Lo-to-Mid Fidelity Prototype Testing and Refinement

STAYSAFE

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Overview of Problem and solution

Delivery drivers getting shot, robbed, and vandalized are common in the news these days. 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.

Lo-to-mid prototype description

Staysafe uses interface designs that are similar to existing GPS devices and crime statistics pages. We use front and map view as in regular GPS products, and zoom buttons with scroll bars like Google Maps. We also defined a template on the bottom of the user interfaces, which contained frequently used buttons. The template also has forward and back buttons similar to an Internet browser. The following is an explanation of the buttons on our interfaces:
StaySafe interface uses the regular text box view to insert the text where necessary, like in set destination page, where user has to insert the destination.

**Set Destination and find crime stats**

This is the major function in StaySafe. The task starts with the home page (Figure1). This page has “StaySafe” label at the top, three buttons “Destination/ Crime Stats”, “Infrared”, “Options/settings” in the middle and the template that has forward, backward, and panic buttons at the bottom. Pressing “Destination/ Crime Stats” leads to the “SetDestination Page”(Figure2) where a user can choose the start and end location by typing the location in the text buttons from the keypad embedded in the interface. This interface uses radio buttons for the selection of crime stats on/off. Pushing the “OK” button finalizes this interface and leads into the relevant map.
view (Figure3). Map view uses the top part of interface as an information bar for the speed, destination, and time left. If the crime stats are on, drop down pin defines the crime stats. Also, zoom buttons with a scroll bar help to zoom in and out the map for better visibility. The buttons on the template help to return to the homepage, turn on infrared, or turn on/off crime stats. Also the “Call 911” button is part of the template as the panic feature function.

Figure1. Home Page
Figure2. Set Destination Page
Figure3. Map View
Set voice code and Activate Panic feature

This task is another main functionality of StaySafe. Setting Voice begins with the home page (described above). Voice Code setting is under “Options/Setting buttons” which leads to the “Options/Settings” interface (Figure4). This has a scroll bar where the user can choose a faster or safer route. It includes a “Set voice Code” button and “Common Functionality” button. Pressing the “Set Voice Code” button leads to “Set Voice Code” interface (Figure5). It includes graphical feedback for recording. Four buttons “Start Record”, “Stop Record”, “Playback”, and “Done” helps to set the code. Pressing the “Done” button finishes the task that leads to a final screen that says “Voice Code Set” and has an “Ok” button (Figure6). During this process, the user can always use one of the buttons on the template to return to the home page or achieve other tasks like infrared or Panic feature.

Once the voice is set, StaySafe uses two methods to activate the panic feature. By speaking loudly, the voice code activates the feature. Also, pressing the “Call 911” button activates the panic feature. Voice activation gives the feedback by having the “Call 911” button blink. Pressing the panic feature button leads to a new feedback interface that says “Calling 911” and has a “Cancel” button for users to push to avoid the Midas touch (Figure7).
Figure 6. Voice Code Set

Figure 7. Calling 911

Activate Infrared

This is the third main functionality of StaySafe. Activating infrared can be done through two methods. The first method is when the user is on the home screen. When this is the case, the user will press the infrared button and it will bring them to a screen showing an infrared view of what the driver sees. The second way a user can activate the infrared feature is through the infrared button on the bottom of every screen except the home page. This button activates the same way and brings the user to an infrared view of what the driver sees (Figure 8).

Figure 8. Infrared View
Complete view of interfaces
Testing Method

Participants

We interviewed one taxi driver, three random people, and one mechanical engineer. The first taxi driver, Bobby, is a friend of one of our teammates. For testing, we tried to make sure all of our users were both taxi or delivery drivers, and even called and emailed taxi companies such as Bar wood and Regency Cab. However, we could not get much help from them. We thought of choosing random people as part of our user testing and decided to go for random drivers since our implementation is about the GPS feature embedded with crime stats. Since almost every driver is familiar with basic GPS functionality, it would not make much difference if the tester were an actual taxi/delivery driver over a regular driver. Also, we were lucky that we interviewed Eric, an air force commander, whom we would like to refer to as an expert. He also worked as an emergency dispatcher, so he provided good feedback about our Panic (Call 911) feature, which calls the police when activated. Another user we considered to be an expert in our walkthrough was Chad who is a mechanical engineer. We consider him as an expert user since he is more likely to view safety features from an analytical point of view.

