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Introduction

The streets are often not a safe place to be alone in cities with high crime rates. Below are just a few examples of recent incidents where the situation got worse after a slow response from the police.

(Source: Twitter)

Our mobile web application is an emergency application, which allows users to walk the streets with confidence. It specifically targets users (particularly women) living in developing countries, where the police response can be extremely slow and ineffective. It aims to help create a safer community by identifying potential areas of threat and providing help in case of danger.

System Objectives

Our system seeks to provide a single-click/single-tap solution for users who are in dangerous situations. It would be able to do the following:

- Make calls and send messages to emergency contacts
- Transmit geographical information of the user
- Update status with location automatically via social media outlets such as Facebook and Twitter

In addition, it would offer the following:
- Provide real-time crime data analytics
- Provide translation for non-English speakers
- Provide self-defense videos
- Mobile-friendly user interface

The initial implementation would target Tucson, Arizona to build a user community. We believe the application would be highly scalable, so if it proves to be successful, we will consider adding additional cities in Arizona and in other states.

**Market Landscape**

The current market is filled with many applications that offer similar core functionalities to our proposed application. However, our system is unique in the additional features that it provides. Three examples are listed below, compared with our application in terms of the features that they offer:

<table>
<thead>
<tr>
<th></th>
<th>Weights</th>
<th>Never Off Guard</th>
<th>Women’s Safety</th>
<th>Family Safety</th>
<th>Safety Secured</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calling</td>
<td>15</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✗</td>
</tr>
<tr>
<td>Text</td>
<td>15</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>GeoLocation</td>
<td>35</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✗</td>
</tr>
<tr>
<td>Social Media</td>
<td>20</td>
<td>✓</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>Analytics</td>
<td>10</td>
<td>✓</td>
<td>✗</td>
<td>✓</td>
<td>✗</td>
</tr>
<tr>
<td>Multi-language</td>
<td>5</td>
<td>✓</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td></td>
<td>100</td>
<td>100</td>
<td>65</td>
<td>75</td>
<td>15</td>
</tr>
</tbody>
</table>

Based on our market analysis above, we believe our application would provide a unique set of features that would attract a solid user base, which would drive the further development and success of our system.

**Unique Features**

Our application is the only one currently on the market that offers social media integration, crime data analytics and multi-language translation, in addition to the typical calling and texting features that share the user’s real-time location to his/her phone contacts and social media connections.
System Design

APIs

The following details the APIs that we used to build our system:

- Twilio – text messaging
- CallFire – calling
- Twitter (2) – login and posting
- Facebook (2) – login and posting
- Google Maps – user location tracking and mapping
- YouTube – self-defense videos
- PayPal – donations
- CrimeReports – source for crime data
- Tableau Public – analytics and visualization
- Bing Maps – crime data geocoding

Architecture
Analytics

Crime data was collected from CrimeReports for the maximum allowed six-month time period – November 4, 2013 through May 2, 2014. We gathered 5,266 records in total and the following related information:

- Type of crime (e.g., assault, theft, robbery)
- Date of crime
- Address/intersection of crime location (i.e., street, city, state)

In order to map the data, the addresses were geocoded on www.gpsvisualizer.com by using the Bing Maps API. The output included, in addition to the original address information, the geographic coordinates as well as the zip code. After this data pre-processing step, we stored the following information for each record in a MySQL database:

- Type of crime (e.g., assault, theft, robbery)
- Date of crime
- Latitude of crime location
- Longitude of crime location
- Address/intersection of crime location (i.e., street, city, state, zip code)
- Zip code

Finally, we used the stored data to create the following analytics and visualization:

- Crime records within a certain radius of the user’s location place-marked on a map
  - Google Maps API/Tableau Public
- Crime breakdown by crime type and date (month)
- Heat map showing the most frequently occurring crime type by date (month)
- Geovisualization of crimes by the type and geocoded by zip code
- Geovisualization of crimes by zip code (all crime types)
- Graph representation of crime data totals by type

System Novelty

Our system is unique because in addition to sharing the user’s location via calling and text messaging, it takes advantage of the ubiquitous usage of the major social media platforms of Facebook and Twitter to better transmit the vital information to the user’s closed ones in an emergency situation. In addition, our system provides insightful analytics that show the user important crime information in his/her area, which is not provided in other competing systems. Finally, our system provides translation for global users – this is a functionality that most others do not offer.

System Walkthrough

The URL for accessing our system is http://54.186.249.149/version2/home.php.
When the user lands on our system’s home page, he/she would see the following:

A user has the option to translate the page to his/her native language:

The first step for a user to gain access to the system’s functionalities is to log in with his/her Facebook account (indicated by the red box above). When he/she clicks the green bar, if he/she is not already logged in to Facebook, he/she would be taken to the following log in screen to log on to Facebook:
Once he/she is logged on, the system will take him/her to here:

As indicated by the red box above, the user will need to click “Allow” to give the system access to the user’s location in order for the application to work properly.

