RFID Based School Bus Tracking using Django Administration System with the Help of Mobile Application

Sara Saeed Auad Bin Orwa[1] and Ashraf Alzubir[2]

[1]Department of Computer Science, International University of Africa, Khartoum, Sudan
sarasara000gh2021@gmail.com
[2]Department of Information Technology, International University of Africa, Khartoum, Sudan
ashrafalzubier@gmail.com

Abstract— because of increasing the number of kidnapping and accidents to school students the parents are more concerned about their children's safety.This study suggests an SMS-based method for parents to track their children's whereabouts in real time. A GPS module is used to track the child's position, and an RFID card that is incorporated into the system is used to identify the child's identification. When a youngster enters a bus, the RFID tag on his identity card is identified by the bus's reader, and the system recognizes the child and sends a text message to his or her parents with the child's current position and time.

Keywords— RFID, Tracking System, Django, Mobile Application.

I.   INTRODUCTION

Many regions of the world are experiencing a rise in crime rates day by day, especially in troubled regions or experiencing profound political transformations that weaken the security circle in society, including those against children, such as child abductions, which have recently become highly and striking, and with the media focusing on this crime, the panic and fear of individuals, especially because this has increased. The effects of these attacks on the child in his mental and psychological composition, considering that in the stage of personality formation, what negatively affects his or her future life path [1].

The absence of parents under the general conditions of our societies and the social and economic problems that plague the family have also become a dangerous and sensitive phenomenon. Parents today work long hours and therefore do not have enough time to take care of their children all the time, and may often play their role remotely through directions and telephone alerts from the workplace [2] to reduce these risks and to keep parents informed of the possibility of their children being present on the move from home to school, it is necessary to reduce these risks and to keep parents informed of the possibility of their children on the move from home to school. Using technology, the researcher proposes an automated system to apply this under the name "Using RFID student tracking technology", which is based on available and affordable techniques.

II.   PROBLEM STATEMENT

Despite a great effort by law enforcement forces in various countries of the world to reduce crimes against children, especially kidnapping, and the efforts of parents to monitor and care for their children, the biggest challenge facing society in this is the delay in obtaining information, namely, that children face risks by criminals or by bad companions or even by the children themselves, which is negligence and lack of awareness of the risk of not committing to school attendance.

Therefore, there has been a need to "use RFID technology to track the student" and be feasible to reduce the problems described above and achieve the possibilities that current parent-school systems and communications cannot do.

III.   RESEARCH OBJECTIVES

After reviewing the problems, it has been found that the main objectives of this research are:
1.   Identify and compare the current method with other methods in previous studies.
2.   The development of an electronic system that enhances the role of the security services in reducing kidnapping crimes to which children can be exposed, at an appropriate cost and techniques available and easily used.
3.   Developing an electronic system to activate the efficiency of the educational system in schools.
4.   Develop an electronic system to track the student from the way out of the house until his return to make the parents more assured of their children while they are busy with their blindness.

IV.   LITERATURE REVIEW

In this section some of previous studies has been discussed to know the application of RFID techniques in different areas as follow:
1.   A study conducted by Fatih Maraşlı, Musa Çıbuk (2016) in Turkey entitled "RFID based on the design of a new fuel recognition system" aims to provide a solution to problems during the refueling process for cars such as the wrong type of fuel filling The misuse of pumps, especially at gas stations where RFID is constantly marked in cars and stations,

concluded that this system will be a solution to the financial and initial loss of fuel stations where an effective and practical solution has been provided against refuelling errors and therefore it will be possible to overcome the kind of errors that cause traffic and car problems thanks to this technology [3].

2. In research conducted by Victor O. Matthews, Adebayo O. Ajala, Segun I. Popoola, and Aderemi A. Atayero, Members, IAENG in London on 7. Yulio 2017, under the title Smart Vehicular Traffic Management System using RFID Technology, the authors developed a smart, cost-effective, and environmentally friendly park management system to control scalable traffic using RFID technologies. Solar PV Signs are set for pre-registered vehicles and visits to access custom parking. However, the widespread implementation of smart park technology and management requires a steady supply of energy without any threat to our ecosystem. SPV UHF RFID readers transfer vehicle information via wireless data links to a host system application in the SPV central database management system for further processing [4].

