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Towards Safe Commuting: Using Internet of Things for Building Smart Student Tracking System

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Abstract— In this research we propose a system that helps the school administration to track and monitor students' activities and movements. The system implements Radio Frequency Identification (RFID), Internet of Things (IoT) and GPS technologies in order to notify parents and instructors about all of students' activities. The benefits of such system are monitoring the students' attendance, presence, safety, boarding into busses, and arrival home. The system is capable of storing the locations visited by students throughout the day and electronically sharing this information with parents, teachers, administration, etc. All these operations can be managed and controlled by a mobile application installed on the smartphones of concerned parties via the real-time monitoring through the dashboard at the school administration. The overall model maximizes security of students and helps with improving their overall performance.

Keywords— IoT, RFID, Safe Commuting, Student Tracking.

I. INTRODUCTION

Students' attendance, monitoring and safety are major concerns for schools' staff and for the parents. This paper presents a model of RFID technology at schools, for tracking and monitoring student's activities and movements by parents and the school administration with the use of IoT. Combining RFID technology with IoT, will provide very powerful tool to record the student's: (1) activities such as attendance and physical presence in the class rooms, library, canteen, play area, etc. at the specified time and the duration; (2) movements including boarding the school bus, and reaching home; and (3) locations which can be accessed through the dashboard to establish where the students have been visiting throughout the day within the specified premises; (4) forecasting the academic performance by analyzing the students' movement patterns and integrating it with their grades and feedback obtained from teaching staff. All these can be managed and controlled by a mobile application either by parents, teachers or even the bus driver at the specified threshold levels and real-time monitoring through the dashboard by the school administration. Fig. 1 shows the framework architecture of the proposed system.

The proposed solution will also benefit not only students, parents, teachers, school administration and bus drivers but also police, fire and other emergency contacts and other government official entities in order to tackle any emergency situation. There are several benefits of this system in schools. Among those benefits:

- The movement of the students can be tracked by the wristbands within the school premises via RFID readers distributed across the school and school busses.
- The system sends messages to the parents to notify them that their child has boarded / reached desired location (school or home).
- The systems providing the automated attendance. This system saves the time of the teachers and students because the manual attendance taking procedure will be not used.
- The system is able to generate the attendance reports of the students.
- This system can be used to track the entrance and departure of number of students at the same time to and from the schools.
- The wristband can also be given to the entering the school premises guests.

The students will be wearing a wristband with RFID chip, a vibrator embedded in it and an emergency button on the wristband. Internet of Things enables the individuals and objects to exchange and collect data. The main purpose of the IoT is to allow the individuals and objects to be sensed and controlled remotely. This integration creates the link between computer based systems and the physical world. The significance of this paper is implementation of the RFID technology with the use of IoT in schools.

The main goal of this paper is to show how RFID and IoT can potentially change the way we manage our lives and provides a complete solution with a fully automated system. The proposed technologies will enable parents to monitor their children's activities to ensure their getting a proper education, safety and happy life, school administration to cost reduction, remote support and online monitoring and etc. Implementing these technologies consists of enabling the RFID readers in school, making students wearing the wristband that considers a RFID tag all the time in buses and school facilities, parents using the mobile application which can be easily installed on their mobile phones.

