the interface for giving help to other users. The user can also get disaster relief information and notifications about where to find local assistance using the “i” icon. See the Getting Information section of this document for more information about getting additional information through HelpSource.

*Image 2: HelpSource home screen*

When you have successfully logged in, you’ll begin with the Get Help screen, as shown in Image 2. In our Conceptual Design, we established the following usability goals for our application.

- Functional on commonly owned devices
- Easy to use
- Effective
- Efficient
- Easy to Learn
- Error Tolerant

Of these goals, the mobile phone application is intended to serve as the backbone of the application, with additional functionality provided by Skinput and Watch input/output devices. As such, our mobile phone application effectively meets the usability goals of:

- Functional on commonly owned devices
- Easy to use
- Effective
- Easy to Learn
- Error Tolerant

We will demonstrate in the Skinput + Watch sections of this guide how the various devices overlap in meeting design goals, and the manner in which providing connectivity to the Skinput

+ Watch combination offsets any usability goals which are inadequately served by a mobile phone application alone.

We designed the application with the first priority of allowing people in need to get help quickly and safely. HelpSource is designed to work on mobile phones and tablets, and allows integration with Skinput and smartwatch devices. To connect one of these devices to HelpSource, press the + button on the Home screen, and you'll be prompted to connect Skinput and/or a smartwatch. This functionality is not pictured in this guide, but please email us at [info@helpsource.com](mailto:info@helpsource.com) if you need assistance in connecting a device to HelpSource.

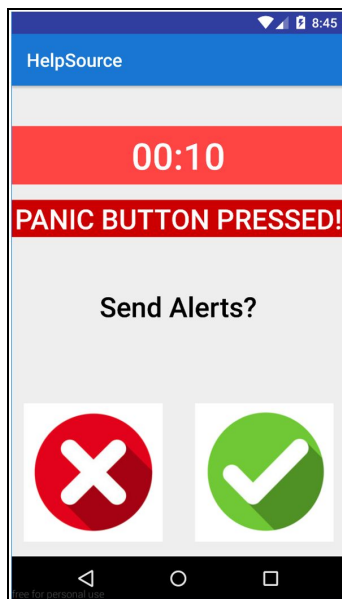
### **Getting Help: Mobile phone application**

For getting and giving help, we defined the following design goals in our conceptual design:

- Act without alerting the criminal
- Fast with few motions needed
- Safe for the situation
- Requires little focus
- Minimal physical effort required
- Natural and discrete motions
- Encouraging to use

Of these goals, the mobile phone application is best suited to meet the following:

- Fast with few motions needed
- Minimal physical effort required
- Encouraging to use



You should notice the very large Panic button on the first page of the HelpSource application. As Fitt's Law tells us, large buttons allow users to quickly access a feature in an application, and we consider the ability to get help when required to be the most important feature of our application, so the Panic button is the largest in our application. When you click the Panic button, you'll be prompted to confirm the need for help, as shown in Image 3. The confirmation helps users to avoid sending false alarms to the local authorities and other HelpSource users, and a 15 second delay is our standard for allowing users to confirm or cancel the request for help. If you choose not to cancel the alert or if you confirm it, your smartphone will automatically send your geospatial coordinates to the local authorities and will begin recording sound and video using the mobile device's microphone and camera. In addition, your request for help and location data will be sent to any users who are standing by to provide help to those in need.

*Image 3: Confirm request for help*

Image 4: Help is on the way!

For getting and giving help, we defined the following design goals in our conceptual design:

- 
- A line drawing of a hand wearing a smartwatch. The index finger is pressing a large, red, circular button on the watch face. The button has the word "PANIC" written in white capital letters. Green concentric circles around the finger indicate a touch or vibration.

When the victim is in a situation where sudden movements or reaching their cell phone would alert the criminal or make the situation more dangerous, Skinput comes to the rescue by allowing the user to interact using natural finger gestures with a skin tracker on a smartwatch.

There are multiple gestures defined for each action (Image 6). In order to make it easy to learn and remember, there are few motions and they are all natural hand gestures. To make the gestures less noticeable, the gestures are mostly activated by one hand, except in a few cases when there is a need to use both hands, such as when writing words with a finger on the palm of the other hand.

Image 5: Skinput+Watch combo

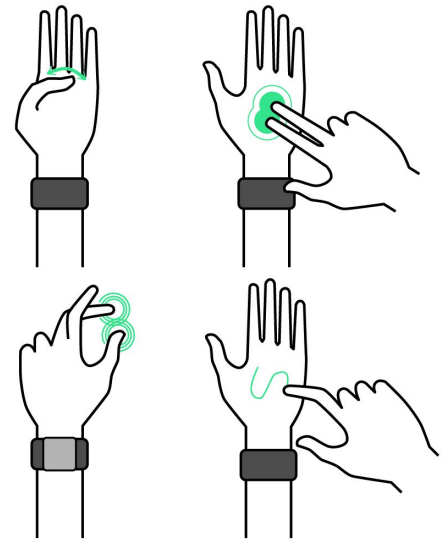


Image 6: Finger gestures

PLEASE NOTE: The user will need to connect the Skinput and smartwatch and also calibrate the device for finger gestures before using peripheral devices with HelpSource. See your Skinput and smartwatch user guides for instructions on connecting these devices to your smartphone.

In the Get Help mode of the app, after the gestures are calibrated for use with the Skinput and smartwatch, the following sections describe the gestures used in the HelpSource application.

### Contact a helper:

Tap the thumb to the index finger or the middle finger, as shown in Image 7. The user may choose to use both fingers to prevent the occurrence of slips in a stressful situation.

The Skinput + Watch devices receive the motion and sends the alert to the app, which sends a predefined message to the desired person along with the geo location.

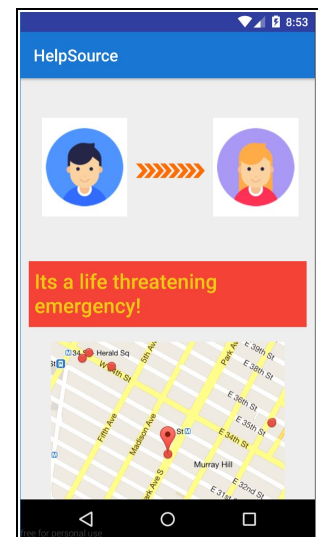


Image 7: Gesture to contact a helper

### Contact authorities directly:

In case the situation is so dangerous that the user needs to contact 911 directly, this gesture is the one to use. Swipe your thumb across the other fingers of the same hand (see Image 8). This gesture is just like rubbing your fingers together. This gesture sends the alert to 911 with the geo location of the incident.