3. In 2018 research by Farshid Sahba Amin Sahba Ramin Sahba, helping Blind People in their Meeting Locations to Find Each Other Using RFID Technology, this research offers a new, specific RFID system to help the blind find the other party at their meeting place. RFID Reader. The blind, the visitor, adjusts the SD card with the other party identification number that they previously shared for example in a phone call, and takes the device to the meeting place. When the blind person arrives at the site, the device reader receives signals from the active tag of the other party's SD card . Then determines its location/location based on the severity and direction of the signals received and informs the blind. In this way, the blind can simply determine the position of the other party in places Crowded and finding each other and the limitation noted that the use of this technique reduces the time it takes to find the visitor's place by 74% to appoint the blind in urban areas and the strengths of this system are the simplicity of training and deployment of the blind, equipment and software licenses, and its high efficiency [5].

4. Study conducted by researchers P. Nunes-Silva · M. Hrncir· J. T. F. Guimarães· H. Arruda3 · L. Costa · G. Pessin · J. O. Siqueira3 · P. de Souza5 · V. L. Imperatriz-Fonseca in September 2018 under the title : "Applications of RFID technology on the study of bees" the idea of the study is based on the distribution of reading devices around hives and flowers, so that they track signals from bees while roaming freely in the fields where these devices pick up signals from rfid sheets located in bees This device is linked to a Rasbury Bay computer, which in turn records these readings and the range of work of the device reaches 2.5 meters, while previous models with a range of one centimeter have been used and it has been noted that this type of study can help to clarify how bee colonies interact with different pressures and provide accurate and controlled developments about bee activities and monitor the surrounding environment around it quickly, accurately and efficiently [6].

5. In a study conducted by six researchers in India on January 6, 2019, Masahiko Hiraki\ Naohiro Matsugaki\ Yusuke Yamada\Masahide Hikita\ Masashi Yamana Toshiya Senda this study focuses on the development of a sample exchange and tracking system on molecular crystalline lines at the Photon Factory for high-productivity experiments, remote operations and automated experiments using RFIDD technology. Since the traditional methods exist in many errors in exchanges and tracking because they depend on the human effort that can be missed as well as the loss of time and seriousness in tracking in addition to the high cost of the devices and they noted that when the RFID technology was relied on in conducting experiments the success rate in tracking and exchange was 100% and at a lower cost, more accurate and faster work it saved time and effort [7].
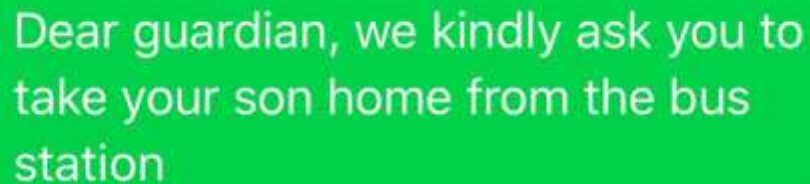
V. METHODOLOGY

In this research the Django administration system with the help of mobile application has been used to let parents tracking their children by receiving SMS in their mobiles. The study community consist of students without basic education, those students called (KG1-KG2) in the Department of kindergarten "Quality Schools in Khartoum, Sudan". The number of kindergarten students were selected for the first semester (KG1-KG2) were Thirty and their ages between three to five years.

The implementation steps are divided into two important sections, both complementary to each other, where the implementation in the first section was a real actual implementation, i.e. it was applied on the ground and was expected to be applied as we indicated earlier in "Quality Schools", and under the current circumstances witnessed by the whole world of the outbreak of CORONA virus coincided with the period of implementation of the project to close schools and suspend the study, so the research has been done on a sample close to the sample selected in kindergartens (30) students where the students were Only the selection of 4 smart segments of the type RFID as well as the number of 4 attendance cards applied to 4 students each time 4 new students are taken and the process is repeated till reach the specified number. The chip was installed on their shoes and the tracking process began by sending a message to parents feeling close to the bus from their station until their children are taken.