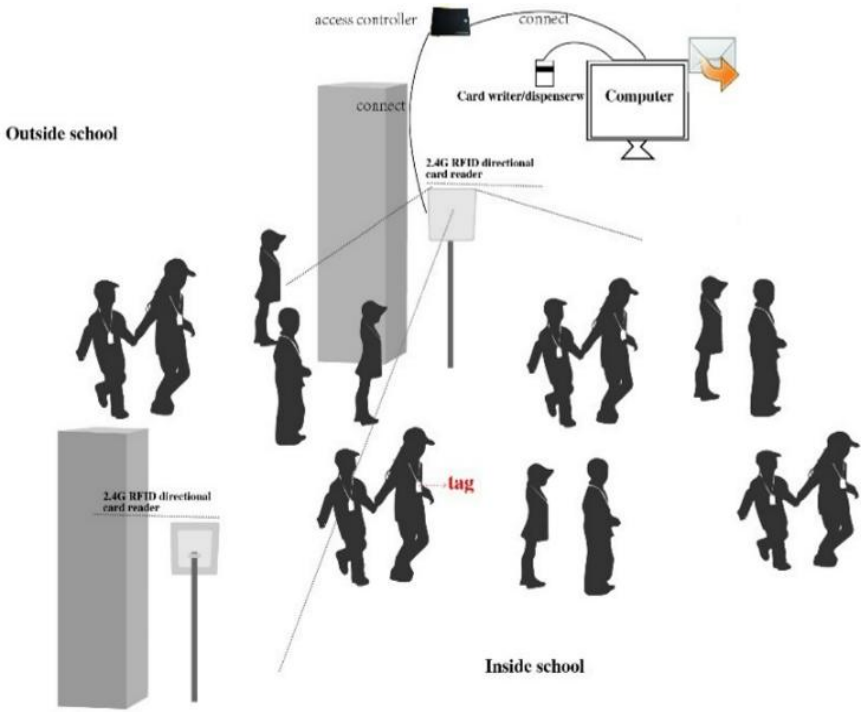

Fig. 1 Framework architecture

This paper is structured as follows. Section 2 presents an overview of RFID and IoT technologies. In section 3 the related research works are represented. Framework and discussion of the proposed system is given in section 4 and 5 respectively. Section 6 concludes this paper and gives general direction of future research.

II. TECHNOLOGICAL REVIEW

A. RFID System technology

Radio frequency identification tag is a small electronic device with a small chip and an antenna integrated in it and is readable by the RFID readers. It uses the radio waves in identifying and tracking the objects. The RFID concept is similar the barcode, i.e., the identification of products, like objects on an assembly line, in a store, etc., however its advantages are far superior. RFID tags are readable from a distance and are not required to be in the line of sight with the reader and may be embedded in the tracked object. They support the larger set of unique IDs and additional data such manufacturer details, product details, object identification details. It is also used to measure the environmental factors like weather conditions and much more.

But the mode of operations and technology is entirely different. The principle of operation is shown in Fig.2: the RFID reader sends out an electromagnetic signal which will be received by the RFID tag. This is answered by another signal in which the encrypted information contained on the RFID tag is sent back to the reader. Appropriate measures are needed to be taken in order to track the students [1].

An RFID tag consists of three elements: one antenna, an integrated circuit (microchip) and a power buffer element.

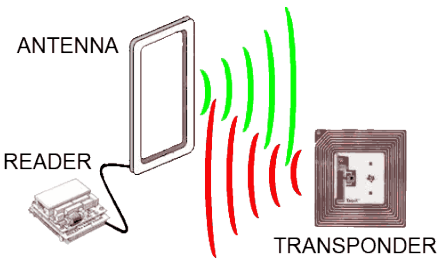

Fig. 2 RFID system

The antenna allows communication between the RFID tag and the RFID reader. The readers can sense the tags from the maximum allowed distance range. The integrated circuit is an analog-digital mixed circuit. The analog part is in charge of controlling power and communication by radio frequency. On the other hand, it manages the digital part where the information is stored in the tag. Finally, it is necessary to include an element to feed the circuit. Depending on the item, RFID uses two types of labels: Active RFID and Passive RFID. Active RFID uses a battery to power the circuit. The main advantage is a wider range of reading. In the Passive RFID, the buffer element of energy is a condenser, which will be loaded with power issued by the nearest reader and then uses this energy to answer. Therefore, the emission power is limited by the distance between the reader and the tag that may not be very high [2]. RFID uses electromagnetic

fields to wirelessly transfer data automatically identify and track tags attached to objects. The tags contain electronically stored information. Some tags are powered by electromagnetic induction from magnetic fields produced near a reader. Some types collect energy from the interrogating radio waves and act as a passive transponder. Other types have a local power source such as a battery and may operate at hundreds of meters from the reader.

An RFID reader transmits an encoded radio signal to interrogate the tag. The RFID tag receives the message and then responds with its identification and other information. This may be only a unique tag serial number, or may be product-related information such as a stock number, lot or batch number, production date, or other specific information. Since tags have individual serial numbers, the RFID system design can discriminate among several tags that might be within the range of the RFID reader and read them simultaneously.

RFID systems can be classified by the type of tag and reader. A Passive Reader Active Tag (PRAT) system has a passive reader which only receives radio signals from active tags (battery operated, transmit only). The reception range of a PRAT system reader can be adjusted from 0 to 600 m, allowing flexibility in applications such as asset protection and supervision.

