A USABLE AND SECURE CRIME REPORTING SYSTEM FOR TECHNOLOGY RESOURCE CONSTRAINED CONTEXTS

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Abstract:

   Crime in technology resource constrained environments has been shown to adversely affect economic growth by deterring investment and triggering emigration. To address this secure reporting channels are being investigated to encouraging anonymous crime reporting. In this paper, we present a system (Cry Help App) developed to enable residents of a university com- munity situated in technology resource constrained environment to facilitate secure and covert crime reporting. We focus primarily on the usability of the application. The system was developed on the basis of user centric iterative approach. Deployment and evaluation results of our prototype system demonstrate that overall the system scored a 77.06% usability rating with a standard deviation of 0.05 for contributing scores on System Use, Information Quality and Interface Quality. This is indicative of the fact that users found the system to be very usable.

Keywords – Cry Help App, Standard deviation, Interface quality.

1. INTRODUCTION

   The penetration of mobile devices in technology resource constrained environments has triggered research towards using mobile devices for submitting crime reports to law enforcement agencies [1] [2]. Outcomes of studies indicate that mobile phone usage has not achieved widespread popularity as a crime reporting medium in technology resource constrained environments. Therefore a key concern users have with respect to mobile crime reporting systems is that of privacy. Furthermore, outcomes of some other studies [3] [4] [5] reveal that a mobile device can serve as a security assurance in reporting crime especially if the victim needs someone to come to their aid immediately. However, according to the studies carried out in [6] users have different perspectives about instance, some users publicly utilize their mobile device to express their connectivity as a means to ward off potential attackers while others see value in utilizing the device only after they have been attacked.

A. Motivation and Problem Statement

   Unreported crime due to fear of privacy violations is an ongoing concern in technology resource constrained environments [7]. In a recent report from the South African Institute of Race Relations (SAIRR) roughly half of all crimes are never reported to the police [7]. This high rate of unreported crimes could affect the society in decision making and law enforcement agencies in allocation of resources. As a result, there is a need for a crime reporting platform that guarantees anonymity and security. Crime reporting and the likelihood of an individual making a report are not as simple as filling a form as researched in [12]. It has been found that the digitising of the reporting process not only improves the likelihood of individuals to make crime reports but can also yield more

comprehensive and meaningful reports. According to [3] [12] [11], it is perceived that the use of mobile devices provides a good security platform for crime report. As a result, there is a need for a mobile application that can facilitate crime reporting in a secured and covert way. To this regard an interface must be designed that serves the full functionality of the paper based service whilst incorporating good design principles and ensuring it suits the mobile platform.

B. Contribution

In order to create an application that facilitates report crime in a secured and covert way, we digitised the crime reporting System in a University Campus setting. We achieved this by breaking down our solution to two components: front and back end. The system back-end addresses the communication and storage of the application. The front-end focuses on the development of the user interface. The interface allows users to create and effectively fill crime reports resembling the existing paper based crime report in a secured and covert way. The interface also allows for two types of crime reports. The first, which is tagged "a full crime report" is based on the digitisation of the existing paper based reporting system. The second report type tagged "emergency report" will automati-report quickly in adverse conditions. The focus of this paper is on the front-end.

C. Outline

The rest of the paper is structured as follows. In Section 2, we present related work on privacy notions and existing cry reporting applications with major focus on those in technology resource constrained environments. Section 3, presents usability and interface design principles for our crime reporting application. In Section 4, we present results from our implementation and conclude in Section.

2. SYSTEM DESIGN AND ARCHITECTURE

In our mobile crime reporting system (Cry Help), the user (reporter) uses a mobile device that runs Android Operating System to report crime incidents to a law enforcement au- thorities. Our framework consists of three main components namely, the "User Interface", "Secure Data Transfer" and "Data Storage". The user interface component enables users to create and effectively fill crime reports resembling the existing paper based crime report. The secure data transfer enables successful transfer of data from the mobile device into data storage. The data storage component manages the data collected from all the user reports that are sent to the authorities. It also manages the access control to the data within the authority organisation . The focus of this paper is on the user interface component. In order to develop the user interface component of the Cry Help App, the user -centred design methodology in an iterative manner was used throughout the development stage of the Mobile Crime Application System. The objective of the design is firstly to investigate whether a mobile device can be used effectively to create a crime report based on existing crime reports used by law enforcement authorities. Secondly to investigate to what extent it is possible to create crime reports instantly to act as panic buttons in emergency situations. Personal privacy can be invaded in numerous ways on a mobile device. In order to gain and supply relevant data to users, location based services are often employed. This

location data could play a vital role in designing a crime reporting system, allowing relevant authorities to figure out the exact location of victims in order to act swiftly. However the possible intrusion of location data, by unauthorized individuals presents a serious threat to the user's privacy. This vulnerability could result in cyber-attacks, spamming and inference attacks not to mention the physical security risk of strangers knowing the user's movement patterns and current location [5]. City Sourced (CS) [8] is "a real time mobile civic engagement platform". It allows users who download and install the application to report a public issue. A major disadvantage of this application is that it only caters for civil matters such as dilapidation and vandalism of public and private areas. Additionally it does not support emergency report.

