

SAFE MISS - A SYSTEM FOR LOCATION TRACKING AND TRANSPORTATION SAFETY

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Abstract—The Global Status Report on road safety reveals the number of abduction cases of school students, and cases of students getting trapped inside school buses and also people getting trapped inside buildings, freezers, etc. are keeping on increasing and the same goes for pet animals as well. The project concentrates on combining GPS with Radio-frequency identification (RFID) to improve human tracking and transportation safety. The target users are students, workers, pet animals. A user's RFID tag was worn and continuously read whenever he or she entered a room / bus for attendance purposes, whereas GPS was mostly employed when the user was outside. To ensure the safety of students and employees our system 'SAFEMISS' continuously monitors and tracks the users in a real time environment and records the client's location and sends the details to the parents (in educational organizations) and authorities. It also has the feature of providing an emergency alarm when their is stuck in cases in buses, buildings. Our application focuses on providing authorities and guardians more convenience about locations. Basically, the system is for monitoring and recording the location of users and thereby sending the information to the educational institution, private companies and guardians to ensure the safety of students, pet animals and working society during transportation.

Index Terms—GPS, RFID, GSM

I. INTRODUCTION

As per the reports by GSR around the world the number of abduction cases of school students, and cases of students getting trapped inside school buses and also people getting trapped inside buildings, freezers, etc. are keeping on increasing. Safety of students is one of the significant matter to dealt and discussed in the present world. Parental comfort cannot be achieved until he child has returned home safely. Similarly, the unsafe working conditions and responsibilities of workers can makes dangers like the employees getting trapped inside buildings and also their missing cases are a matter of discussion. Technology should be imperative to safeguard the society. So the project focuses on solving this by introducing an innovative technology to provide secure life for students and workers. With the help of GPS, RFID, GSM, systems having the functions of location tracking and alerting can be designed to solve the problem.

II. MISSION STATEMENT

A system for monitoring and recording the location of users and thereby sending the information to the educational institution, private companies and guardians to ensure the safety of students, pet animals and working society during transportation.

III. OBJECTIVE

This system for transportation safety and location tracking system's goal is to develop and place into use a reliable, secure, and cost effective system that can track, monitor, and provide real-time information on the location and safety of transportation vehicles, enabling increased safety and efficiency of transportation services. To record the client's location and send the details to the parents (in educational organizations) and authorities. From this project our application focus on providing authorities and guardians more convenience about locations. This embedded system-based transportation safety and location tracking system's goal is to develop and place into use a reliable, secure, and cost effective system that can track, monitor, and provide real-time information on the location and safety of transportation vehicles, enabling increased safety and efficiency of transportation services. To record the client's location and send the details to the parents (in educational organizations) and authorities. From this project our application focus on providing authorities and guardians more convenience about locations.

IV. MOTIVATION

There are several occasions when disasters happen based on the safety of an individual. In 2015, a 7-year-old girl was sexually harassed by a bus driver as she rode home. He drove her to a lonely location daily and sexually exploited her, but her parents were unaware of the situation, so when she recently returned home, they had no idea why she had arrived home later than planned. Nobody suspected the bus driver of doing the crime. After a few days, the girl became ill, and the doctor confirmed that she had been sexually exploited. Such brutality was exposed, and the bus driver was found to be

the major offender. However, this act ruined the girl's and her family's entire way of life. The 10-year-old girl was abducted in 2014 after being dropped off by the bus in front of her apartment. Because her mother didn't receive any notification that she had arrived at the stop, she was completely unaware of the girl's location. The girl was abducted and killed by the kidnapper, which causes great suffering in our society. In 2015, a girl was stuck inside a freezer and found dead at a hotel in Chicago due to lack of safe working condition and improper communication. Recently in 2022, a 4-year-old girl died of suspected asphyxiation after getting stuck in a school bus by accident in Qatar. As per Kerala Police data, 66,838 missing cases were registered in Kerala during the last six years while the numbers this year till September stood at 7,408. More than 80 per cent of the missing persons either returned or were found. As many as 16,637 individuals went missing from 2016 to 2018 January. In such situations, it's always a nice idea to go for GPS tracking systems with RFID that will notify you where they are and in some cases if they are safe or not. Real-time position tracking of each person aboard a bus equipped with RFID and GPS is possible because to each person's unique identifying code. This allows parents and the police to track the school bus in real time. As soon as the bus departs the grounds of the school or institution, the GPS tracking technology makes sure that parents are notified. They can use the app to follow the bus's path so they can be alerted to any deviations from the plan or traffic-related delays. The school/institution and the parents are promptly notified on the app in the case that the car is late for either a pickup or a drop, easing any stress. This tool is especially helpful when children are attending school-related events outside of regular school hours, such as athletic events, school picnics, and late shifts for employees.

