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SKMS: School Kids Monitoring System

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Abstract— *With the increase of crime rates over children, monitoring of school kids is of great importance for parents who send their kids to school. There are many incidents where the child forgets to board the bus or reaches late due to road accidents which make their parents feel uncomfortable. There are even incidents where kids are kidnapped by an unknown person. Based on these problems, the proposed project aims to provide a new authorized system to check whether the school kid is in the vehicle or not using android device and Near Field Communication (NFC). The project introduces NFC as a technology that is more secure, convenient, protection oriented than the existing approaches. The proposed system includes Near Field Communication (NCF), Global Positioning System (GPS) and Global System for Mobile Communications (GSM), a database for the school to monitor and an android device.*

Keywords— *Global Positioning System (GPS), Global System for mobile Communication (GSM), NFC cards, NFC enabled android device.*

I. INTRODUCTION

Nowadays security for school children is very important. Several incidents force to develop an innovative methodology to provide a secure life for the school going child. Based on this, the proposed project aims to create a suitable environment for safety and security of school children. It is important for the parent to track their kids who travel to school via school transport until their child reaches back home safely. There are many applications available, that provide information about the vehicle and its exact location but these don't tell whether their children are in the vehicle or not. In the proposed system, the in-time and the out-time of each and every child is monitored using a NFC tag which has a unique ID. With the help of this NFC tag, verification of every child is done and an SMS is sent to the respective parents while their children are travelling to and from school using android mobile phones through Near Field Communication features. With the help of this system only the authenticated person will be able to come into the bus.

Near Field Communication (NFC)

NFC is a technology that allows the user to use the smart phone and similar devices for some special purpose. An NFC tag can share and link to information such as web pages, social media, etc. There are many areas where NFC is starting to evolve like in transportation, payments, home automation, and many more. To invoke all these actions, an action based on user placing user's phone near or in contact with the thing the user wants to read or interact with. NFC bridges the gap between physical and virtual world. NFC is a set of standards to establish radio communications with each other by touching them together or bringing them to proximity, usually no more than a centimetre. NFC builds upon RFID systems by allowing two-way communication between end points, where earlier systems such as contactless were one way only. It has been used in devices such as Google nexus,

running android 4.0 Ice cream sandwich, named with a feature called “Android Beam” which was first introduced in Google nexus.

II. LITERATURE REVIEW

The system proposed by the authors in [1] consists of a server side and a client side. The main function of the server device is to provide the location of the bus to the server, or to the user in case of SMS based query from client’s device. A client can find the position of the bus either by using an SMS service or by using internet service. The system mainly uses Global Positioning System (GPS), SMS gateway, Google maps, web server and database server for tracking the position of the bus.

A.Saranya, Dr.C.Venkatesh and S.Selvakumar proposed an automatic child monitoring system using wireless network [2].The system monitors the child’s regular activities and also helps the guardians to know their children’s location timely by using Global Positioning System(GPS) sensors, Geographic Information System(GIS), acceleration sensors and Global System for Mobile communications(GSM).

Many of the systems were not powerful enough to reduce the crime rate towards children so a system was proposed [3] which consist of a child module including ARM7 microcontroller, Global positioning system (GPS), Global system for mobile communication (GSM), and a Voice playback. The receiver component included an Android mobile device in parent's hand and a database in control room of the school.

Another study carried out by the authors in[4] is also based on ARM7, GSM and GPS. GSM technology is used to send vehicle information. The vehicle information contains the exact location of the vehicle. ARM7 TDMI core LPC 2148 processor collects the information and sends it to the monitoring system using a GSM modems then updates the information on Google maps using a Graphical User Interface (GUI).

Systems were proposed based on school children transportation which uses the Radio-Frequency Identification (RFID) technology and Global System for Mobile communications(GSM). These systems were designed to control the entry and exit of the children from the bus. The systems were also helpful in tracking the position of bus and updating the location to the parents [5,6].

III. PROPOSED SYSTEM ARCHITECTURE

In the proposed system, we are planning to monitor the in-time and out-time of each and every child using technology of NFC and android devices. Using NFC Writing App, admin has to fill the student details, bus details, parent cell details etc., then he has to press the write button, once writing process is initiated the data is encrypted and encrypted data is written on the NFC Tag. An NFC Smart phone is placed in each bus handled by the conductor, when a school kid steps-in, the conductor should scan the NFC tag with NFC mobile that reads the encrypted data and then decrypts it which is further validated. If scanned ID card is not matched then it will show an error message else if the data is correct then it will send an SMS to concerned parents mentioning that “Your kid is inside the bus”. With the help of this proposed system, only the authenticated person will be able to come inside the bus. Main benefit of proposed system is that parents can know if their kid is coming in the school vehicle or not. The Android SDK supports Near Field Communication API that can be used to develop NFC applications to conduct Protection and monitoring of school kids.