An Active Reader Passive Tag (ARPT) system has an active reader, which transmits interrogator signals and also receives authentication replies from passive tags. An Active Reader Active Tag (ARAT) system uses active tags awoken with an interrogator signal from the active reader. Fixed readers are set up to create a specific interrogation zone which can be tightly controlled. This allows a highly defined reading area for situations when tags go in and out of the interrogation zone. Mobile readers may be hand-held or mounted on carts or vehicles.

B. Internet of Things

The Internet of Things (IoT) is the network of physical objects or "things" embedded with electronics, software, sensors, and network connectivity, which enables these objects to collect and exchange data. The Internet of Things allows objects to be sensed and controlled remotely across existing network infrastructure, creating opportunities for more direct integration between the physical world and computer-based systems, thus resulting in improved efficiency and accuracy, and economic benefits. Each thing is uniquely identifiable through its embedded computing system but is able to interoperate within the existing Internet infrastructure. Experts estimate that the IoT will consist of almost 50 billion objects by 2020.

British entrepreneur Kevin Ashton first coined the term in 1999 while working at Auto-ID Labs, originally called Auto-ID centers - referring to a global network of connected objects with imbedded radio-frequency identification (RFID).Typically, IoT is expected to offer advanced connectivity of devices, systems, and services that goes beyond machine-to-machine communications (M2M) and covers a variety of protocols, domains, and applications. The interconnection of these embedded devices (including smart objects), is expected to usher in automation in nearly all fields, while also enabling advanced applications like a Smart Grid, and expanding to the areas such as smart cities.

"Things", in the IoT sense, can refer to a wide variety of devices such as heart monitoring implants, biochip transponders on farm animals, electric clams in coastal waters, automobiles with built-in sensors, DNA analysis devices for environmental/food/pathogen monitoring or field operation devices that assist firefighters in search and rescue operations. These devices collect useful data with the help of various existing technologies and then autonomously flow the data between other devices. Current market examples include smart thermostat systems and washer/dryers that use Wi-Fi for remote monitoring. Besides the plethora of new application areas for Internet connected automation to expand into, IoT is also expected to generate large amounts of data from diverse locations that is aggregated very quickly, thereby increasing the need to better index, store and process such data.

Environmental monitoring applications of the IoT typically use sensors to assist in environmental protection by monitoring air or water quality, atmospheric or soil conditions, and can even include areas like monitoring the movements of wildlife and their habitats. Development of resource constrained devices connected to the Internet also means that other applications like earthquake or tsunami early-warning systems can also be used by emergency services to provide more effective aid. IoT devices in this application typically span a large geographic area and can also be mobile

III. LITERATURE REVIEW

IoT are supporting changes in education and teaching, learning, management, experiment and training, school, and so on. Now IoT are causing education revolution [3]. Companies and schools have signed an agreement with the SUN Microsystems company to collaborate on development projects with RFID technology in the areas of market of transport and industry [4]. RFID based attendance management system has been widely used to control and monitor the students [5].

The effective monitoring of an individual depends on reliable and accessible information which can be provided by RFID tags. RFID Tags can easily provide more data about students than a conventional barcode. It can be used to spot where they are and what has happened to them at all times in the school management system. However, the take-off of radio frequency identification systems has been slow. The system can also help the school generate extra money by attracting more students to join the school since the system will provide piece of mind to the parents. A school district in Texas is already conducting a pilot test with RFID tags for students in their schools. The Northside School administration says that this system will help to keep children safe and decided to adopt this program in all their 110 schools [6]. Other advantage of RFID is the enhancement of students' safety on campus and in the classroom. The purpose is to exploit the power of advanced technologies to benefit all involved [7].

Agrawal in [8] proposed an online attendance management system utilizing RFID with the special object counter. The RFID reader tracks all the RFID tags available in the classroom and the special object counter keeps track of the number of students present in the classroom. In this system the attendance will be authenticated, and proxy attendance can be avoided which will result in increase of the percentage of students' attendance.

A prototype is developed in the context of smart university. The proposed system is maintaining the attendance records, switching control of electrical items and security locking system to the rooms. Some of the features of the system are room automation, tracking of objects, theft control and power conservation. These features can be used in any working environment. The results of the proposed system have demonstrated improvement of the objects tracking; reduction of energy consumption, increased security in classrooms and the attendance records accuracy. This system can support multiple nodes environment with the capacity of handling 256 rooms where each room can accommodate up to 512 radio frequency identification cards. Such a system is also scalable and, by increasing the system's memory size, each room will be able accommodate up to 65000 RFID cards. The authors have quoted though that there are some weaknesses and the system is prone to trickeries which will be handled in the future research [9].