The school or institution might highlight this useful feature as one of their strategies for ensuring the safety of pupils or staff.

V. TARGET USERS

A. Primary Users

1. Students who have threats of getting locked/stuck inside school buses.
2. Students who might get abducted.
3. Employees in unsafe working condition.
4. Pets that can be lost as it have no clear sense of purpose.

B. Secondary Users

1. Parents of the primary users.
2. Owners or authorities.

C. Tertiary Users

1. Drivers or Security guards of the vehicles or buildings
2. Owners of the vehicles or buildings

VI. BACKGROUND STUDY

Had collected responses through survey that helped to form requirements for the designing of the system. Had visited several schools to give a description about our project and to record their needs. Responses were also collected from parents, teachers, drivers, vehicle owners and in charge transportation faculty. From the responses collected it was understood that the need of the system is required. The surveys done were aimed at collecting responses from the students, parents, workers, authorities. The requirements such as transferring of alert messages, knowing the location of the user every now and then, recording of the user's transportation status was selected by majorities as needs. The system is planned to implement in identity card as needs. The system is planned to implement in identity card as it was selected as good choice by the users during our need analysis. Institutional responses were collected in personal from the facilities who were in charge of transportation. Their hints and suggestions were valuable inputs for the project.

VII. SEQUENCE DIAGRAM

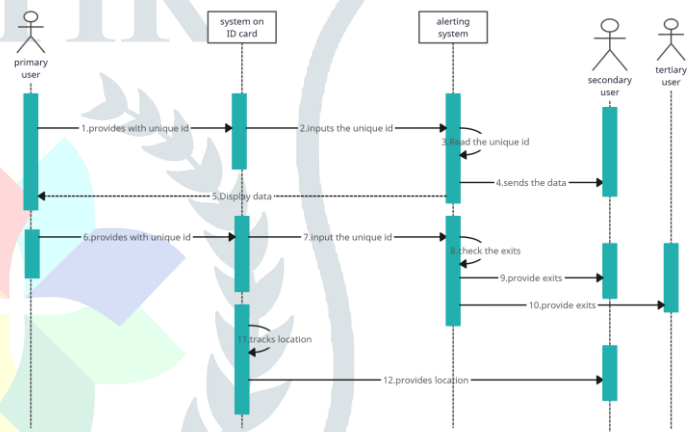


Fig. 1. Sequence Diagram

The system mainly consist of three processes. First, the primary will be given with the unique id and that will be provided to the alerting system. The alerting system will scan and verify the id. After scanning the id the details and status of the user will be shown to him/her through a display it will be sent as a message to the secondary user. Second, the message will be delivered to the Secondary user and the Tertiary user in the form of an emergency alarm if the number of entries does not match the number of exits. Third, the location of the user will be continuously recorded and the details will be sent to the secondary user.

VIII. USE CASE DIAGRAM

When the RFID gets read by the RFID reader, the stored details of the primary user will be displayed in the LCD display. All the entry and exit information of the primary user will be sent to the secondary users. Location of the primary user will be continuously tracked and in case of

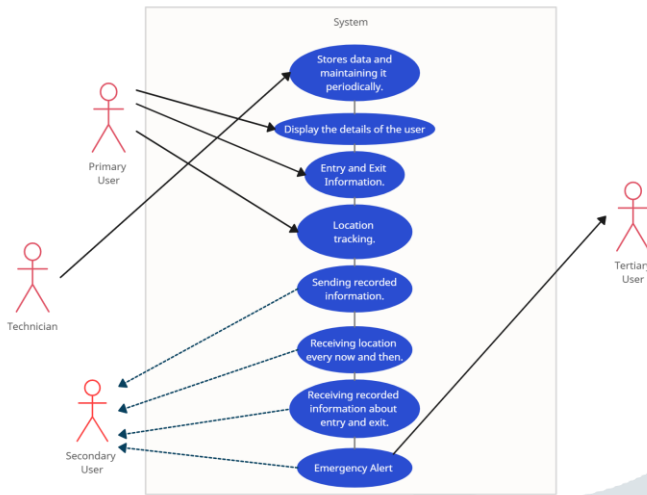


Fig. 2. use case diagram

any emergency condition (if anyone got stuck in), emergency alert will be sent to secondary as well as to the tertiary users. So this is the basic use of these systems. In addition to the primary, secondary, tertiary users and the actor involved in this scenario will be the maintenance person. If this system is implemented in a school the students coming by a particular of the bus can be changed in every year or in between of the year therefore a maintenance person should be present in order to update about status of the clients or users thereby helping smooth functioning of the systems.

