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Doorstep Security; using a technology based solution for the prevention of doorstep crime

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Abstract. Safety and security rank highly in the priorities of older people on both an individual and policy level. Older people are commonly targeted as victims of doorstep crime, as they can be perceived as being vulnerable. As a result, this can have a major effect on the victim's health and wellbeing. There have been numerous prevention strategies implemented in an attempt to combat and reduce the number of doorstep crimes. There is, however, little information available detailing the effectiveness of these strategies and how they impact on the fear of crime, particularly with repeat victims. There is clear merit in the creation and piloting of a technology based solution to combat doorstep crime. This paper presents a solution which utilizes everyday technology to provide increased security for older people within their home whilst simultaneously reinforcing doorstep etiquette through educational material.

Keywords: Independent living, Doorstep crime, Security.

1 Introduction

The term doorstep crime covers a number of offences including, distraction burglary, rogue traders and pressure sales. This includes cases where the offender first enters the premises and subsequently uses distraction burglary tactics in order to remain on the premises in order to commit burglary [1]. Indeed, doorstep crime has been highlighted as a priority within the Consumer Protection Partnership (CPP) Priorities Report 2013/2014 as an area, which is currently or has the potential to cause, the greatest detriment to consumers [2]. In 2010/2011 5,480 distraction burglaries were recorded in England and Wales [3]. Not all offences, however, are reported. Distraction burglary is often cited as one of the most under reported crimes. Some studies have estimated the actual number of cases to be between 15,344-17,294 [4]. It has been further estimated that the social and economic cost of distraction burglary in the UK is £35 million [4]. This paper considers the nature and prevalence of doorstep crime, in addition to prevention strategies and describes an information and communication technology (ICT) based solution to aid in its prevention.

2 Background

Research has shown that victims of doorstep crime are predominantly older, female and white [1]. Data from Operation Liberal, which focused on combating doorstep crime, indicated that the average age of doorstep crime victims was 81 and over two thirds (69%) were female [5]. Worryingly, it is estimated that 63% of victims of distraction burglary experience repeat victimization [6]. Specific targeting of a victim is characteristic of doorstep crime, with criminals assessing the potential risks and rewards. Older people are perceived as 'suitable targets' as they are commonly associated with increased vulnerability. The stereotype of an older person can include: living alone; keeping amounts of cash within the home; less likely to remember stolen items; less likely to make good identification of perpetrator and less likely to report the incident [7].

A number of prevention strategies have previously been employed in an attempt to prevent doorstep crime. These can broadly be broken into 3 categories; Enforcement, Situational and Educational. The aims of these strategies along with examples are presented in Table 1.

Table 1. The aim of the three categories of prevention strategies for doorstep crime; enforcement, situational and educational, including examples.

Prevention Strategy	Aim	Example
Enforcement	Improve detection rates so more offenders are brought to justice and increase local knowledge.	Specialist distraction burglary detectives/task force and specialist forensics to gather evidence.
Situational	Manipulation of the environment with the aim of reducing susceptibility to crime.	The use of locks and chains to prevent forced entry or intercoms, and security camera as deterrents.
Educational	Raise awareness of the risk of doorstep crime and what steps can be taken to minimize the risk.	Educational events, Television adverts, Trusted Trader register, doorstep etiquette to improve safety.

The use of situational security devices has increased over time. For example the use of double locks has increased by 13% since 1995 [8]. Security enhancements can range from simple physical solutions, such as door chains and peepholes, to audio and video intercoms and more complicated solutions such as remote video and access devices. The effectiveness of these solutions is, however, yet to be fully evaluated and understood [5]. One study found that installation of a voice intercom system provided a reduction of 21.5% in distraction related burglaries [9]. Installing these features does not, however, address the issues as the victim may still be persuaded to grant access to the perpetrator. Therefore, education and reinforcement of proper doorstep etiquette is essential in lessening the risk of falling victim to doorstep crime [10]. The Cambridgeshire Distraction Burglary and Rogue Trader Taskforce organized awareness days which included an introduction of the 'Stop, Chain, Check' message, a video on doorstep crime and multiple advertisements highlighting the issue [10]. While such events may receive positive feedback, it is difficult to assess if these approaches actually prevent attendees from becoming victims of doorstep crime.