To record the attendance of students' at classrooms, library, labs, canteen, and etc. researchers implemented a real time intelligent system in conjunction with RFID in a school/university environment. A generic architecture of intra-connected network of RFID readers was proposed for educational institutions. Such architecture is fully automated, easy to use and accurate for recording the attendance and for monitoring students. This system can be integrated with any campus activity, for an example, in libraries or in canteen, with payment systems and etc.; it is cost effective and one time investment with longer life [10].

Researchers developed a system by adopting passive RFID technology. This system is developed considering the child safety at the school busses. They conducted the technical feasibility tests on the proposed system in the lab and with the public. The outputs proved that the RFID tags were effective and stable so that it can be used for tracking and monitoring the children at the school buses to enhance the safety level. The proposed system is cost effective and easy to maintain. The feedback received from the parents though the questionnaire is positive as 95% of the parents were convinced of effectiveness of the proposed system. The main advantage of this system is its capability of prohibiting the students from getting into the wrong bus or getting off at the wrong stations [11]. This system is limited to the school busses only. In Guangdong Province and Fujian Province of China the RFID-enabled intelligent system was successfully implemented to improve the performance of the kindergartens and proved its stability and reliability as a total security for kindergartens. The proposed systems consisted of RFID, IoT technologies, and cloud computing characterized by low cost and high efficiency, which lead to reduction in the cost of kindergarten security, and improving the service standards [12]. Uzelac et al [13] analyzed the impact of the physical environment on students' focus during the lectures using Internet of Things. Design and of an IoT-based ecosystem that have been deployed in 8 schools across England and was described in [14]. De la Guia Elena et al [15] investigates the benefits of using wearable and Internet of Things (IoT) technologies in learning foreign language scenarios.

IV. PROPOSED SYSTEM ARCHITECTURE

The proposed solution is an add-on to the existing available systems for tracking and monitoring the students in schools using RFID and IoT. As quoted in the literature review most of the proposed solutions are partial. The proposed solution in this paper has many additional features and safety measures and is fully automated which will reduce the workload of the school administration. Implementation of RFID technology in schools is used to track the students' activities and movements. Parents, school administration and bus drivers can track the students at the specified threshold levels. Fig. 3 describes the proposed solution components.

RFID system helps to control the movement of the students in the school. This system verifies if the students take the right bus on the right time. It also contains the automated attendance management system of the students. RFID has brought a lot of advancements and innovations in the field of security. It offers an effective way to enhance the security of the premises. The schools also benefit from the advantages of this technology. The proposed solution for tracking and monitoring students by utilizing the RFID technology with the use of IoT in schools is categorized into four layers such as Identification Perception Layer, Network Transport Layer, Data Processing Layer and Application Service Layer [16]:

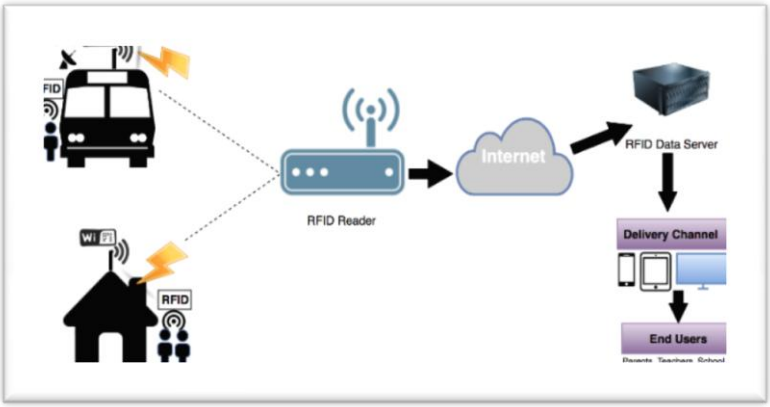

Fig. 3 System architecture

Identification Perception Layer consists of the RFID components such as the RFID embedded student wristbands, RFID readers distributed all over the school premises and the school busses, GPS and other sensors used to track the presence and the real-time movement of the students and the school busses.

Network Transport Layer plays a major role as it will be infrastructure for interconnecting the active and passive components for exchanging and transmitting the information between the database server and the front end applications.

Data Processing Layer is the database engine that process and store the data received from RFID readers and other sensors before being processed to the frontend applications; this data is obtained from the students' wristbands.