IX. PROJECT OVERVIEW

When the RFID gets read by the RFID reader, the stored details of the primary user will be displayed in the LCD display. All the entry and exit information of the primary user will be sent to the secondary users. Location of the primary user will be continuously tracked and in case of any emergency condition (if anyone got stuck in), emergency alert will be sent to secondary as well as to the tertiary users. As of 2022, we have accurate statistics from the previous years. Had collected responses through survey that helped to form requirements for the designing of the system. Had visited several schools to give a description about our project and to record their needs. Responses were also collected from parents, teachers, drivers, vehicle owners and in charge transportation faculty. From the responses collected it was understood that the need of the system is required. The surveys done were aimed at collecting responses from the students, parents, workers, authorities. The requirements such as transferring of alert messages, knowing the location of the user every now and then, recording of the user's transportation status was selected by majorities as needs. The system is planned to implement in identity card as it was selected as good choice by the users during our need analysis. Institutional responses were collected in personal from the facilities who were in charge of transportation. Their hints and suggestions were valuable

inputs for the project. The basic idea of the project is that it mainly consist of three processes. First, the primary users will be given with the unique id and that will be provided to the alerting system. The alerting system will scan and verify the id. After scanning the id the details and status of the user will be shown to him/her through a display it will be sent as a message to the secondary user. Second, the message will be delivered to the Secondary user and the Tertiary user in the form of an emergency alarm if the count of entries does not match the number of exits. Third, the location of the user will be continuously recorded and the details will be sent to the secondary user.

A. Block Diagram

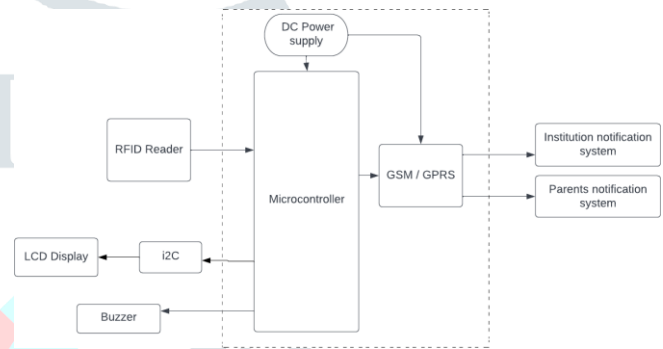


Fig. 3. Elementary block diagram of the alerting system.

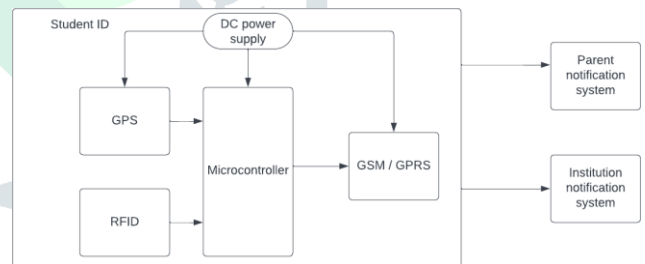


Fig. 4. Elementary block diagram of system on ID card.

This project consist of two systems. One has to be implemented on the id tags of users whereas the other system has to be implemented on the school bus or outside of the buildings. The system implemented on the user id consist of GPS for tracking the location of the user and will have a unique code given with the help of RFID. And the unique code will help to display the details of the users like their name, contact details, entry and exit points etc... the RFID reader is part of the system. Both the details about the location of the user will be given to the respective authorities and guardians via GSM module. The alerting system will consist of rfid reader to read the code and will display the data and also with the help of GSM module the information about

their status can conveyed to their authorities and guardians. The alerting system also consist of an emergency alarm in case of students, if they got stuck inside the bus the secondary and tertiary users will get a notification about their status and an emergency alarm will get on.

B. Algorithm

1. For system on ID card

- STEP 1: Start
- STEP 2: Continuously record the location of the user.
- STEP 3: Store the information about entry and exit.
- STEP 4: If the user’s entry/exit point differs, go to next step. Otherwise go to step 6.
- STEP 5: The message about the current location is send to authorities/guardians.
- STEP 6: Send the information about the status of the users to authorities/guardians.
- STEP 7: Stop

2. For alerting system

- STEP 1: Start
- STEP 2: Read the unique code.
- STEP 3: If the code is not read, error is displayed go to step 2.
- STEP 4: Send the stored information regarding the status of the user to the guardians/authorities.
- STEP 5: After the engine switch is turned off, check if the count of entries not matching to total count of exits, emergency alarm turns ON .
- STEP 6: Stop

C. Flowchart

1. For system on ID card This system mainly concentrates on tracking the location and sending the messages to parents. The details about the location of client will be send to their guardians or authorities during a particular slot of time and within a particular interval of time. And the details can also be transmitted in the time the user desire.