Study Environment

The first environment was in Bobby’s apartment. We used paper prototypes, placed the paper screens of the UI on the desk, and replaced the prototype screens as the user progresses through the task given. The second environment was in the Student Union where we interviewed students and other random people we found who were drivers. We used paper prototypes starting with the home screen page laid out on a desk in front of the user.
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 has 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.

Additional Tasks
During previous testing, we discovered that the front/map view buttons that we have might not make sense or are hardly visible to the user. These buttons are on the top right corner of the screen when seeing the map (directions) and can change between front view, which is zoomed in, and map view, which is zoomed out. We included a fourth task during testing where the user must toggle between these views.
Procedure

Before every usability test interview, we explained to each user about our UI, such about the template present in every screen and basic functionality. We let the user figure out the rest.

One of the group members was responsible for filming, another took notes, another explained the task and interacted with the user, and the last one helped to make the user interface workable by sliding down the right UI page. We alternated who did which job once a new user interview was being held.

We placed our paper prototype UI screens on a table. We started most of our tasks from the home page paper screen in front of the user. We explained them their task, and let them figure out how to accomplish that task by them. We also asked our users to talk loudly about their thinking process. They would press the buttons with their finger or a pen and we would replace the screen with its successor. 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 interfaces. Also, we asked their opinion about how they think the user interfaces should look. One such example was the feedback we got about the Front/Map view toggle button. A complaint that users shared was that the button was hardly visible, and thought they needed to go to settings to toggle it.

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 it 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 to help us find what could become more users
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 better our design.

**Testing Results**

The main thing we learned was that our panic feature was not explicit enough. We have a button that says, “HELP” on it on the screen and everyone that we tested missed this feature. One of our tasks that we have is to have the user perform is to activate the panic feature. Every single user failed this task. After the tasks were finished, we asked the users why they missed the “HELP” button and it was always because they thought that it was help for general user interface help like on a computer, and not help from police. We changed the name from “HELP” to “call 911” so that users will use this button because it's clear that it should be used in an emergency.

Another feature that we tested was for crime statistics where the user would activate the crime stats. In this case, all the users were successfully able to enable the crime stats. The only problem was that few testers actually understood the graphic we used. We have two ways of activating the crime statistics. One way is to change the radio button from off to on when setting the destination and the map view will show up with the crime stats. The other way is to have the radio button off, and then the map view will show up with crime statistics off. Then on the map view they would press the button that says crime stats. Only when they pressed this button would they see a difference and know that the new dots that showed up on the screen were where crimes have taken place. Otherwise they would just see dots or shaded circles and had no idea what they were looking at. We decided to fix this by having an additional screen that would explain to the user what all the different buttons and settings were. The screen would appear only the first time the device is used and then set to not be shown again.
One of the users we tested pointed out that the infrared is not that helpful. He explained that in the city, where there are lots of people, how do they figure out who is good and who is bad from the infrared. We think that if that’s case when the destination is a public place, then it’s not that dangerous and the user doesn’t have to use infrared feature.

Consistency was the other issue we faced. Our buttons were oval shaped, and so does the labels. The labels like “StaySafe”, “SetDestination”, “SetVoiceCode”, etc, all were treated as buttons. For the task like setdestination, setvoicecode, users used this label as a task-accomplishing button.

Also, the front/map toggle button was in the description part of the map UI. So, users didn’t realize that there is a front /map toggle button in the UI. The problem here was that we mixed labels and button together. Also we put the toggle buttons and information bar in the same location. There should have been consistencies in the location and size of the UI objects. Also, some users commented out that the instead of toggle button, they were looking for zoom buttons to help them change the map views. They were looking for standard “+” and “-” buttons with scroll bar.

Interface Revision

We realized during testing that our prototype was way too colorless. So, we added colors to define different objects by different colors. The testers often thought that labels were buttons, and missed over some buttons because they thought they were labels. To fix the button and label similarities, we colored in every button so that it was very clear that this was a button and not just a label.