Application Service Layer is the final output of the of the system where the alerts are sent the school administration, parents and the bus drivers on application installed on smart mobile devices like phones and pads, in addition to the real-time dashboards notifications which will be displayed on large screens available at the school administration.

A. Components of the proposed architecture

Students represent the most important part of the system to be properly observed, they will be wearing a wristband with an embedded RFID chip and a vibrator. The wristband vibrates when the bus reaches his / her house to pick up the child in the morning; when the bus arrives at the school gate to collect the students and drop them back to their houses. The wristband will be equipped with an emergency button that will be used by students in case of emergency, in response to some attack or harassment so that school management and parents can be notified in order for them to be able to take necessary measures accordingly.

This system helps to improve the sense of responsibility in the students. When students know that they are being monitored, they will feel responsible for accomplishing their tasks. The students will also complete their home works properly because they will know that the information will be automatically transferred to the parents. The system will:

- Generate value to the school;
- Expand transparency and innovative profile of the school;
- Allows focus on teaching quality;
- Help to avoid fraud and human error by automating the frequency and satisfaction reports;
- Broad operational monitoring allows quick and accretive management measures.

Parents are the part of the monitoring party. They will receive the notifications on their smartphones after their child has boarded the bus, upon entering the school and when the students goes to the canteen so that they will know that they have taken their meal. Parents will get one more notification when their children leave the school and board the bus to go back to their houses. Parents can easily, using smartphone application, notify the bus driver, if they are not willing to send the child to the school for a particular day so that the bus driver will not have to pass by the student's house to collect him. The same notification shall be also forwarded to the school to record the absence. Parents can follow up the progress of their children, track them, monitor the performance at the school and their daily activities though the online dairy and students' daily schedule from their mobile application. The system assures the safety of their child at school and in the classroom, by sending weekly reports. The parents will get the notifications on their mobile application when their child gets on or off the school bus. This is by and large the main concern for the parents because they get more concerned about their children when they go out for any purpose. They need to be sure that their children are in safe hands. The implementation of this system will assure parents about the safety of their children.

Teachers and School Administration: Proposed system will significantly simplify some task of teaching staff. Teachers will not have to take the attendance manually because it will be recorded automatically at the moment student enters school and they will be notified through the mobile application, if the students are late to classes. Teachers will be notified if a student goes to the washroom with their permission and doesn't return back to the classroom within the specified time or if the student leaves the classroom during the class. The class teacher and the school administration will get the notification on their mobile application if a student visits restricted places during unspecified time.

Improving time management, finance management and competitive advantage, receiving real-time information, facilitate school control by monitoring students' attendance and tracking the timeliness of teachers. The system also provides solution to online presence and attendance control in schools. The School System seeks to improve the school environment and assist management. Parents, teachers, school administration and coordinators will have access to real-time information with accuracy and confidence in data to guarantee agility in decision-making. In addition, by integrating RFID and biometric technologies, system also enables online monitoring, data access at any time and from anywhere, continuous data backups, remote support and cost reduction.

Implementation of this system provides certain benefits for the teachers. It streamlines the daily closure of class and saves paper which also reduces the costs for the school as the students' notes can be updated in online students dairy. This system also saves the time spent in class which can be utilized for the teaching purposes. The teachers can follow and track the progress of students and avoid deprecations. The automatic attendance management system also provides the peace of mind for the teachers and they would be able to implement their all energies on the teaching and evaluation processes.

Bus Driver: The busses will be fixed with the RFID readers. The bus driver will get the notification on his mobile application or on the vehicle dashboard display unit during picking up students from their houses so that he will not miss out somebody. The bus driver will also be notified after all the students are off-boarded either at school or houses so that he shall not lock the bus if any student is left in the bus for any reason.

B. Safety and Monitoring

Big display screens will be available in the rooms of the school administration which will show the real-time status of the entire system in a dashboard and the same can be shared respectively. The school busses can be tracked by the route they travel through GPS and maps by the school administration and parents. In case of accident, the bus driver will notify the transportation department through mobile application and they will send an alternative bus to the place where the accident has occurred by locating through GPS and move the students accordingly. In addition to that the necessary actions will be taken if required in case of any casualties or emergency.

The school canteen will be provisioned with turnstiles for "Entry" and "Exit" which will operate through the RFID readers to avoid the overcrowding. For example, if the canteen is provisioned for100 members the entry turnstile will allow only 100 students and as the students go of the canteen through the exit turnstile the entry turnstile allows the other students to get inside the canteen.