2. For alerting system This system is designed to store the data related to the entry and exit and also to alert the secondary and tertiary users if there is an emergency. And this system also consist of an buzzer which will get turned on if the count of entries of the users is not matching getting equal to the count exited people after the engine of the vehicle is turned off.

X. RESULT AND DISCUSSION

In this project we track the user’s entry, exit time and location based on the combination of GPS and RFID in their identity cards. The system uses RFID to identify users and sends notifications to parents and authorities at the same time as GPS gathers all coordinates from satellites and sends them to the database server using a highly precise and encrypted GSM/GPRS service module. Thus a satisfactory reduction can be brought in case of accidents and can ensure the widespread safety of the users in future. The technology starts broadcasting an alarm notification to both authorities for consideration of the matter when it detects a bus driver taking an unusual



Fig. 5. Flowchart for system on ID card

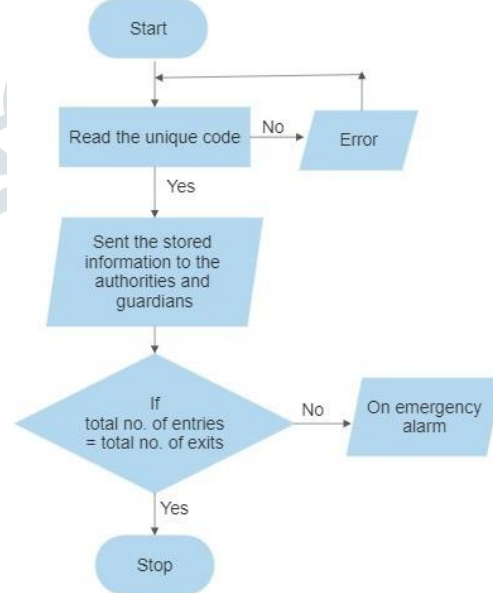


Fig. 6. Flowchart for alerting system

route or stopping someplace for whatever reason. Both workers and pupils are provided with a high level of protection by the system. While accomplishing research on the project, we divided our project work into two modules. As there are two systems to be implemented one in identity cards as well as the other in vehicles. the project helped to acquired more knowledge about GPS tracking with RFID technology, learnt to use different developer tools, software and developed problem solving skills. We also learnt some more about android application development while doing our study and research work. Despite the problems encountered while doing the project, we became successful in solving them and completing our project up to simulation, development of code in Arduino IDE and assembling of components in breadboard. In overall, with team work and confederation the project have come this far and hope for the successful completion of the project in the coming phases.

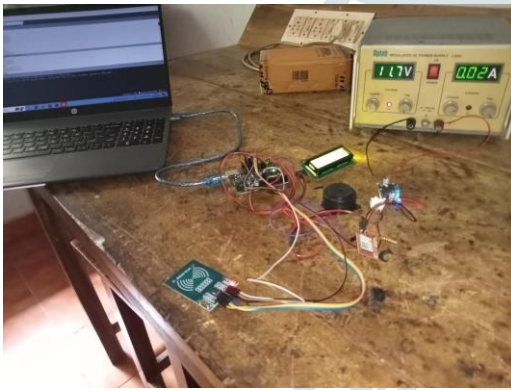


Fig. 7. Prototype of alerting system

XI. CONCLUSION

In our world the overall number of accidental death remains high and missing cases are increasing day by day and there are many chances to be locked in or stuck inside vehicles and buildings. Child safety is a serious issue in India, where many kids are abducted after being dropped off by a school bus and their parents are uninformed of the timing, delay, or early arrival of the vehicle. They therefore failed to arrive to pick up their kids, which results in crimes and accidents. Introduction of this system allows parents and authorities to know the whereabouts of users and to discover the exact location and time. The system is prepared by merging GPS and RFID. The system is necessarily required for the parents. In this type of tracking device, GPS provides exceptional position-finding skills that aid in identifying lost or missing children. And also one of the important features of this system is the addition of emergency alarms which acts in situations like stuck in bus. And this system has a wide range of target users like employees, students, pet animals, cattle.

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