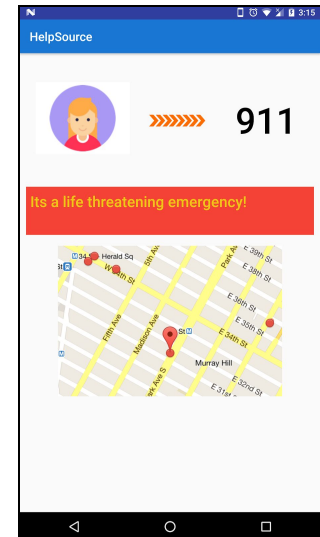


Image 8: Contacting 911

### Writing a message:

The Skinput system provides the capability of writing short messages (Image 9). In less dangerous emergencies when the user can safely use both hands without alarming an attacker, they can write complete words or letter by letter to compose a short message. The Skinput device recognizes the letters, composes the message, and sends it to first assigned helper through the HelpSource application. The command to send the message is given by swiping the index finger of one hand on the little finger of the other.

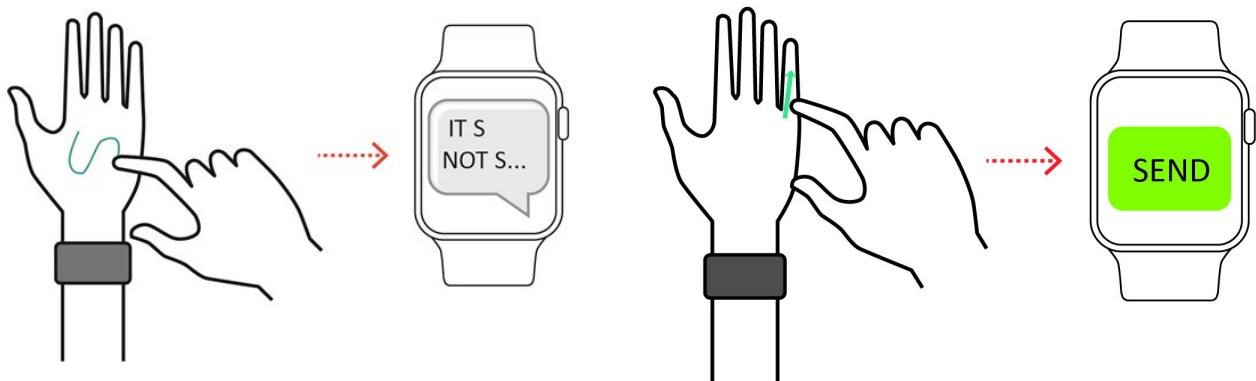


Image 9: Writing messages





### Audio recording:

If the user needs to record the environmental audio, they need to simply make and hold a tight fist. The watch and the mobile phone will start recording and save it on the phone.

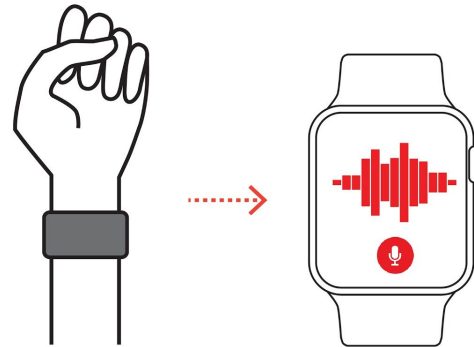


Image 10: Recording audio

### Giving Help: Mobile application



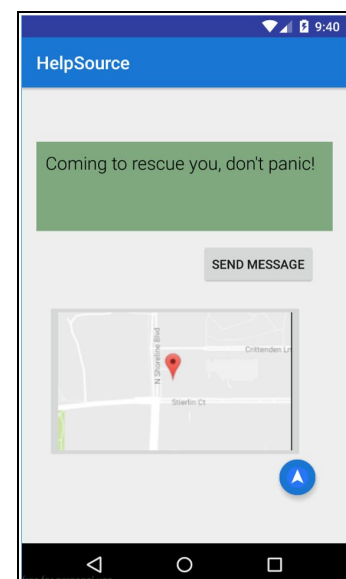
Image 11: User 21 needs help!

Allowing our users to help each other when they need it was also a design goal for our application. In support of this goal, the user can click the toggle in the upper right of the home screen to Give Help. The application will begin monitoring for help requests from our HelpSource user community. When help is requested within the range you specified for providing help, you'll be notified as shown in Image 10.

When you receive a request for help, you'll be prompted to accept the mission. At this point, you'll need to select Yes to accept the mission or No to reject it. If you accept the mission, you'll be provided a map to the location where help has been requested. You can also send a message to the user in need to reassure them that help is on the way. Simply click Send Message to send the default response, or customize the response before sending it. Image 11 shows the interface for providing help to other HelpSource users.

Image 12: To the rescue!

You can also touch the map to zoom in to the navigation screen while you make your way to the user in need. When you've completed the mission, you can return to the Give Help screen and wait for another mission. As we stated earlier in this document, the mobile phone application is best suited provide an interface that is fast and that requires few motions, which requires minimal physical effort to use, and is also encouraging. The simplicity of our design means that our users can stand ready to assist other users by toggling the application to Give Help mode and choosing Yes or No to accept a mission. Furthermore, we make it easy to encourage those in need by providing a default

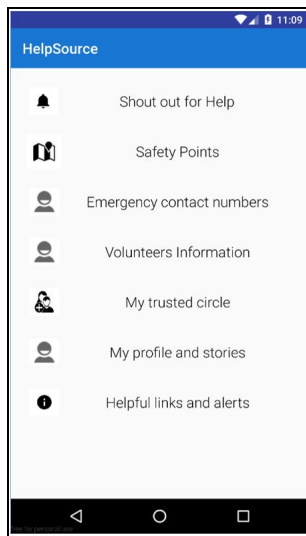




message and Send Message button to notify those in need that help is on the way. For these reasons, our design is well-suited to meet the design goals for the mobile application as specified in our conceptual design.

***PLEASE NOTE: Per the terms of our end user license agreement (EULA), users who choose to provide help to others do so at their own risk! While we respect your desire to help others, please take all appropriate steps to ensure your safety while using our application!***

### **Getting Information: Mobile application**



Getting information is easy with HelpSource. Whether you've been injured in an accident or your city has just been attacked by terrorists, you can simply click the information icon (the 'i' in the bottom right of the home screen) to get information from state and local authorities, as well as from other users. See Image 13 for a look at the HelpSource information screen. As you can see, you can *Shout out for Help* through the information screen as well as the home page. You can select *Safety Points* to see a map of emergency response centers (hospitals, urgent care, aid stations). You can access your *Emergency Contacts* and *My trusted circle* to contact people you've previously specified with HelpSource. You can find information about volunteering to help with the *Volunteers Information* link. *My profile and stories* has your profile and user history, and *Helpful links and alerts* will allow you to see emergency response broadcasts and other helpful information.