The RFID readers will be present all over the school premises so that each and every movement of the students can be recorded. The security of the school will be notified through the mobile application once all the students are out of the school so that there will be no student left behind either in washrooms or some other places, so school gates can be closed. In case of any emergency or fire, the system will be integrated with fire alarm system and it will check the entire school premises and if any student found, the wrist band vibrates continuously to alert for immediate evacuation. The system will also notify the school administration about students' places through the real-time monitoring dashboard and the mobile application if any student is left out so that it will be easy for the rescue team to evacuate the left out students.

C. Analysis of the Proposed System

The goal of analysis of the proposed system is to produce sets of essential functional and non-functional requirements. Functional requirements deal with what the system should do or provide for users. They include description of the required functions. Non-functional requirements - a description and, where possible, target values of associated non-functional requirements. Non-functional requirements detail constraints, targets or control mechanisms for the new system. They describe how, how well or to what standard a function should be provided. An Activity Diagram is a behavioral diagram that shows the flow or sequence of activities through the proposed system. Each type of external individual or group with which the system must interact is represented by an actor. The actor's name clearly denotes the actor's role. Use Case Model serves to scope the system functionality by defining what functions will be performed by the system in sufficient detail. Actors, Use Cases and their relationships represented in the Table 1 and Fig. 4 and 5respectively.

Table I Actor Catalog

#	Actor	Description
1.	Teachers	Represents a Teacher user who is responsible of checking attendance, receiving notifications and calling Parents in emergency situation.
2.	Bus	Represents a School Bus, which comes with the technology of RFID.
3.	Wristband	Represents a Wristband which the Student must wear all the time either in Busses or School facilities.
4.	Parents	Represents a Parent of the Student user who is/are responsible of requesting excuses, receiving notifications and calling School in emergency situation.

