

An RFID Perception to Secure Kids: A Conceptual Mapping Approach

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Abstract: Radio Frequency Identification (RFID) is an automated identification technology having greater identification capabilities than bar codes. RFID is being used to track objects in supply chains and even consumers themselves [1]. So, RFID can be used to secure kids by tracking them which further leads to reduced problem of kidnapping and missing cases. This paper proposes three models for enhancing the security of kids with RFID technology by making use of concept maps. This paper also proposes the solutions to some of the practical problems associated with the proposed models.

Key words: RFID · Security · Kids · Conceptual Mapping

INTRODUCTION

Radio Frequency Identification (RFID) is widely used due to its promising advantages like:

- Read through obstacles
- Read in hostile environment
- Read in real-time by the RFID Reader [2].

RFID chips are miniature devices designed for wireless data transmission. The RFID tag (chip) can communicate with an RFID reader which is further connected to a large network. An RFID system is designed to carry data in mobile transponders known as tags and to retrieve that data by machine. This data can be used to track the belongings of consumers and even the consumers themselves [1]. To locate a tag, web databases also plays a great role, which reveals how RFID data can be melded with other rich data sources using Web services.

Conceptual mapping is a structured conceptualization technique used to stimulate the generation of ideas. More often concept maps are used to communicate complex ideas, such as, it combines group processes with a sequence of multivariate statistical analysis in multidisciplinary research teams (Maize, Soya beans and Swine) investigating market opportunities within the Global food system [3]. Hence, concept maps can be used to communicate the ideas behind any complex process.

Also, a picture is worth thousand words, so, the concept maps are used to communicate the ideas relating how RFID technology can be used to strengthen the security of younger ones.

This paper proposes three models build upon the emerging RFID technology for the security of kids by making use of concept maps.

All the three models assume the possession of an RFID tag with the kid.

Proposed Models

The Silent Alarm Model: Think about a kid in a hostile situation, where no one is there to rescue him [3]. This could be anything like kidnapping, lost case, serious health problem etc. This model is build to solve such kind of situations where a kid is in danger. The I-Card worn by the kid has an RFID tag and a button. This button when pressed will enable the RFID tag to communicate with the software. The software now sends a SMS (as an alarm) to the parent of that kid indicating emergency. The advantage of this model is that, for example, if somebody is trying to kidnap a kid, would not even come to know about the alarm being raised [4]. Without much wastage of time immediate actions can be taken by the parents to rescue the kid. One of the possible problem associated with this model could be raising a false alarm. The proposed solution is that an infrared sensor can be attached with the RFID tag

which senses the heartbeat rate at the moment when the alarm was raised. Also, the kids can be trained, to some extent, to raise the alarm only when necessary. The idea is illustrated with the help of concept map in Fig 1.

The Key-Spot Notification Model: RFID readers can be installed at some key spots like school gates for a record. Whenever a kid crosses the gate while coming in or going out, the RFID tuples are stored in a database. Typically, RFID tuples includes the EPC (Electronic Product Code) which uniquely identifies the kid, location where the RFID reader scans the kid and time when the reading took place [5]. So, whenever required, this data can easily be analyzed to determine the whereabouts of the kid. But, this may cause in-flood of data. This is due to the fact that even the modest of the RFID deployment will generate gigabytes of data a day since each kid is tagged and will send data continuously about its EPC, location and time [6]. The proposed solution to restrict this to some extent is to clean the unwanted data from the database before they are streamlined to some other application. The idea is illustrated in Fig. 2 with the help of concept map [7].

Location Tracking Model: This model tracks the movement of kids around the campus. Here, RFID readers are located at various points in the school campus. In the proposed model, the RFID readers establish communication with software which further connects to a web database. This web database can also be melded

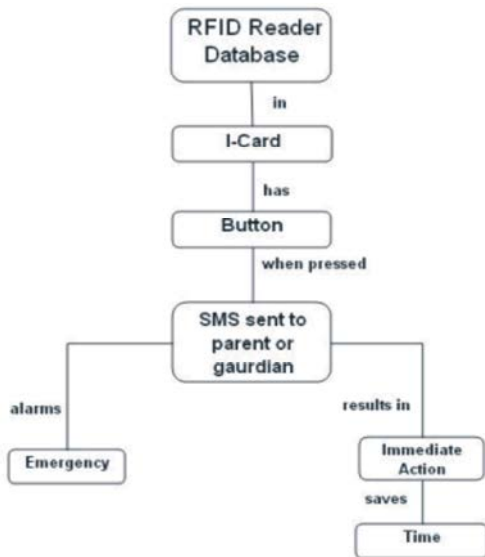


Fig. 1: The Silent Alarm Model

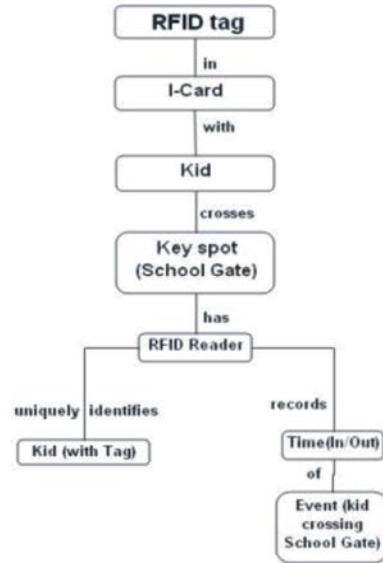


Fig. 2: The Key-Spot Notification Model

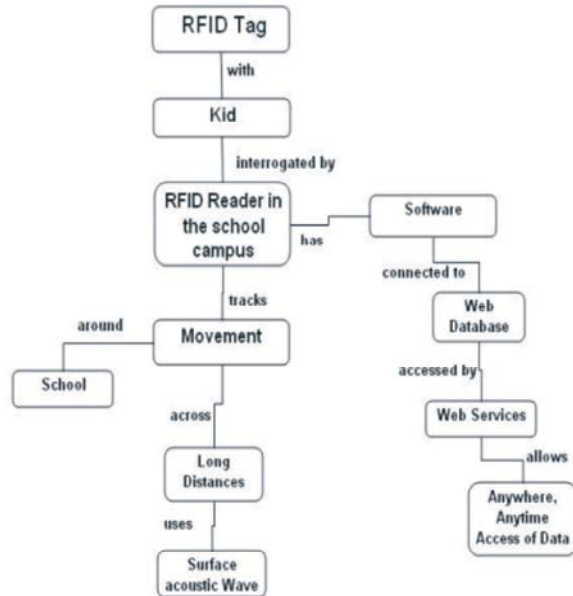


Fig. 3: The Location Tracking Model

with other data sources using Web Services [8]. This would allow anywhere and anytime access of raw or analyzed data about the whereabouts of the kids. From time to time, the parents can easily view the information scanned with the RFID reader from a mobile phone or a personal computer [3,4]. One of the problems with the existing RFID systems is the range in which they work is very short. In order to increase the range of RFID, SAW (Surface acoustic wave) can be used. The idea is being illustrated with concept map in Fig. 3.

CONCLUSION

This paper proposes three models using the RFID Technology and Conceptual Mapping which when used individually or in combination enhances the security of the kids. The paper as well explores some of the practical problems associated with the proposed models. Proposed solutions corresponding to these problems are also discussed. In case of emergencies, like kidnapping etc., all the three models, when used simultaneously, would involve quantitatively less amount of time in taking appropriate action.

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