Interactive Prototype and User Testing

STAYSAFE

![Image of a red panic button with 'Don’t Panic! Press Here' on it]

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Overview of Problem and solution

According to nypost.com, attacks against taxi drivers have risen in New York to over 400 attacks per year [1]. It is unsafe for taxi and delivery drivers to drive around and do their job. Regular drivers can avoid dangerous situations, but the delivery drivers are often bound to drive to these bad areas because of their job. Our solution helps the user find the criminal history of their destination with the crime stats feature, find the number of people (suspects) that are around or near the exact destination with use of infrared feature, and get the help they need when they are caught in dangerous situations with the Panic feature. This will help them to be aware of the place and the situation they are going to be in, and find help in the most convenient way when they are in trouble.

Background and Review of Past Work

Since taxi and delivery drivers sometimes are faced with going to dangerous areas, we decided to have a focus on a Panic feature, infrared vision of the area to see if there are people nearby, as well as crime rates of the area so that users can be aware of the dangers in that area.

There are many phone applications and electronic devices that can be activated to alert family or police that the user is in danger. Some devices take this a step forward and have included GPS, which can show where a person is going. For example, the “Spark Nano 3.0” has “real time gps enabled tracking” and lets others track where the user is [1]. If a taxi driver is out on the road and is robbed or shot, emergency crews could have a hard time finding them. With real time gps tracking, it would be much easier to find a wounded taxi driver.
The company skyhook is developing a device that has a heat map telling how densely populated a certain area is at any hour of any day [Figure 1]. This technology would be useful to taxi drivers and delivery drivers because it could show if an area is full of people, and could prepare the user to be cautious or avoid the area if it seems questionable.

Virginia Tech is presenting a device, which has “a novel convergence of Internet crowd sourcing and portable smart devices to enable real time, location based crime incident searching and reporting” [4]. This device, named CROWDSAFE, includes features such as a safety router and crime analytics. The safety router would be able to show the safest route to the destination and the crime analytics would show the statistics of the crime in the area. Figure 2 shows a graphic of what the CROWDSAFE safety router looks like. The user can select a safer route by pressing SAFE until it’s very safe, or a faster route by pressing FAST until it’s the fastest.

Figure 1 – Population density heatmap
Microsoft has also recently patented a technology to help keep pedestrians safe, which will be incorporated into Bing Maps [6]. It is a location-based service that calculates the “pedestrian route production” which allows the user to take paths that take them to their destination in a quick amount of time. It also keeps the user relatively safe. The algorithm uses crime statistics to make the directions where crime indices are below a certain threshold.

**Interactive Prototype and Description**

Our prototype follows our mid-fidelity paper prototype hand in hand. After doing several iterations of our prototype, we eliminated as much ambiguity in the
design as we could and made it as user friendly as possible. The general structure of the design relies heavily on buttons to get from one screen to another and uses back and forward buttons. This alludes to the Internet browser metaphor in case a user mistakenly presses a button or realizes the current screen is not where they would like to be. We also implemented a ‘template’ bar at the bottom of the screen, which further facilitates navigation. Icons such as home screen, infrared mode, Call 911, and the forward and back buttons are readily available the help the user.

The languages used to build our interface were HTML, CSS and PHP. Most of the features concerning our tasks were ‘faked’. When the user types in a destination, a standard map picture is provided regardless of the address that is typed in. The same thing happens when the crime stats are toggled on or off. The next thing that is ‘faked’ is the infraRed picture that is displayed when the infrared feature is activated. Besides the point that this would be hard to implement in the real world, we have no camera to incorporate in our design. Setting the voice code is another ‘fake’ feature. When the user presses the record button, no recording takes place. As mentioned above about the camera, there is no speaker or memory incorporated in the system to be able to capture and store the voice code of the user.

The interactions with our interface rely mostly on the mouse for navigation and keyboard for things such as destination input. We have made all three tasks really straightforward in our design. One click is all it takes to activate the infrared view from any screen.

Enabling the panic feature (Calling 911) is another straightforward task. This can also be activated anywhere on the interface. The ‘Call 911’ button is located at the bottom template bar and calls 911 with a simple click. Information such as user location is also sent.