Previously, in order to show crime statistics on the screen, we used pencil to draw dots, which represented where crimes took place. In a zoomed out view, we drew circles where darker circles would mean a high density of crime, and a lightly shaded area was a lower density of crime. Because it was shaded in pencil, users had no idea
what these markings were. We fixed the crime statistics problem by having concurrency and changing them both to droplets instead of dots and large circles. This way, if users understand one, they will be able to distinguish that the other is the same thing.

Also, we had two different views of the map, a zoomed out view, which we called map view, and a zoomed in view, which we called front view. During user testing, none of the users were able to figure out how to switch between these views. In our new design, we scratched the idea of having two views, and changed it to a bar with plus and minus for zooming in and out. We also moved this feature to an easily recognizable place on the screen instead of the top right corner.

Finally, our panic feature was confusing to users because it was labeled “HELP”. Users thought this was interface help and not “get help from police.” We renamed it to “Call 911” as suggested by every person we tested.

Also, we included a manual that explains what all the buttons do and labeled the features on the map (figure0).
Discussion and Summary

Our group was very pleased with the usability testing. Before starting the testing, we were pretty assured that the testers would be able to complete the tasks easily because most things were rather explicit. For instance, in order to activate the infrared feature, the user simply has to press the button labeled “Infrared.” The only feature of our device that we thought the testers might not be able to get was switching from map to front view. This was not one of the three-featured tasks, but we decided to add it to testing because we were unsure if it was understandable to use. We were glad that we tested this part because none of the people tested were able to complete this task.

Even though the testing itself went well, we had major problems getting started. Since our GPS device is designed for taxi and delivery drivers, we thought that is whom we should test. As one might have guessed, we had trouble getting in contact with any drivers who were willing to help us out and we even tried calling the company itself to see if we could set up a time to meet. Due to time constraints, we were unable to make any meetings with any taxi drivers. At this point, we decided that it wasn’t all that necessary to test on just taxi drivers, because any driver could use the GPS and find flaws in our design. We went to stamp and spoke to people asking if they would like to help us out and test our interface design. Amazingly, everyone we asked was willing to help and even let us record them after signing the consent form.

After getting user feedback from our interviews, we added color for better visibility of buttons and for users to be able to distinguish between buttons, labels, and text. We replaced the dots on the map view that showed where crime had occurred with pin drops to make it less convoluted. The dots would become darker shades once many of the dots were clustered in one place, but many users found this to be confusing. We changed the Panic Feature Button from “HELP” to “Call 911”, since many of our testers thought that this was interface help instead of a call for emergency. The last change we made was to get rid of our map/front view toggle button since most testers did not even
notice that this button was present on the screen. We replaced it with conventional
“+/−” buttons for zooming in and out along with a scroll bar to adjust the view.

There wasn’t much we could improve on for our usability evaluation. The
feedback from everyone was tremendous, and it helped that everyone basically had
constructive feedback for our project. This made it easy to change our design because
we knew exactly what was wrong, what was right, and what we needed to fix.

Appendix

User 1
Task 1 (Set destination and crime reports)
- Home screen -> Got the “Destination/Crime report) button, self
  explanatory
  - Set Destination page -> he thought “Set destination” label as a button, once informed, he realized the “OK” button
  _ Map Page -> Crime stat button was still hit after he turn on the crime report in “setdestination Page”
  _ Crime dots were not understandable

Task 2.1 (Voice Code set)
- Home -> setting voice code was figured out to be in options/settings
- Clicked the “Set Voice Code” button
- Successfully recorded voice code in the next step
- he found the set code UI very useful and clear

Task 2.2 (Panic feature)
- He could not figure out the panic feature
- Repeatedly pressed the crime stats button for the help
- Unaware that the “help” was the panic button
- “help” button was thought of as a interface usability help

Task 3 (Infrared vision)
- Home -> pressed infrared button
- Easily understandable and easily achievable task
- But commented out that in a big city with lots of people, wouldn’t be that affective