*Image 13: Getting information*

Our goals for the Getting Info task in our HelpSource conceptual design included:

- Informative for the situation
- Fast with few motions needed
- Safe for the situation
- Requires little focus
- Easy to understand
- Simple to navigate
- Limited possibility of slips and mistakes

Of these goals, we found the mobile application would best meet the requirements for the following:

- Informative for the situation
- Fast with few motions needed
- Easy to understand
- Simple to navigate
- Limited possibility of slips and mistakes

Due to the ubiquitous nature of cell phones and the recent surge in the popularity of smartphones, today's users are usually quite comfortable with searching the Internet for information by smartphone. As such, it's clear that the HelpSource application integrates easy search features and extends these capabilities by placing immediate access to emergency contacts and other information in one central location. As users typically are required to make only two selections (pressing the 'i' for info and selecting the desired information submenu) in order to find information, we've clearly met our goal of enabling fast interactions with few motions to get helpful information. All of the features in our information menu are well-known to smartphone users and are merely placed in one easy-to-find location, so we've met our goal of making information simple to navigate and easy to understand. Also, since our menu of information choices is well separated and easy to read, the possibility of slips and mistakes is very low.

## **Evaluation - - - - -**

### **Goals of the study:**

The goal of this project was to create a tool that makes it easy for people to help each other. As is mentioned in previous parts, the project is framed using two devices: cell phone and Skinput. The main goals of the application are to make it efficient and easy to "get help", "give help" and "get information" in an emergency situation; therefore, the evaluation part has been separated into two phases: evaluation of the app interface and design, and the evaluation of the Skinput movement.

In evaluating the mobile application, the goal is to figure out how usable, learnable and user-friendly the mobile application is. We also wanted to determine if it is persuasive enough to encourage people use it to get help, give help or look for information in emergency situations.

In the evaluation of the Skinput system of Help Source, the goal of the evaluation was to understand how natural and user friendly the gestures are, as well as how easily the user can learn the gestures. We also needed to determine how long it takes our users to grasp the usage of each gesture.

### **Description of Experiment:**

Following the evaluation goals that are mentioned above, we decided to design a walkthrough for the mobile application, so that the participants follow tasks to accomplish three different scenarios: Give help, Get info and Get help. During the experiment we observed the participants, then asked them series of designed questions, answers to which made it possible to analyze the data with our predetermined metrics. These metrics were selected based on the highest priority goals and measures of each, based on the Table 1 and also those that were possible to be done in the limited time we had. Details of the experiment are explained in the **Mobile Application Evaluation** section of this document.

For the evaluation of the gestures, since the actual device is not yet developed and commercialized, we needed to propose gestures and assign them to our desired interaction with HelpSource application. We evaluated the naturalness and speed of the proposed gestures by giving the description of how a gesture is acted and what happens after a user does that gesture. We gave a little freedom to participants by letting them use their desired fingers. In this way the participants had the structure of the move and could act it with freedom of choosing their finger.

We measured the speed (time) and accuracy (similarity of the gestures to proposed ones) of the gestures, followed by questions regarding how natural and discreet the gestures are. The details of the experiment are explained in **Skinput Evaluation** section of this document.

### **Description of Methods:**

We created the chart below to help in discovering the most appropriate evaluation methods for our user testing. This table starts with the goal and priority of the goal in the application. For each goal, we have metrics that demonstrate how successful the application is in meeting our goals as well as the level of importance for each. In the next step, we translated our metrics into qualitative and quantitative variables and questions. Based on these variables, the best technique(s) for each specific measure has been identified in the last column. In this column, “H” stands for “Heuristic”, “O” for “Observation”, “S” for “Survey” and “L” for “Live demo”.

Table 1: Goals and evaluation measurements: deciding on the evaluation technique

Goal	Goal priority	Measure	Priority	How to measure?	Best Technique for evaluation
Getting help	1	Fast: few motions needed	1	<ul style="list-style-type: none"> <li>Average number of motion for one “help request”</li> </ul>	H, O, L
		Low possibility of mistake & slip	1	<ul style="list-style-type: none"> <li>Average number of mistake/slip (considering the levels of danger) in 10 “help requests”</li> </ul>	H, O, L
		Encouraging to use	2	<ul style="list-style-type: none"> <li>Asking the victim player “If you have possibility of using this app as well as your normal way of asking help (we should ask it before), in what condition s/he will prefer this app?”</li> </ul>	S
		Act without alerting the criminal	1	<ul style="list-style-type: none"> <li>Average number of unusual movement of the victim,</li> <li>“We can ask it from a criminal player”</li> </ul>	H, O S, L
		Requires little focus	1	<ul style="list-style-type: none"> <li>How many users were able to run or react to the criminal actions, while they were using the app?</li> </ul>	O, S, L

		Safe for the situation	1	<ul style="list-style-type: none"> <li>Number and level of criticality of the possible dangerous events</li> </ul>	H, O, L
		Minimal physical effort required	1	<ul style="list-style-type: none"> <li>Average number of visible body movement</li> </ul>	H, O, L
		Natural and discreet motions	1	<ul style="list-style-type: none"> <li>Asking a third person if they notice the motion</li> </ul>	O, L
		Easy to learn	2	<ul style="list-style-type: none"> <li>Number of items, gestures that users should memorize</li> <li>Number of tries before a successful "get help"</li> </ul>	H, O H, O, L
		Enough feedback (to understand the help and helpers' status)	1	<ul style="list-style-type: none"> <li>Asking the user if s/he was sure about his/her help status and could s/he decide for the best action based on those feedbacks?</li> </ul>	S
Giving help	2	Fast, few motions needed	1	<ul style="list-style-type: none"> <li>Average number of motions for one "help response"</li> </ul>	H, O, L
		Safe for the situation	1	<ul style="list-style-type: none"> <li>Number and level of criticality of the possible dangerous events</li> </ul>	H, O
		Requires little focus	2	<ul style="list-style-type: none"> <li>How many users were able to run, drive or talk on phone, while they were using the app?</li> </ul>	O
		Easy to Understand	2	<ul style="list-style-type: none"> <li>Average amount of time before the user report that s/he is comfortable with the app</li> </ul>	H, S
		Simple to Navigate	2	<ul style="list-style-type: none"> <li>Average amount of time and click for a user to find a specific information</li> </ul>	S
		Low possibility of mistake & slip (number of mistakes and slip)	2	<ul style="list-style-type: none"> <li>Average number of mistake/slip (considering the levels of danger) in 10 "help requests"</li> </ul>	H, O
		Trustable	1	<ul style="list-style-type: none"> <li>Number of responses stating they would trust the app</li> </ul>	S
Getting info	3	Easy to use	2	<ul style="list-style-type: none"> <li>The average amount of time for a user to do a task in "getting info" part</li> </ul>	H, O, S
		Easy to Learn	2	<ul style="list-style-type: none"> <li>Asking users how easy/hard is it to remember the tasks</li> </ul>	S
		Error Tolerant	1	<ul style="list-style-type: none"> <li>Asking users if they have any issue or error during</li> </ul>	S
		Alarming but not annoying notification	1	<ul style="list-style-type: none"> <li>Asking the helper user about the feeling when s/he receives the notification.</li> </ul>	S

General	1	Common device(s) to own	1	<ul style="list-style-type: none"> <li>Fraction of users that has the devices already</li> </ul>	O, S
		Compatible with disabled users' needs	2	<ul style="list-style-type: none"> <li>Asking disabled users to work with the app and how comfortable they are with</li> </ul>	O, S

As you can see, the best methods for us were heuristic evaluation, observation, and survey. We completed our heuristic testing in class with another group, but were given very little in the way of specific feedback to improve. For the next phase of the evaluation, based on the priority established in our table, we selected some of the important measures for each goal and planned our evaluation to test both the mobile application and Skinput.