Enabling the crime stats feature is relatively easy. The screen to enter the destination address has a radio button for crime stats to be toggled on or off. Once the user has entered the destination address, the map view is shown on the screen. The crime button on the template can enable or disable crime stats with a single click.
Testing Method

PARTICIPANTS

Our first participant was a student here at the University of Maryland. Our second and third participants provided a lot of great feedback on things that could be improved about our design. Most of the things mentioned below about suggested revisions came from them.

STUDY ENVIRONMENT

Our testing environment was Adele Stamp Student Union. We went around looking for people that weren’t too intensely involved in the final exam studies. We asked people until we found some that were willing to take a couple minutes and test our interface.

TASKS

Our GPS device has three main tasks. These are activating crime statistics, setting and enabling the panic feature, and activating the infrared feature.

Task 1 (Easy): Enabling Infrared

This task requires an infrared camera installed that will allow the user to be able to see potentially dangerous people that might be hidden from view. The user has to activate the infrared view.

Task 2 (Medium): Viewing Crime Statistics for an area

This GPS device is equipped with crime statistics for drivers to see how dangerous the destination is. The user must begin by entering an address for where they want to go and they have to check the crime stats for that area.

Task 3 (Hard): Calling for help in an emergency
The final feature for this GPS Device is a panic feature that calls the police when activated. The user can set a voice code to be activated automatically. The user must then set a voice code for the panic feature when starting on the home page. After successfully setting up their voice code, the user must activate the panic feature manually or automatically.

PROCEDURES

Before every usability test interview, we explained basic functionalities to the user. We let the user figure out the rest. One of the group members was responsible for filming, another took notes, and another explained the task and interacted with the user.

We placed our laptop with the hi-fidelity prototype on a table. We started all of our tasks from the home page screen. We explained the tasks to the users, and let them figure out how to accomplish the task by themselves. We used the think-aloud protocol by asking our users to talk loudly about their thinking process. The users would use the touch-pad on the laptop to click the different buttons on the screen and used the keyboard for entering text. If they chose the wrong button, we would let them continue until they hit a dead end or were wrong, so we would be able to see any confusing aspects of our design.

At the end of all testing, we asked the users to provide any feedback they had about the user interface. We also asked their opinion about how they thought the user interfaces should look.

TEST MEASURES

During testing, our goal was to find the flaws in our user interface, and we encouraged the users to navigate entirely on their own. We provided minimal help to simulate the interaction when a consumer has recently purchased a piece of technology, and is trying to get acquainted with the product by using it a few times accomplishing
different tasks. We found this to be effective since we eliminated our own bias of what was easy or hard to accomplish, and let the user help us find what could become more user friendly. We took note whenever a user got lost or used the wrong path to try to accomplish a task we provided them, and used this information to improve our design.

**Testing Results**

The results for the second user testing were not nearly as helpful as the first user testing. We found all of the confusing and ambiguous parts of the design earlier and were able to fix those. No one had any major trouble and the confusing parts were more because the user was not completely clear about what to do.

One user we tested seemed nervous about people filming her and did not initially recognize that the red pins were crimes. She thought that the red pins were the destinations.

Another user we tested had one problem too. When trying to activate the panic feature, he first went to options and then went back to the home screen. We think he didn’t understand what the task was because after returning to the home screen, he re-read the prompt that we gave him and he was able to successfully activate it. This doesn’t seem like a problem with the interface, but instead that the user wasn’t sure of what he was doing.

The only actual problem that users had with our interface was when trying to record a voice for the panic feature. One user didn’t know whether it was recording when he pressed “START RECORD” or if it started to record when pressing the ok button on the pop up [Figure 3].
Suggested Interface Revisions

We were happy to find that there weren’t many revisions to be made in our final prototype, which means we did a great job in the initial stages of the design weeding out the ambiguous aspects. In our interactive prototype user testing, we had some minor misunderstandings about our design. One user had trouble figuring out what the red pin drops meant while another went into options while trying to activate the panic feature, so he had to start the process over from the home page. We don’t think that this was a problem in the way we designed the interface but more of a problem with the artificial atmosphere and environment of where our user testing took place. It was finals week, and all the students at the Stamp Student Union were studying or doing final projects. Although most were nice enough to take a couple minutes and go through our design, they were rushing to get it done and didn’t really care about giving constructive feedback.
One revision we realized could make the interface more comprehensible is a modification in the screen to the set voice code. Once the record button is pressed, a feedback should be displayed such as ‘Recording..’. When the Stop Record Button is activated, the feedback message should pop up saying something like ‘Recording Completed.’