Our application is optimized for mobile phones. The red siren, which is part of the core functionality of the system will always be shown, even if other parts of the website become hidden:
To activate the application during an emergency situation, the user would click/tap on the red siren, which would automatically transmit calls, text messages, Facebook statuses and Tweets to share the user’s current location:
After the siren is clicked, an actual siren will sound off, and the icon will turn into the icon above, which also flashes. During this process, the user’s designated contacts will receive a call with a message asking for help and a text message that says the following:

“Help! Please help me I am in danger! My Facebook and twitter feeds have my location!
Please reach me asap! Thank You”

In addition, the system would automatically post the following Facebook status and Tweet on user’s accounts:

Once the user clicks on the link to Google Maps, the user’s location will be shown:

The second part of our system (“Extra”) provides a system overview video, as well as several self-defense videos via YouTube:
The third page of our system ("Donate") allows the user to make a donation via PayPal:

Next, the “Analytics” section provides a dashboard that allows the user to visualize crime data locations and key statistics in his/her area:
(The user can search for historical crime incidents that occurred within a certain radius of his/her location.)

Our system also allows user to submit their feedback:
Finally, since our application is meant to serve the public, we have made our system source code open source (with restrictions) to allow others to help make our system better. Users can download the code as follows:
Revenue Model

We will offer the users three ways to use our system, for each of which we will deploy a different strategy to generate revenue:

- **Free Version**
  - Only Social Media Integration
  - No Analytics
  - No Calling + SMS
  - Revenue generator: Advertisements (Local businesses such as gun shops, gyms and taxi companies)

- **Premium Version**
  - Full location Analytics
  - 5 Numbers for Call and SMS
  - Facebook + Twitter Integration
  - Revenue generator: Fee ($1.99/user)

In addition, we plan to generate revenue via the following:

- Grants from non-profit organizations that seek to raise public safety awareness
- Grants from government agencies such as the City of Tucson and Pima County
- User donations

Our business model is not designed to generate profits, but rather, to keep our application free and publicly available to the users. Thus, any extra funds will be re-invested in application development and maintenance and potentially, expansion into other cities and states.

Revenue projection:

<table>
<thead>
<tr>
<th>Revenue</th>
<th>Unit Amount (1st year)</th>
<th>Quantity (1st year)</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
<th>Increase % per year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advertising</td>
<td>$1/visitor</td>
<td>14,600</td>
<td>$14,600</td>
<td>$16,060</td>
<td>$17,666</td>
<td>$19,483</td>
<td>$21,376</td>
<td>10%</td>
</tr>
<tr>
<td>Subscriptions</td>
<td>$1.99/user</td>
<td>3650</td>
<td>$7,263.50</td>
<td>$8,716.20</td>
<td>$10,459.44</td>
<td>$12,551.33</td>
<td>$15,061.59</td>
<td>20%</td>
</tr>
<tr>
<td>Donations</td>
<td>$1/user</td>
<td>1825</td>
<td>$1,825</td>
<td>$1,918</td>
<td>$2,032</td>
<td>$2,113</td>
<td>$2,218</td>
<td>5%</td>
</tr>
<tr>
<td>Grants</td>
<td>-</td>
<td>-</td>
<td>$1,000</td>
<td>$1,000</td>
<td>$1,000</td>
<td>$1,000</td>
<td>$1,000</td>
<td>-</td>
</tr>
<tr>
<td><strong>Total Revenue</strong></td>
<td></td>
<td></td>
<td>$24,688.50</td>
<td>$27,692.45</td>
<td>$31,137.50</td>
<td>$35,096.59</td>
<td>$39,655.79</td>
<td></td>
</tr>
<tr>
<td>Expenses</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Website Hosting</td>
<td>$1/hour</td>
<td>8760</td>
<td>$8,760</td>
<td>$8,760</td>
<td>$8,760</td>
<td>$8,760</td>
<td>$8,760</td>
<td>-</td>
</tr>
<tr>
<td>Advertising &amp; marketing</td>
<td>$200/month</td>
<td>12</td>
<td>$2,400</td>
<td>$2,400</td>
<td>$2,640</td>
<td>$2,640</td>
<td>$2,640</td>
<td>10%</td>
</tr>
<tr>
<td>Salaries</td>
<td>$2000/person</td>
<td>4</td>
<td>$12,000</td>
<td>$13,200.0</td>
<td>$14,520.0</td>
<td>$15,972.0</td>
<td>$17,569.2</td>
<td>10%</td>
</tr>
<tr>
<td><strong>Total Expenses</strong></td>
<td></td>
<td></td>
<td>$23,100</td>
<td>$24,380</td>
<td>$25,820</td>
<td>$27,372</td>
<td>$28,969</td>
<td></td>
</tr>
<tr>
<td><strong>Profit</strong></td>
<td></td>
<td></td>
<td>$1,588.50</td>
<td>$3,312.45</td>
<td>$5,217.50</td>
<td>$7,724.59</td>
<td>$10,686.99</td>
<td></td>
</tr>
</tbody>
</table>
Future Directions

The following are some of the new functionalities and improvements we would to add to our system:

- Timers – Auto call APIs every 7-9 seconds until stopped
- Real-time path tracking – Implement Glympse API for real-time path
- Camera – Automatically takes pictures when application starts
- 911 calling – Obtain permission from local police department
- Advanced analytics – Automatically informs user when he/she enters dangerous area

Member Contributions

- Sumeet Bhatia: Database, API Testing, Analytics
- Aadil Hussaini: API Testing, API Integration, Web Development, Demo
- Snehal Navalakha: API Testing, API Integration, Web Development
- Mo Zhou: API Testing, Analytics, Documentation

References

8. Twitter. https://dev.twitter.com/docs