We used the following methods for evaluation of the mobile application:

- Task lists capturing primary features (getting information, giving help, getting help)
- Observation of users attempting these tasks while recording metrics for number of motions and time required per task
- Survey questions about each step and the overall application

We evaluated the Skinput features separately using the following methods:

- Observation of each user following the description of gestures and acting them
- Recording the time required
- Live demonstration of proposed interaction features
- Survey questions of impressions from potential users

We set up a list of interview questions asking for general information, as well as open ended questions, that ask the participant to work with the prototype. We observed their struggles and behavior and asked for feedback about the experiment. We also asked some users to think-aloud while they were completing the tasks.

The interview began with a scenario about an emergency situation and try to use this app to help handling that situation. For a comprehensive evaluation, it would have been best to include three different roles: criminal, victim and helpers. However, due to limitations that we had in number of people, time, and expenses, we only evaluated the victim and helper users.

### **Heuristic Evaluation:**

We were tasked with completing our heuristic evaluations with another group during class on November 21, 2016. Unfortunately, we did not receive a lot of feedback during this exercise. In fact, we only received two comments regarding our prototype at the time. The feedback in general was very positive; however you can see the two recommendations we were given in the chart below:

Table 2: In-class heuristic evaluation results

	<b>Feedback or reported issue</b>	<b>Related Heuristic</b>	<b>Importance (H-L)</b>	<b>(Assessment or solution?)</b>
1	As a bonus for helpers, we can provide kind of “reported safety issues in specific period in specific location” (to the helper users for encouraging people to help, or to everyone for encouraging people to report even anonymously? We need to have a methodology for verification of the reports either by helper feedback or by a verification rate coming from witnesses)	Encouraging	L	We determined that this feature would be a nice addition to the application; however, due to time limitations and the infrastructure required in support of this feature, we did not add anything like this to the prototype.
2	Email along with the other notification	Visibility of System Status	L	Same as item 1

Based on this limited feedback, we decided that both items were of low priority and moved ahead with refining the prototype based on some internal heuristic evaluations. Table 3 includes additional feedback during our internal heuristic evaluations.

Table 3: Heuristic evaluation we used

	<b>Feedback or reported issue</b>	<b>Related Heuristic</b>	<b>Importance (H-L)</b>	<b>(Assessment or solution?)</b>
1	Lack of memory and crash during pushing “panic button”	Error prevention	H	Did some fixation in the platform and design
2	Did not have a genuine interface	Aesthetic design	L	Added a logo for the app
3	Different pages had very different design and structure	Consistency and standards	H	Unified the overall design and structure of different pages

4	Many setting was fixed that could be varied depends on user needs	User control and freedom	L	Added "Setting" to the menu options
5	The interface was cluttered and the page was full of items	Aesthetic and minimalist design	H	Added more white space to the page designs and put the unnecessary items in the sub-menus Put the "Give help/Get help" toggle button to make the main page clean and clear. Put the "get info" options into submenu.
6	The place of icons were unusual and hard to find	Consistency and standards	H	Change the places of the icons and menus to the ones people got used to
7	Understanding submenu options were hard to remember	Recognition rather than recall	H	Put related pic for the icons to make them familiar and easy to pick

We further identified the following focus areas to improve during our redesign, based on our internal heuristics:

- **Error prevention**
- **Efficiency and minimum number of clicks for getting help**
- **Recognition rather than recall, especially for getting and giving help.**
- **Getting info and settings need to go through the menu instead of the main page**

After these quick evaluations, we refined the application and created the final prototype. The next phase of evaluation was completed using this final version, with no additional changes allowed for the remaining duration of the project.

#### **Mobile application evaluation:**

Based on the important measures from Table 1, we created a survey to be completed using the prototype, as well as measures for different aspects of usability and design of the HelpSource application.



## **Method of Evaluation:**

### **Experiment and Survey:**

In order to evaluate the mobile application, we chose a combination of experiment, observation and survey. In the evaluation, we gave the interactive prototype to potential users and asked them to complete the tasks. During this process, we observed their behavior and gave them a brief survey to capture their feelings, issues, and ideas on each task, as well as for the application overall. This experiment was primarily focused on measuring how efficient, understandable and appealing the mobile application structure and functionality is for potential users.

### **Mobile App Evaluation Tasks:**

For the following 5 tasks, we asked participants to complete the task and then answer a set of questions so that we could gather immediate feedback. We presented the participants with a different scenario for each of the 3 main tasks: "Get Info", "Give Help", and "Get Help". We also asked the users to complete an overall evaluation of the application after completing the tasks, in the form of a survey asking for qualitative data.

#### **1. Sign on**

#### **2. Get Info**

##### *SCENARIO 1 : GET INFO*

*There has been a terror attack in your city. You are a doctor and want to offer help. Get information about safety points, where you can help to aid victims.*

#### **3. Change Status to Give Help**

##### *SCENARIO 2 : CHANGE STATUS TO GIVE HELP*

*You have time on a Friday evening, and you want to help people nearby. Change status to "Give Help!" and change the status/mode of the app to "Give help"*

#### **4. Give Help**

##### *SCENARIO 3 : GIVE HELP*

*Continuing last scenario with: After half an hour while you were watching TV, you receive a notification that a HelpSource user needs assistance. Use the mobile application to give help to someone in need. Use the app to give help.*

#### **5. Get Help**

##### *SCENARIO 4 : GET HELP*

*You are in a dark parking lot and a stranger is headed in your direction as you are walking to your car. Luckily, you have a friend nearby. Use the app to get help.*

We measured time and click counts required to complete each task. Also, after each of these tasks we asked the participants for feedback about the level of difficulty of the tasks and clarity of the design. Each participant was asked to provide their comments and record any specific feedback regarding the issues they faced while completing the evaluation tasks.

#### **Follow Up Questions :**

- A. Time Approximation to Complete Task** (Timed by Evaluator)
  - *Possible Answers : Time (in seconds)*
- B. Number of Moves**
  - *Possible Answers : Number*
- C. Rate Overall Difficulty of Step**
  - *Possible Answers : Numbers Between 1 and 10*
- D. Rate Overall Design and Clarity of Step**
  - *Possible Answers : Numbers Between 1 and 10*
- E. Did you run into any Issues or Errors?**
  - *Possible Answers : Yes, No, or Other*
- F. Other Comments [Please explain any issues you ran into or any recommendation you have]**
  - *Possible Answers : Long answer text.*

After finishing all the tasks, we captured the overall user impressions and feelings using the survey questions listed below. It is important to note that in this survey we used a fixed list of tasks, which left our results vulnerable to skewing due to the learning effect. In future evaluations, we could control the learning effect by giving a random order of the tasks to complete.