Task (Interface testing for front/map view)
- User can never figure out that there was front/map toggle button in the application
- Since located at the top bar with information, couldn’t distinguish between toggle button and information

User 2 comments:
voice code set properly
infrared screen understandable to her
Map to front unclear, went to common functionalities
liked crime/infrared features
crime stats/ infrared easy
help button on home page looks like help on a computer
911/emergency a lot better than ‘help’
blinking was good
infrared concept was clear

User 3 comments
Crime stats radio button left off on set destination screen, then pressed crime stats button on map view
Screen in between those saying what the dots mean and what the different things on the screen mean. have check box to not show that message again.
Didn’t know what the dots meant
Panic feature set properly
manual and automatic panic feature easily set
options for front/map view -> went to common functionalities
overall comments:
change help button

User 4 comments:
not sure what dots mean, no legend
set voice code → doesn’t understand fast/safe slide bar in the options

pressed record then done. (didn’t stop recording or test it)

“Voice code set” → “does this screen go away automatically or do i press home screen?”

Scenario: assume you’re driving, now activate the panic feature
-pressed home button, and did not see help button and said “there is no panic button”

Staysafe label looked like a button.

Advised a tutorial on what voice code to use (like what we had earlier) to avoid Midas touch
like maybe have a number or letter combination

infrared → view of surrounding heat sources representing surroundings

pressed Set destination but its not a button, didn’t use ok button, wasn’t clear.

comments:
“the simpler the better”
be explicit as possible.
use different taxonomy
help button to him is device help, not police help
Front/Map view should be Route or some other name

Some screens have labels at top, some have buttons → be more consistent
infrared view → knew what we were going for but not the same view he is used to seeing as an air force commander.

7) Interface Revisions

Nita------
Help button === Call 911xt button -DONE
front/map === plus/minus -DONE
Color top information bar-DONE
Voice code set === add OK button that take to home page -DONE
make OK button bigger on set destination screen-DONE
change crime rate picture (Map View)-DONE
add 1 more UI where map view is average-DONE
StaySafe
Instruction Menu

- HOME ( ) → Takes you back to the Home screen
- Infrared ( ) → Gives the user a infrared vision of GPS camera is capturing (adjustable)
- Crime Stats ( ) -> Shows crime statistics in area
- Call 911 ( ) -> Calls 911 and provides user location
- Zoom In/Out map view ( ) -> Zooms in or out on the map
- Forward (===>) -> Moves interface to previous screen if backward button was previously pressed
- Backward (<<<) -> Moves interface to previous screen
- explain what are the dots on the crime stats page
University of Maryland
CNSC 434

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? __ Yes __ No

[Signature] 19 April 2012
[Date]
Do you want to record 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 passing the results at the university?

Name (last) __________________________ Date ____________

So you want to record 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 passing the results at the university?

Signature __________________________ Date ____________
Video Report

We used an iPhone to record all of the videos while the user interacted with our prototype. On a couple of the interviews, the interviewer had to both switch the screens, interact with the user, and film all at the same time. However, during most of our interviews, which were held at the Stamp Student Union, each group member did one thing, and the extra person took notes about the user interface process. In our very first user interview, we had a very disruptive background in which music started playing after we had begun the interview. The rest of the interviews held at Stamp were a lot smoother. By watching the video post-hoc, we learned about the lack of consistency in our design, how buttons, labels and text looked and where the UI objects were located. We noticed that we were mixing the information bar with buttons. For example, the map/front toggle button was placed with the information bar at the top. We also noticed the poor visibility in the interface design and also the way in which particular labeled buttons were ambiguous and confusing to some users. “Help” button was one of the best examples for the ambiguity of the button label. After all the interviews were conducted and recorded, we used iMovie to edit the video. The editing part was straightforward. We cut the unnecessary portion of the recordings and try to mix up the videos as far as possible to make it look better and understandable. Videotaping really helped us to iterate the interface design, because along with the notes we took, we always had a recorded video to go back and check what was good and bad about the design. We can re-watch the videos to track down the difficult parts of user interfaces where the tester found it hard to follow the design and accomplish the task. Overall, interviewing the usability testers and videotaping them helped to iterate through the design and modify the design where necessary.

References