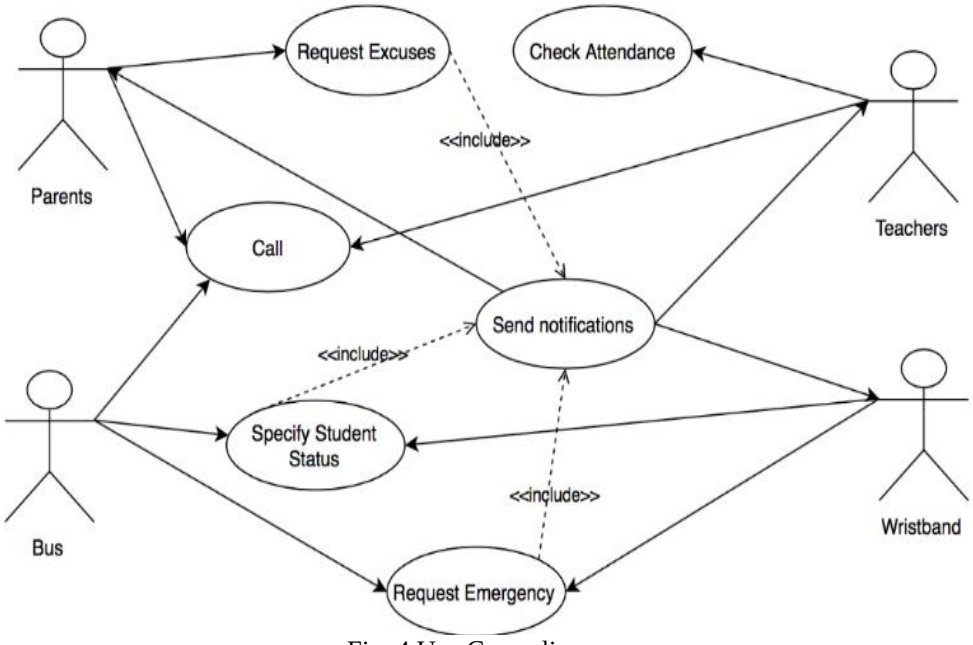

Fig. 4 Use-Cases diagram

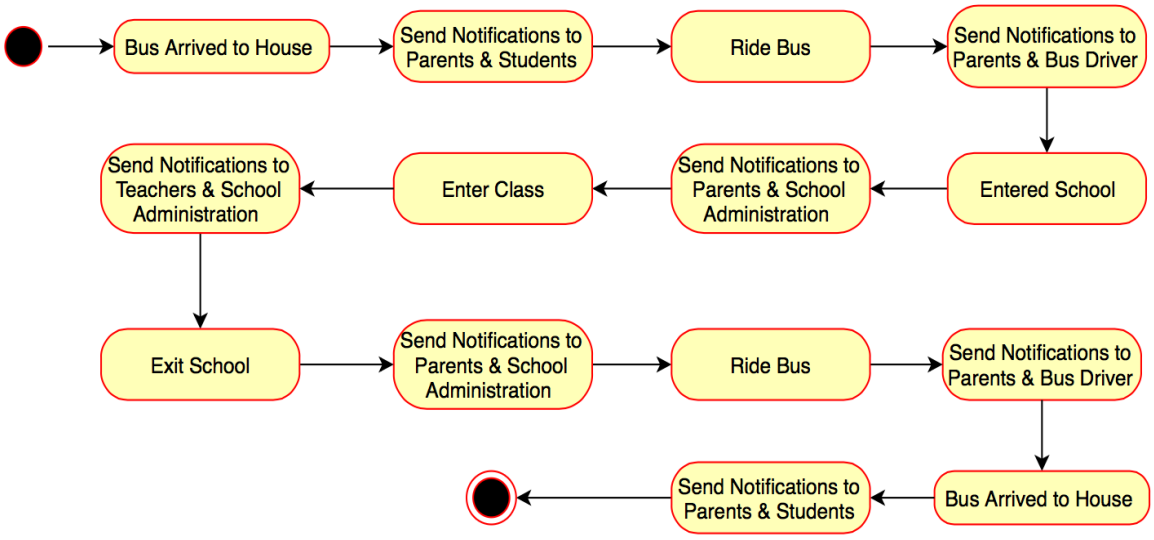

Fig. 5 Activity diagram

D. Use-Cases Scenarios

A number of Use Case scenarios which together cover all of the proposed system functionality are presented below in TABLE II through TABLE VII.

Table III Specify Student Status Use-Case

Use-Case Name	Specify Student Status
Use-Case ID	UC 1
Primary Actors	Bus, Wristband
Description	Describes the process of Specifying Student Status.
Related Use Cases	UC 2
Triggers	Wants to specify Student Status.
Pre-Conditions	RFID Reader can read RFID Tag successfully.
Typical Course of Events	Step 1: Student's wristband identifies the student status by RFID Technology (Student Status is identified based on Student Location and time).
Alternate Course	
Post-Conditions	User successfully specified Student status.
Business Rules	System is able to specify Student Status as long as the Student exists at RFID covered area.

Table IIIII Send Notifications Use-Case

Use-Case Name	Send Notifications
Use-Case ID	UC 2
Primary Actors	Wristband, Teachers and Parents.
Description	Describes the process of sending notification to users' mobile application and Student wristband.
Related Use Cases	UC 1, UC 3, UC 5
Triggers	Wants to send notification to Wristband, Teachers and Parents.
Pre-Conditions	Users must have the mobile application installed at their mobiles and be connected to the internet.
Typical Course of Events	Step 1: System sends a notification to Parents when: 1. Bus arrived to House.

	2. Child boarded the Bus. 3. Child entered School. 4. Child entered Canteen. 5. Child left School. 6. Bus came to House. Step 2: System sends a notification to Teachers when: 1. Late Student. 2. Late Washroom break. 3. Left Classroom. 4. Restricted Places visit. Step 3: System sends a notification to Bus Drivers when: 1. Students entered Bus. 2. Students left Bus 3. Students Excused. 4. Students left behind.
Alternate Course	
Post-Conditions	Users successfully receiving notification.
Business Rules	– Mobile will make sounds when receiving notifications. – Wristband will vibrate when Bus comes to house or School.

Table IVV Request Emergency Use-Case

Use-Case Name	Request Emergency
Use-Case ID	UC 3
Primary Actors	Wristband, Bus Driver
Description	Describes the process of sending Emergency Request.
Related Use Cases	UC 2
Triggers	Wants to send Emergency Request to School Administration and Parents.
Pre-Conditions	
Typical Course of Events	Step 1: System sends a notification to Parents and School Administration, when Student Presses on emergency button in case of emergency.
Alternate Course	Alt 1 Step 1: Bus Driver calls Police in case of emergency.
Post-Conditions	Users successfully requesting emergency.
Business Rules	Emergency Request notification has the highest priority among notifications.