#### **Overall Evaluation Questions :**

- A. How appealing did you find the app appearance?**
  - *Possible Answers : Time (in seconds)*
- B. How easy did you find the app to learn?**
  - *Possible Answers : Time (in seconds)*
- C. How do you think that would be improved?**
  - *Possible Answers : Long answer text.*
- D. What were the main problems you had to deal with, while you were doing the tasks?**
  - *Possible Answers : Long answer text.*
- E. If you want to get help in an emergency situation, which one do you prefer?**
  - *Possible Answers : Get help via Skinput, Get help via Panic Button, Get help via the traditional way you are used to, or Add other option.*
- F. If your answer to the above question is to "Get help via the traditional way you are used to" or "others", What was your usual way of getting help?**

- *Possible Answers : Long answer text.*
- G. If you think each one of these are suitable for specific situation, can you tell us which one is good for which situation?**
  - **Getting help via Skinput**
  - *Possible Answers : Long answer text.*
  - **Getting help via panic button**
  - *Possible Answers : Long answer text.*
  - **Getting help via traditional way you are used to**
  - *Possible Answers : Long answer text.*

Our evaluations were completed with 20 individuals with an even distribution of males and females. The majority (65%) of our interviewees were in the age range of 18-29; however, we had some users in the range of 30-49 and 50-64. No one under 18 or above 64 completed our evaluation. This distribution seems appropriate in regards to our target audience for our application. However, we did not gather any information about their expertise in working with applications. We assume an average level of knowledge in working with applications, even though this may not be true in all cases.

The gender distribution of the survey makes the reported issues reliable as no gender is favored over another. If we think of people in range 18-29 as those who are comfortable with the technology, we can say that the reported issues should be taken seriously, but the list would be incomplete. Having some people in the older range, specifically 50-64, covers some issues that people with less familiarity with the technology may face. However, one important group that we may have missed in our survey are children under 18. Since this group of people is especially vulnerable to safety issues, they may be important potential users of this application who should be included in any future evaluations.

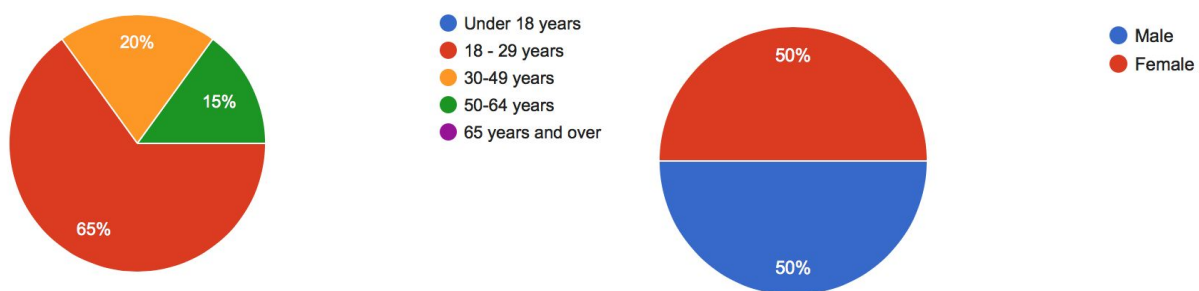


Chart 1: Demographic distribution among survey participants (left: Age distribution, right: Gender distribution)

From this combination of users, we reached the conclusion that the reported issues should be critical and the results are reliable, but we may have missed a significant group of other issues. In order to cover a more extensive range of issues and better redesign the application, we need

to complete our evaluations with a wider range of people with different levels of knowledge in technology and various age demographics.

The mobile application survey is divided into three main scenarios for working with three main functions of the application: getting information, giving help, and getting help. The app works in either give help or get help mode, therefore two extra tasks were included to require each user to toggle between these two modes and also to sign in to the application.

Users were asked to imagine some related scenarios and complete each of the five evaluation tasks. The observer then recorded their time and number of clicks required for completing these tasks. We calculated the average time for finishing each task and the median of the number of clicks for each user on each task. See Chart 2 for these results

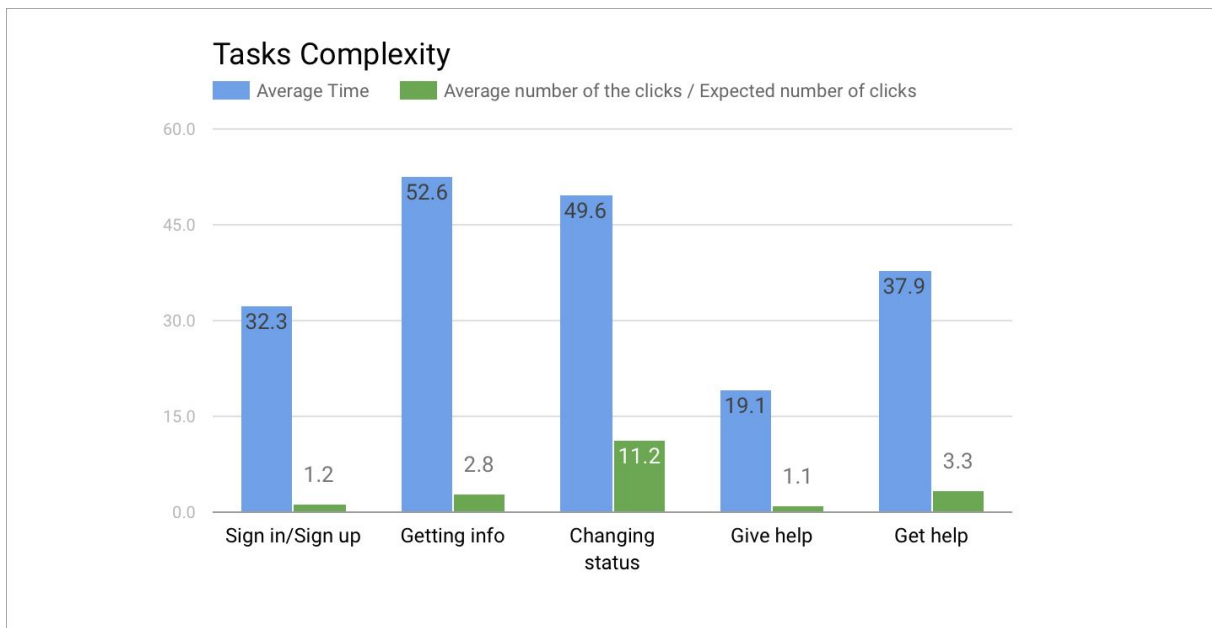


Chart 2: Complexity of the tasks based on the amount of time and number of clicks

As *Chart 2* demonstrates, “Changing status” and “Getting help” were the tasks that needed the greatest number of extra clicks. In an ideal situation, both of these two tasks should be completed in 1-2 clicks. However, the average number of clicks for users were 3-11 times more than this number, which demonstrate severe problems in usability for the application, especially for these tasks. The time parameter, on the other hand, shows that “get info” was one of the most time-consuming tasks, while the number of needed clicks is just 3-4. This indicates that users probably spent a lot of time studying the options without clicking. This means our “get info” task needs to be redesigned to make the steps required to complete the tasks more obvious to the users.