Crime Line [9] is an initiative of the South African com- munity, endorsed by South Africa Police Service (SAPS) to help report crimes and wrong doers. As a website and hot- line it provides a platform for users to give information on a crime that has or is suspected to happen. When reporting via the web, the report is compiled as a tip off; users can report suspicious activity anonymously or supply their contact details. Crime Line then compiles the report and sends it to the relevant local authorities. A major setback of this system is that it is a web-based application. Crime Push [10] is a mobile crime reporting application that gained much media attention during its launch, being featured on numerous television reports. Users can send an image and a description of what is happening in their surroundings. It also allows users to choose whom to send the report to, for instance medical contacts, family or the police. Key points in the Crime Push interface are that it uses icons and descriptions to help users quickly categorise a report, avoiding long possibly unnecessary text input and overall making the reporting process less time consuming. It uses large buttons and icons which also help make the process less daunting for nervous or first time users. Finally a red interactive bar is used to send the final report; ensuring users do not send a report mistakenly.

1) User Requirements:

A small sample of 5 users was selected to source user experiences with reporting crimes. The sample contained users who had been affected by crime before and only one user whom had never been personally affected by crime. The requirements were also supplemented by debriefing sessions carried out before and after prototype interaction using questionnaires. Users identified that they want the application to be easy to use, have option to hide user's identity, option to save the current report, option to allow users to fill it later and allow quick convenient input. Some users wanted a guarantee that the personal information provided would be stored securely.

2) Prototypes:

Using the iterative design model, we develop prototypes. Prototyping is a means of letting users test a tangible element of the system, and is employed as a means of gathering user input. In this research, the use of prototypes allowed design of the interface to undergo criticism.Paper based prototypes were used for the low ideality prototyping. These prototypes were not only cheap to produce but also allowed users to manipulate them freely, without having to need computer skills or use a computer at all. Paper prototypes however have the disadvantage of being unable to

implement numerous features such as animation and gesture input. Figure 3 shows examples of our paper prototypes. HigHfidelity prototyping was used when the basic interface model had been fleshed out. Prototypes were more involving and designed to work on the target device.

3. DESIGN IMPLEMENTATION

We designed a simple-to-use and flexible user-interface that produced content similar to what we mocked up using our paper prototype in order to produce content in a format that would fit on any android mobile phones. The design implementation consists of two iterations. The objective of the first iteration is to get users to under- stand what a crime report is and help design an interface that is a logical extension of what the users understand a crime report to be. To achieve the objective of the first iteration, the users were given design input on the full crime reporting scenario, particularly the data capture. The design arguments were written down by the designer for later reference.
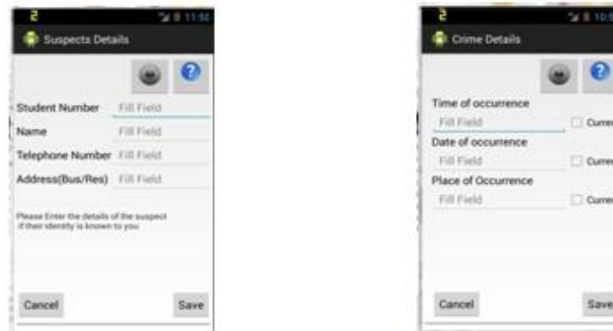

Fig.1. Result analysis

The users immediately identified 3 main functions with regard to the reporting process which are as follows: Main Screen, User Details Form and Full Report decided to use JAVA language. For the development of the interface the eclipse SDK for android development, a tool made available by Google was used. The target API for the application was the latest Android available at the time of

Fig.2. Output

development, Android 4.3 Jelly bean. The tool allowed development of all the features in the design including touch gesture input, however it did not reflect true performance of the final application as it was much too slow. The emulator ran on a desktop machine capable of GPU acceleration; however the emulator never peaked more than 10fps (frames per second). Despite this set back implementation was still possible.

CONCLUSION

Experimentation session was divided in two main tasks namely Full Crime Report and an Emergency Crime Report. The first main task, Full Crime Report was comprised of the overall task of sending the full crime report (filling in data), taking an image of the scene of the crime and tagging the image either suspect or victim. The second task was only possible after the first, participants faux details would be used to send emergency crime reports. Users were given an opportunity to perform the task and send an immediate crime report; the difficulty they faced was recorded by the researcher.

REFERENCES

[1] Burke Mark-John and Kayem Anne V.D.M., (2014) "K-Anonymity for Privacy Preserving Crime Data Publishing in Resource Constrained En- vironments." In the 8th International Symposium on Security and Multi- nodality in Pervasive Environments, (SMPE 2014), Victoria, Canada - May 13-16, 2014

[2] Jensen, K. L., Iipito, H. N., Onwordi, M. U. and Mukumbira, S. (2012). "Toward an mPolicing solution for Namibia: leveraging emerging mobile platforms and crime mapping." In Proceedings of the South African Institute for Computer Scientists and Information Technologists Conference (pp. 196-205). ACM.

[3] Cui, Y., Chipcase, J. and Ichikawa, F. (2007). "A cross culture study on phone carrying and physical personalization." Usability and Internation- alization. HCI and Culture. Springer, pp. 483-492.

[4] Liu, Y., Krishamachari, B. and Annavaram, M. (2008). "Game theoretic approach to location sharing with privacy in a community-based mobile safety application." Proceedings of the 11th international symposium on Modeling, analysis and simulation of wireless and mobile systems 2008, ACM, pp. 229-238.