Discussion and Summary

As this project comes to an end, there were many lessons learned. We learned the importance of sketching, the idea that lightweight lo-fidelity prototypes are a great easy and fast way of translating ideas to paper. The phrase “fail early, fail often” is a great way to weed out unrealistic ideas or bad design before the project gets more serious, and can avoid a great amount of wasted additional planning, time and money. Our group experienced this, as in the beginning our ideas were way too broad. After doing poorly on the first assignment we were able to get on the right track.

We also learned that studying similar projects are an important part of design. One thing we never want to do is reinvent the wheel, and if there is a similar project already implemented, we want to build on those ideas to make it either unique or better, and not re-implement something that already exists. We learned to take in consideration ethnography, or how an individual’s customs, cultures and background can affect how they see or understand the design. We also learned that observing people accomplishing inefficient tasks could often bring up ideas for new designs. Surveys and questionnaires are not so reliable because people are overtly bad at predicting things they’d like to use when talking hypothetically but can respond much better to concrete things, or even make comparisons. When coming up with ideas for inventions, it is better to watch what people do instead of asking them what they want. Steve Jobs once said, “It’s not the customer’s job to know what they want.” Henry Ford, when talking about the how the concept of the car first came to him, mentioned, “If I had asked my customers what they wanted, they would have said a faster horse.”
The Midas Touch Problem was another thing we came across in our design. In our Panic Feature, where the user can call the Police by calling out a voice code previously set, one has to do this prudently not to set a code that could mistakenly activate while singing a song, or saying something out loud that is unrelated. We also learned about mental models, and how they shape a person’s view of an interface and how paper prototyping is convenient because it reveals how certain features or designs might lead a user in the wrong direction.

Appendix

Your signature indicates that you are at least 18 years of age, you have read this consent form or have had it read to you; your questions have been answered to your satisfaction and you voluntarily agree to participate in this research study. You will receive a copy of this signed consent form.

If you agree to participate, please sign your name below.

NAME OF SUBJECT [Please Print] Ibrahim Alyahya

Last Work (20 ptc)
equipped with crime statistics for drivers to see
CMSC434 Project Title: Interactive Prototype and User Testing

StaySafe

Nita Sutreja
James Leffler
Ricardo Kreyhsig
Amrit Khatri

<table>
<thead>
<tr>
<th>Project Title</th>
<th>Interactive Prototyping and User Testing</th>
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<tbody>
<tr>
<td>Purpose of the Study</td>
<td>This research is being conducted by the students of CMSC434 (Kreyhsig, Leffler, Sutreja, Khatri) at the University of Maryland, College Park. We are inviting you to participate in this research project because you provide us with valuable feedback on the strong/weak aspects of our interface design. The purpose of this research project is to have users test our interface so we can potentially improve it by taking out ambiguities and making it as user-friendly as possible.</td>
</tr>
<tr>
<td>Procedures</td>
<td>The procedures involve the user reading a couple of tasks to be accomplished and trying to figure out how to accomplish the task on the interface design.</td>
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<tr>
<td>Potential Risks and Discomforts</td>
<td>There are no known risks associated with participating in this research project.</td>
</tr>
<tr>
<td>Potential Benefits</td>
<td>This research is not designed to help you personally, but the results may help the investigator learn more about the strengths/weaknesses of the interface design.</td>
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<td>Confidentiality</td>
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<td>Any potential loss of confidentiality will be minimized by storing data in a secure location in a password protected computer inside a locked office. If we write a report or article about this research project, your identity will be protected to the maximum extent possible. Your information will not be shared with representatives of the University of Maryland, College Park or governmental authorities if you or someone else is in danger we are required to do so by law.</td>
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<th>Right to Withdraw and Questions</th>
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<td>Your participation in this research is completely voluntary. You may choose not to take part at all. If you decide to participate in this research, you may stop participating at any time. If you decide not to participate in this study or if you stop participating at any time, you will not be penalized or lose any benefits to which you otherwise qualify. If you decide to stop taking part in the study, if you have questions, concerns, or complaints, or if you need to report an injury related to the research, please contact the investigator: [Principal Investigator: Ricardo Kreyhsig, (240) 438-3458, <a href="mailto:rkreysig@termpmail.umd.edu">rkreysig@termpmail.umd.edu</a>]</td>
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<th>Participant Rights</th>
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| If you have questions about your rights as a research participant or wish to report a research-related injury, please contact:  
University of Maryland College Park  
Institutional Review Board Office  
1204 Marie Mount Hall  
College Park, Maryland, 20742  
E-mail: irb@umd.edu  
Telephone: 301-405-0678 |