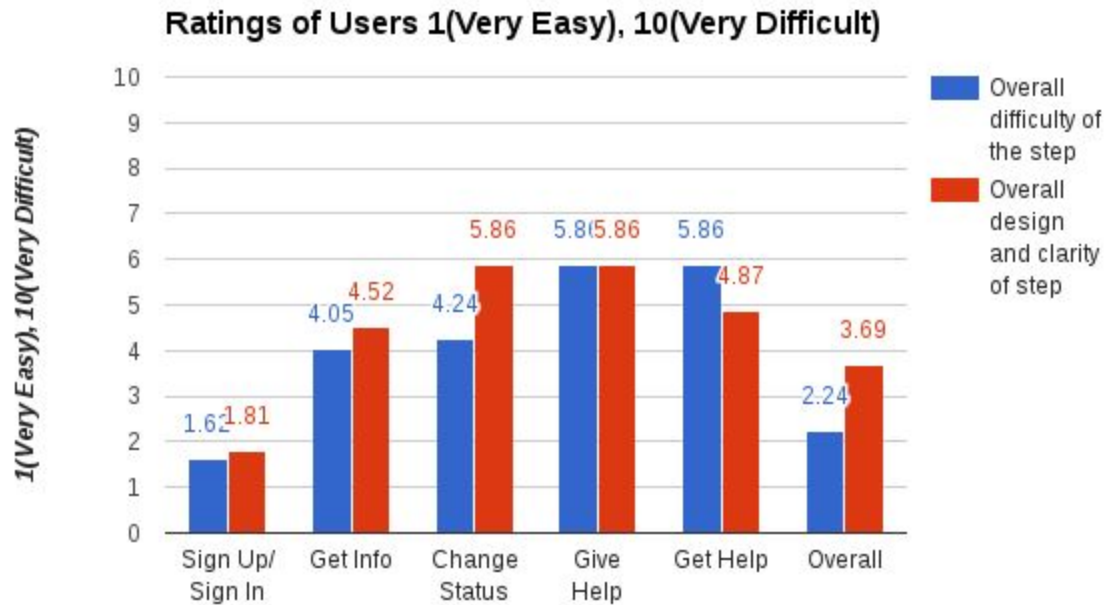


Chart 3: Difficulty of the tasks based on users' report

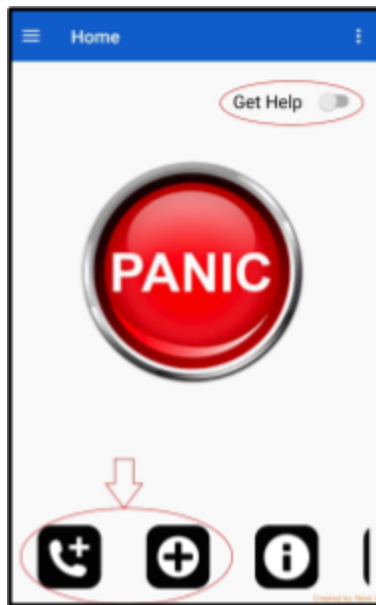
Not only the functionality, but also the observations and the users' feeling made it clear for us that changing status was the most ambiguous step in the experiment. We expected changing status to require a single click, toggling "get help" mode to "give help"; however, as you can see in Chart 2, this task requires the highest average number of extra clicks, and very nearly the highest amount of time.

As we were designing, we expected this button to be very obvious and straightforward for the users. However, as it is clear in Chart 3 and also the comments, it was ambiguous and hard to catch the button and its functionality. According to the comments, the toggle button could not get users' attention and present itself. Therefore, most of the users were looking for that in the help menu or setting.

There were two main issues in this design for the users:

1. Users were looking for the "Give Help" option to toggle, while the button showed the current status that is "Get Help" which did not capture the user's attention as "the word" they were looking for.
2. The color and shape of the toggle button is not sharp and is very similar to the background color; therefore, it did not get any attention when the users were looking around. Having big and sharp unimportant buttons like "add contact" below the screen added to the user errors.

Finally, the concept of switching between two modes was not easy to understand for most of the users. This situation became worse when the user was not very good with technology.



Getting help is one of the most critical tasks in this application, as it is used in a very stressful situation. For this reason, we designed the structure of this function to be very straightforward, requiring just one click of the panic button. However, as the average time and number of clicks demonstrate in our evaluation, we were not as successful in fulfilling this goal as we had hoped. It takes 38 seconds for an average person to figure out how to get help, which is too long in an emergency. Also, the number of clicks was 3.34 times the expected number, which means this iteration of the design did not meet our goals.

Based on the comments from this phase, many users try to use the phone icon on the bottom left to call instead of the panic button. Also, many users couldn't understand the feedback after pushing the panic button, and they became confused. All these problems indicate that we were not successful in

designing this function well.

*Image 14: Misleading icons*

Another point that was noticeable during the experiments was the possibility of slip. We can see repeatedly in the comments that users became stuck after pushing the panic button either by a mistake or slip. Either way, most of the time they were unable to correct the mistake before the end of the count down timer and the phone was locked into reporting an emergency. In a live situation, this will cause serious problems if they call 911, or it may cause helpers not to trust their notifications anymore.

Another time-consuming and click-consuming task was finding needed information in the app, in the safety point scenario. Based on the comments, we now understand that having unimportant buttons on the main page is problematic. "Add contact" and "Add device" are not among the primary goals of the application, so having these options on the main screen was misleading for some people. Many users had to test both options to find the information in the third icon. Having no label for the buttons further adds to the ambiguity of these options. It is true that many users could intuit that "i" is a symbol for "information" or "help", but this was not generally the case, as we discovered in our evaluation.

Beside the major issues described above, there were numerous less critical issues that caused problems during the survey.

Aside from the major problems reported above, based on Table 1, the most critical issue is the panic button. One suggested way to fix this issue and improve the other problems as well is to remove unnecessary options like “add contact” and “add device” from the home screen.

Another suggestion we received was instead of having the panic button inside the application, perhaps we could add a hardware code for the same function. For example, one of the evaluators mentioned the SOS emergency code in Samsung Galaxy phones, which activates by pushing the turn-off button 3 times. We could apply a similar idea in our application in order to reduce the complexity of the steps required to request help.

If we prioritize these issues, the next problem that should be addressed is the toggle button. We need to change the design in order to either make it a single-mode application, or we need to make the toggle button interface function clearer and more visible. Finally, we believe that placing labels and suitable pictures for each button would make it easier to select the write feature and also to learn the application in general.