4 Implemented solution to reduce doorstep crime

The solution, described within this paper, combines situational ICT prevention strategies with educational approaches allowing the user to seek assistance in deciding if it is safe to grant access to a person visiting their house. In Figure 1, an overview of the implemented solution is presented. A key component is a low-cost (≈ €40) wireless IP camera (Fig. 1a) which provides a video stream input of the area outside a user's door. The introduction of a person at the user's door (a caller) to this image scene results in motion. A motion detection algorithm [11] is used to identify frames potentially containing the caller. A face detection algorithm, based on the Viola-Jones method [12], is then executed on each of these frames. Should a face be identified within a frame the user is alerted via a sound and web browser notification (Fig. 1b). The person may then either request help through the system or indicate that they are familiar with the caller. In future iterations the option to capture photos from the press of a door bell will also be included. Upon requesting help, alert details containing the user's id, alert time and the caller's image are transmitted and stored in a remotely hosted SQL database. A Google Cloud Message (GCM) is subsequently pushed to all carers who are registered for the relevant user. GCM is utilized as it provides an off-the-shelf solution for pushing light-weight notifications (<=4Kb) to multiple devices. Additionally, in the event of a carer's device being offline the GCM architecture includes message persistency whereby messages are stored on the GCM servers and retransmitted when the device regains connectivity. When the carer clicks the GCM notification on their mobile device an Android based application is launched (Fig. 1c) which retrieves and displays an image of the caller. In addition to the image of the caller being displayed the following options are relayed to the user, e)'let in' or f)'keep out'. Once the carer chooses an option the recommended action is transmitted to the SQL database and a GCM message is pushed to the remaining carers informing them that the alert has been answered. The recommended action is subsequently fetched by the user-side device which continuously polls the database until a carer response has been inserted or a timeout value (10 minutes) is reached. In all end cases (Fig. 1 d, e, f) educational content relating to doorstep etiquette is displayed to the user thus helping to reinforce safe doorstep behavior.

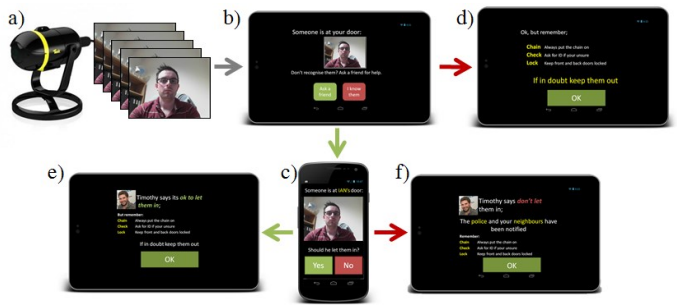


Fig. 1. ICT solution incorporating both situational and educational approaches, a) low cost camera and captured images, b) user interface showing caller image and choices, c) carer app showing captured image, d)doorstep etiquette educational information, e) carer response to allow entry and f) carer response to deny entry.

5 Conclusion

This paper describes the issues around doorstep crime and the effects it can have on health and economy. In order to address this, an ICT solution which can combat these issues has been developed. This technology solution is targeted at older people (70-80) who may suffer from a limiting cognitive, functional, mobility, visual or hearing impairment, that can give the impression that the person is vulnerable to becoming a victim of doorstep crime. The solution within this paper combines situational and educational prevention methods to provide piece of mind for the user whilst reaffirming doorstep etiquette. By keeping the installed technology to a minimum and as unobtrusive and familiar as possible the system will avoid heightening the user's fear of crime. Future work shall seek to evaluate the system with a cohort of older adults who have been previously targeted by doorstep crime in the past.

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