Problem definition

Many of the existing systems provide information about the vehicle and its location, but these systems don’t tell whether the school going kid travels in the school transport or not. Assume that due to some road accidents and traffic the child reaches home late or forgets to board the bus due to some extra co-curricular activities, in these cases the child needs to communicate between homes to school.

Web Server Applications

This application runs on web server where in the centralized database is stored. Here there are separate Admin sessions which are made available through which an admin will be able to maintain the Bus Details, Route Details and Student Details. Admin can also monitor the position of the bus with the help of this system.

Android Application

This Android application has two sub programs

- NFC Writing Application
- NFC Reading Application and Data Processing Application

A NFC Writing Application

The writing app is available for authorized users only, which means only the Admin will be able to use this part of the system. By using this App, Admin has to fill the student details, bus details, route details, parent cell details etc., then he has to click the write button, once writing process initiated the data is encrypted and then the encrypted data is written on to the NFC Tag. Each NFC Tag contains different tag data in encrypted form.

B NFC Reading Application and Data Processing Application

A smart phone has to be placed in each and every bus which is handled by the conductor. The NFC reading application and the Data Processing Application has to be installed in it. Once a student steps in, the conductor has to tap the student ID with NFC enabled mobile, which will read the encrypted data and decrypts it.

Decrypted Data is validated so as to check whether the kid belongs to this bus or not, if something goes wrong an error message is shown. If the data is correct then a SMS is sent to concerned parent mentioning your kid is inside the bus and reaches your home in next xx minutes. The data is also sent to the web server application and is updated in the database.

IV. RESULTS AND DISCUSSION

The proposed system includes a web application and an android application. Web application is mainly used for the Admin module in which admin will maintain the entire database. The proposed system's design application is implemented in the java programming language on an android operating system. The working is as described as follows. Firstly, the admin has to login to the web application using the username and password provided. If the login is successful then with the help of this application the admin will be able to fill all the details such as student details, bus details, route details and can also change his/her profile and password.



Figure 1. Login Page of web application

Using the writing application, the admin can write on to the tag. For this to be done, the admin has to place the NFC tag over a NFC enabled android device. Once the tag is detected the admin has to fill the required student details such as student name, roll number, class, parent details, etc. and also upload the student's image using the URL. After all the changes the admin has to click the write button so that the details are encrypted on the NFC tag.

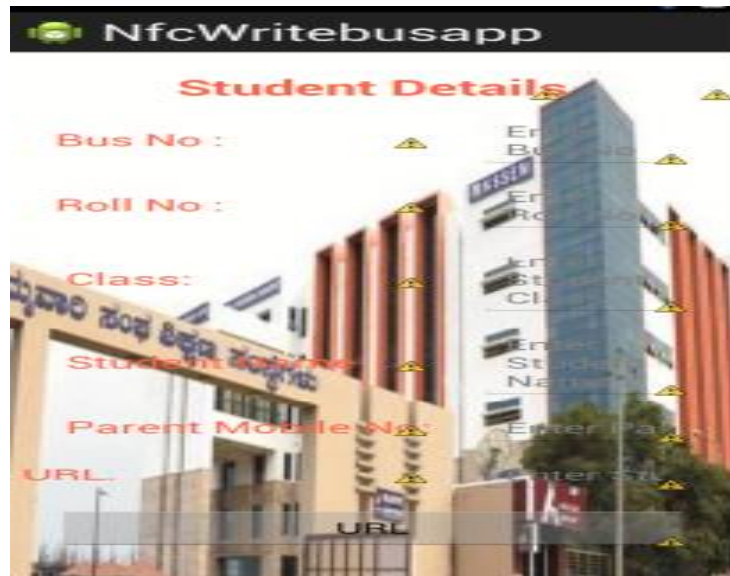


Figure 2. NFC writing application

An NFC Smart phone is placed in each bus handled by the conductor, whenever a school kid steps-in, conductor should scan the NFC tag with NFC mobile that reads the encrypted data and then decrypts it which is further validated. If scanned ID card is not matched then it will show error message. If the data is correct then it will send an SMS to concerned parents mentioning that "Your kid is inside the bus". After reaching the destination again with the help of NFC tag and android device verification is done and an SMS is sent to the respected parents mentioning that "Your child has reached the destination".



Figure 3. NFC reading application

V. CONCLUSION

This System is tested with sample data on NFC cards. All our experimental result shows this system works as per the requirements. The system mainly concentrates on providing a safety measure for the school going kids using the android and Near Field Communication (NFC) features. However the system has limitations in some aspects but this system is flexible enough which means that it can be further developed by adding the required modules. Development of NFC continues wider as it is one of the fastest processing technologies on the real time systems.

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