### **Skinput evaluation:**

The goal of this evaluation was to evaluate the gestures we designed for Skinput integration. As mentioned in our conceptual design, the design goals were to come up with gestures that are discreet, natural and fast without attracting attention from the potential threat. We decided that the best method to evaluate this design was to ask participants to reproduce these gestures, observe them, and show the result of the gesture on the app in a live demonstration, with a Wizard of Oz approach.

### **Participants:**

Participants in this part of evaluation were in the age range of 18-45 who use their cell phones and applications with different frequencies. We had 12 participants distributed almost evenly between male and female. Two participants were left-handed and the other ten were right-handed, which appears to be a fairly normal distribution of handedness when compared to the general population.

### **Tasks and measurements:**

When we asked the participants to reproduce the Skinput gestures with a line of description, all users were able to correctly reproduce the gestures. 90% of the users managed to correctly perform the gestures on the first try, in less than 3 seconds, which is a satisfying result. The other 10% required more time to correctly duplicate the gestures but still required less than 7 seconds on average. In order to select the most natural gestures, we gave the participants freedom of using whichever fingers were most comfortable to them. In this way, participants were given the structure of the move and had the freedom to choose the fingers to complete the gesture. For example, in the description of the first gesture, users were asked to tap their thumb to one other finger. 70% Used their Index finger while others used their Middle finger.



### **Skinput Evaluation Tasks:**

Complete the gestures to “Get Help”:

**Gesture 1:** Tap your thumb to the tip of one other finger.

*Result: User sends a help request to a friend*

**Gesture 2:** Swipe your thumb across four other fingers of the same hand

*Result: User sends a help request to directly authorities*

**Gesture 3:** Tap and hold two fingers on the palm of your other hand

*Result: Record environmental sounds*

**Gesture 4:** Make a tight fist

*Result: Record environmental sounds*

**Gesture 5:** Write a word letter by letter on the palm of your other hand

*Result: The device recognizes the words and composes a short message.*

During the experiment, completing the gestures was timed, and as mentioned before, most participants did them correctly in less than 3 seconds. After getting to know the gestures the participants were asked some qualitative questions about the naturalness and difficulty of the gestures. 50% found all the gestures discreet, 40% thought they were unnoticeable, and the rest stated that the gestures with both hands are noticeable. Since 90% of our users agreed that our gestures were discreet, we definitely satisfied that design goal.

The gestures we designed and their results are shown in the images below.

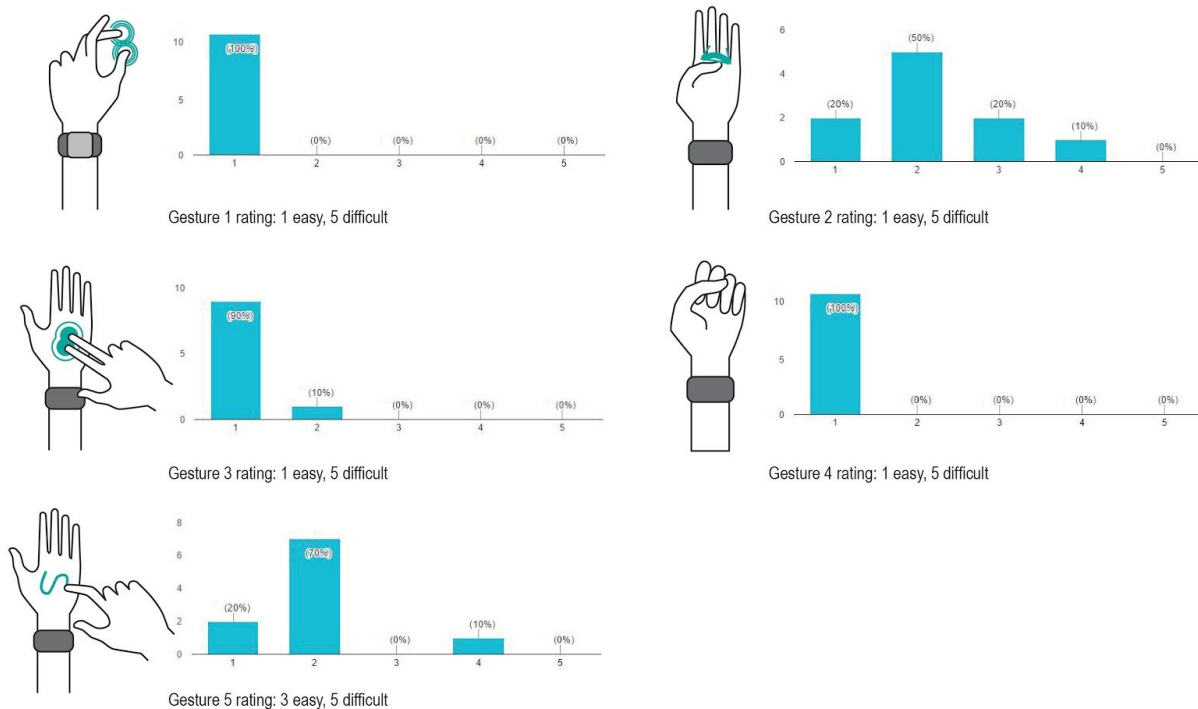


Image 15: Gestures and their survey result

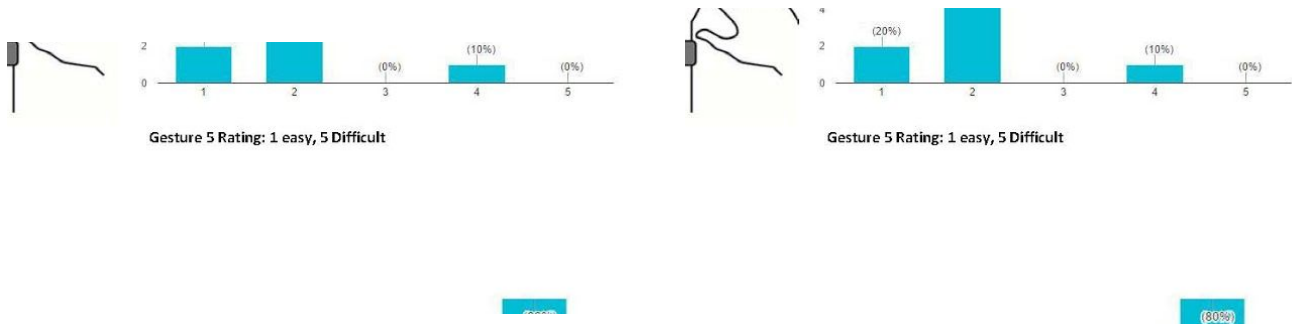


Image 16: Gestures and their survey result

### **Interpretation of results [What/Why]:**

Based on the results of our observations and the live demonstrations of the reactions of the application to the gestures, between the gestures with one hand, there was one gesture that people found not as natural as the others (gesture 2). Our approach is to notify the users of the fact that the motions need to be natural and sufficiently different from normal hand and fingers movements in order to make them unique to this application's use and reduce the possibility of slips. Also, we tested two different gestures for one action (sound recording). Based on the results we are going to use the one handed gesture (gesture 4) for this action.