Table V Call Use-Case

Use-Case Name	Call
Use-Case ID	UC 4
Primary Actors	Parents, Teachers and Bus Driver.
Description	Describes the process of calling.
Related Use Cases	
Triggers	Wants to call other party.
Pre-Conditions	
Typical Course of Events	Step 1: if the user is Parents user, user presses on Call School button. Step 2: if the user is Teachers user, user presses on Call Parents button. Step 2: if the user is Bus Driver user, user presses on Call School button.
Alternate	

Course	
Post-Conditions	Users successfully calling other party.
Business Rules	

Table VI Request Excuse Use-Case

Use-Case Name	Request Excuse
Use-Case ID	UC 5
Primary Actors	Parents.
Description	Describes the process of requesting an excuse.
Related Use Cases	UC 2
Triggers	Wants to request an excuse.
Pre-Conditions	
Typical Course of Events	Step 1: Parents user presses on Requests button. Step 2: System shows user Requests page. Step 3: User enters Number of Days, Excuse Reasons and presses on Send Excuse. Step 4: System sends notification to School, Teachers and Bus Drivers.
Alternate Course	
Post-Conditions	Users successfully calling other party.
Business Rules	Excuse Reasons will be discussed through a phone call between School Administration and Parents one day after sending the Excuse Request.

Table VII Check Attendance Use-Case

Use-Case Name	Check Attendance
Use-Case ID	UC 6
Primary Actors	Teachers
Description	Describes the process of checking attendance.
Related Use Cases	
Triggers	Wants to check attendance.
Pre-Conditions	
Typical Course of Events	Step 1: Teachers user presses on Attendance button. Step 2: System shows names list of the attended students.
Alternate Course	
Post-Conditions	Users successfully calling other party.
Business Rules	The system will consider any student enters after 10 minutes of class starting time a late student, and his name will be in Late Students Page.

E. Non-Functional Requirements

Following are the non-functional requirements of the system:

1) Usability requirements:

The System should be easy to use for all users.

2) Reliability requirements:

The System should be able to perform its required functions under stated conditions for a specific period of time.

3) Security requirements:

The System should provide a secure environment for users.

4) Performance requirements

a. The System must be interactive and the delays involved must be minimal.
b. Response times: application loading, screen open and refresh times should be less than 3 seconds.

c. Processing times: functions, calculations, imports, exports should be less than 3 seconds.
d. Query and Reporting times: initial loads and subsequent loads should be less than 3 seconds.

5) Availability requirements

The System shall be available 24×7

V. DISCUSSION

The proposed solution saves considerable amount of time and greatly improves the operational efficiency. It will improve security and safety, tracking the performance of students. Each wristband will have a label with a unique universal number that will be registered on the school system including the student information. Attendance management system will also enhance the efficiency and performance of teachers within the classroom. By implementing the RFID technology for tracking students in schools, the system can forecast the future of the students' performance by analyzing the grades of students. The proposed model will also be helpful to understand the nature and the behavior of the students by sending reports to their respective parents about day to day activities which are as follows:

- Sick: (They will try to sit and relax at some place and ignore their meals or going to play area or not attending to school).
- Social/Unsocial: (This can be understood by the students mingling and interaction with each other).
- Hyperactive: (For example, when the student is going to play area several times, it is understood that he is more interested in sports; therefore, we motivate and support him accordingly with his specific interests).
- Safety: (Safety of children is usually the main concern for the parents. The students can be monitored with the use of this system).
- Activities: (The parents can also monitor the activities of their child during his/her presence in school. The parents can also have the check and balance of the child's curricular activities.

VI. CONCLUASION

Child care is very much important both for the school and for parents. The collaboration of the family and the school can help in improving the education system. RFID technology will bring peace of mind both for the parents and teachers. The use of RFID technology in schools will bring positive impact for the overall performance and safety of the students. All the students will receive a wristband equipped with a chip with the personal data and record of the student. Students will be tracked by RFID readers present at school busses, school entrance gates and all over the school premises – and any amendments will be notified by the mobile application on the smartphones of the board members and parents. Implementation of this system will improve students' attendance, performance and safety.

Currently implemented systems at schools are not really successful due to their weaknesses and problems. Extensive research is needed to improve the performance and productivity of organizations. The collaboration of team members will permit exploration of the research grounds that will be beneficial for the school, parents, students and teachers.

As a future study, this proposed system will provide a chance to extend the scope of school management and can be implemented at the community level.

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