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<th>Statement of Consent</th>
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<tr>
<td>Your signature indicates that you are at least 18 years of age; you have read this consent form or have had it read to you; your questions have been answered to your satisfaction and you voluntarily agree to participate in this research study. You will receive a copy of this signed consent form. If you agree to participate, please sign your name below.</td>
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<th>Signature and Date</th>
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| NAME OF SUBJECT  
[Please Print] Ibrahim Alyahya |
1) PREFACE: This GPS device is equipped with crime statistics for drivers to see how dangerous the destination is.

**TASK:** Enter 3427 Tulane Dr. Hyattsville, MD as the destination address and check the crime stats for that area.

2) PREFACE: This GPS Device has a panic feature that calls the police when activated. You can set a voice code to be activated automatically.
   a) **TASK:** Set the voice code for panic feature to "HELP"

   b) **TASK:** Activate the panic feature to call the police.

3) PREFACE: The final feature is an infrared camera that can reveal hidden people.
   **TASK:** Set the view to infrared.

Do you want to reveal your face in the prototype testing?  [ ] Yes  [ ] No

Do you give us consent to video tape this prototype testing and use it for the sole purpose of presenting the results at the University?

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Do you wish to reveal (check all that apply)
[ ] entire body
[ ] hands only
[ ] voice
notes taken during interviews:

User1: Pressed destination re-entered address of college park instead of keeping current location crime stats on radio button “where is crime data?”
called 911 successfully
voice code set successfully
task3: set infrared
Feedback: Menu with crime indices
User2: Went to options
home
destination
entered address
radio button on
task2: options
set voice code
didn’t replay, but was successful
call 911 successful
infrared successful
dots made sense
User3: set destination
entered end location successful
radio button on
set voice code:
options
set voice code
start voice code, end voice code done ok
wasn’t clear if recording started or not
options
re-read paper
call 911 successful
infrared successful
Feedback: didn’t know if recording started or not
“instead of okay, use end”
Optional: Project Write-up

Our initial website contained only our web-based interactive application. Our idea was that if we implemented a web app, it would be a smoother transition at the end to finalize the web site. The entire application and website were implemented using HTML, CSS and PHP. We used MAMP to create the HTML, CSS, and PHP script, and checked them locally. We also used photoshop to play with some of the photos as part of CSS design. The website contains the photos that we took throughout the semester. We took some of those photos and displayed them on the website as a part of the periodic display. We used a GIF file to create the periodic display. Once all the scripts were ready locally, we set up our domain name “staysafeumd.com” and used FileZilla to transfer our script files form our local disk into the Internet. FileZilla is a File Transfer Protocol that we used to easily to transfer our file.

All the design was done via paper prototyping, which we kept improving through the each project cycle and as we did more user testing. All the design ideas were taken right from our lo-to-mid paper prototype with a couple of changes from our user testing to make the app more user friendly.

As you seen in Figure 4, the website starts with a home screen. It starts with the “About” section of the page that describes the proposals of our project. All other

References
sections like Documents, Tasks, Prototype, and Teams can be accessed from the menu bar in the website. The “Prototype” button in the menu bar leads to the actual interactive prototype.

Once we completed the project, we tested the final version in Google Chrome, Internet Explorer, Firefox Mozilla, and Safari. It worked in all the environments as expected.

Figure 4 – [www.staysafeumd.com](http://www.staysafeumd.com)