As the proposed gestures are such simple and natural moves, all of the participants were able to complete them the way they were designed. Out of the 12 participants, we observed one other gesture from 2 participants. Instead of using the tip of one other finger they tapped the thumb to the side of index finger. This was a good suggestion, but based on the capabilities of the Skinput device and sensitive nature of the situation, the device is being used in such a way that we needed to have distinguishable gestures for the designed tasks (suggested gesture was similar to gesture 4). For this reason, we decided to use the proposed gesture (gesture 1) completed with the middle finger.

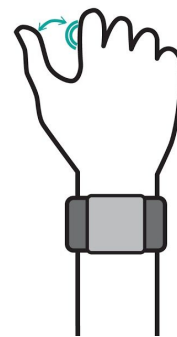


Image 17: Suggested gesture by participants

It is obvious that using two hands is more noticeable and less discreet than using only one hand. Please note that the gestures using both hands are appropriate to use only in situations when the threat is less severe and the user feels safe to use both hands.

## Overall results:

After all the tasks we asked users to rate their overall experience with the application and their preference to use in a real emergency. Not surprisingly, the largest group of votes belongs to the traditional way of getting help over the other options; however, if we consider the Skinput and panic button together, more than half of the users were happy with the idea. Probably, the challenges for them were some of the difficulties they had with the current design.

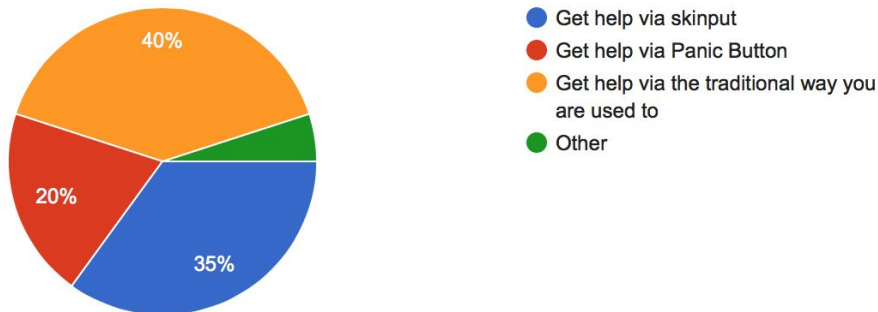


Chart 4: User preference for getting help in an emergency situation

The users' response to the learnability of the application explains much of the users' preference of Skinput or the traditional methods over the mobile application. As we see clearly in Chart 5, 50% of the users find it moderately difficult or very difficult to learn to use the application. Our conclusion based on this evaluation is that improving the easiness and clarity of the design will likely change the preference order, although a redesign and further testing would be required to verify this conclusion.

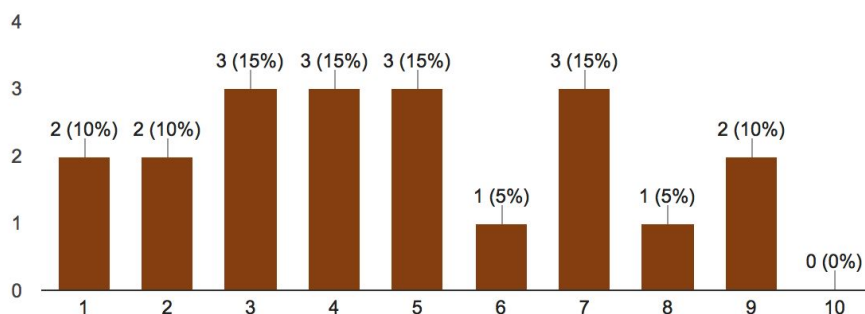


Chart 5: Learnability of the app based on users' idea ["how easy did you find the app to learn"]

## Conclusion - - - - -

With the intent to better prepare people for incidents where help and assistance are needed, we developed the HelpSource app. Our goal was to provide a platform for users who need to get help, get information, and want to give help to others in emergency situations. To evaluate the app, we gathered participants run through a set of tasks and then give feedback at the end of each step. As we worked through analyzing the collected results of our study, we began to notice the lack of diversity in age groups of the participants we tested. If we were to continue evaluations of the app, we would make sure to get an accurate sample of participants. The evaluation also showed us which features of the app were clearer for participants to understand and faster for them to accomplish. In order for the app to work successfully, it was really crucial for the app to be efficient and clear so that any user could understand how to react quickly in unexpected times of emergency.

The “Give Help” task in our evaluation had the smallest percentage of issues and errors with participants, while also averaging the shortest amount of time for completion of the task. Moving forward with the app, we would also make sure to rework the design to use some of the successful features of the “Give Help” task which included features that gave hints and explanations of what was expected of the user at each screen. We also evaluated the use of Skinput as we saw it fitting for our HelpSource app and how it could eventually be applied as an input for sending signals through natural gestures to the app. We asked participants to act out the gestures, observe them and show the result of the gesture on the app in a live demonstration. As a result, we were able to better understand which gestures worked more efficiently and more comfortably for users in emergency scenarios. This collected feedback along with the ease and rapid rate to which a user can send signals for help gives Skinput great importance to how we perceive the future use of HelpSource.

Overall, we were very happy with the design of our app and the minimal amount of error or issues that occurred in our evaluations. All of the tasks we studied, but one, however took over 30 seconds each to accomplish. The length of time to accomplish tasks is where we find a real need to enhance the quality of the app, as we are aware that every second counts while you are in an emergency. Our goal is to create an app with optimal efficiency for a user in need. Carefully responding to the pros and cons within the feedback is crucial for moving forward in the right direction with the HelpSource app and we believe that our results provided us with useful information for making future improvements.

# APPENDIX

## Installation Steps:

1. Register as a developer (free) on the [Genymotion](#) web site.
2. Download and install the Genymotion application with the virtual machine.
3. Run Genymotion and click on Add a device.
4. Select Nexus 6P with API of 24 and install it.
5. Power on the device by hitting the start button in the Genymotion application.
6. Download the prototype for the [HelpSource application](#) from this link, or copy and paste the link from here:  
<https://drive.google.com/a/uncc.edu/file/d/0B6fPnGeOWjV5NVNmQ0k0TWk4RFk/view?usp=sharing>
7. Drag and drop the downloaded HelpSource prototype to the Genymotion Android Nexus 6P emulator you started in step 5 to run the application.
8. **If any of these steps are unclear, please contact Rob Frye directly via phone at 828-446-8000 for technical support in installing Genymotion or the HelpSource prototype.**

## *Troubleshooting Genymotion:*

If there are problems in installing or launching a device from Genymotion, download the [latest Oracle Virtual box](#) and try again.