Then the slides with the shoes RFID Tag passed the reader RFID Reader and the response occurred and the notices were sent to the concerned authorities.
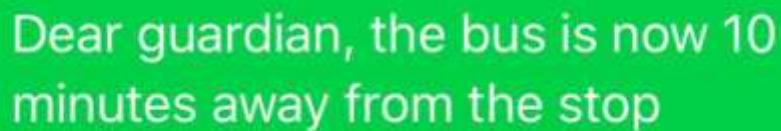
Also the experience of registering attendance by passing slides to the reader of the slide so that the reports were sent to the centra control unit and then the mobile application was entered and the report was selected for the student to know his presence and absence in the classes

and then was tried sending a message by the controller (school management) to parents stating that their son is late for the time of return in order to make a surprise ceremony honoring the ideal students The message was received and answered during the response button so that the administration is fully assured that all parents have received the message.
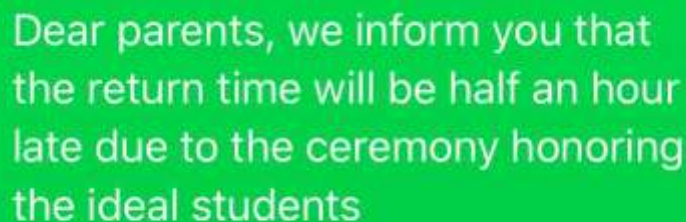
Dear guardian, we kindly ask you to take your son home from the bus station

Image 1: Message to inform the guardian that your child has been arrived

Dear guardian, the bus is now 10 minutes away from the stop

Image 2: Message to inform the guardian that the bus will arrive after 10 minutes

Dear parents, we inform you that the return time will be half an hour late due to the ceremony honoring the ideal students

Image 3: Message to inform the guardian that the returning time has been changed
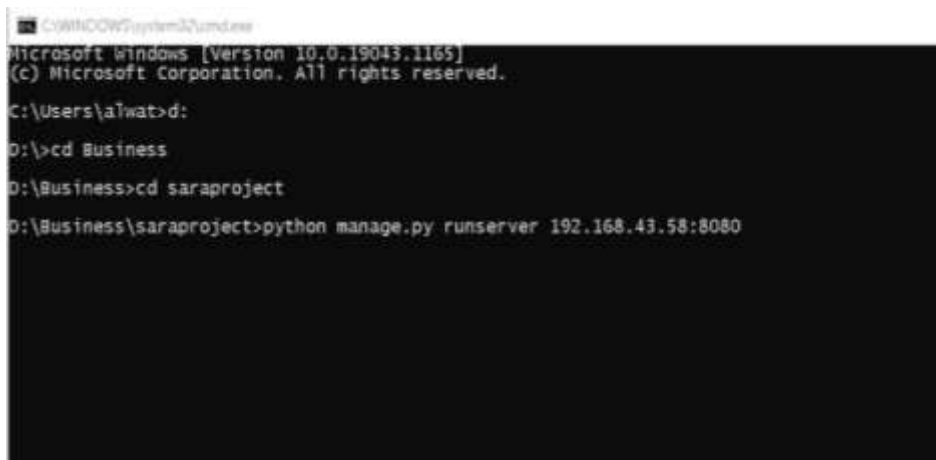
Then returned the previous steps to return home and each time parents received messages from the school control center, so the experiment was successful every time and made sure that all devices worked as well as make sure the system worked on the site with the mobile application.

Implementation of work:

It has been known that the system has two important parts, front end & back end, starting with the Back end by running Django as follow:

Python manage.py run server 192.186.43.58:8080   Django

The device connected with phone to use it as a server by port (192.186.43.58:8080) and it appeared on the command screen:

Image 1: How Django is turned on

Image 2: The login screen

Image 3: The home screen
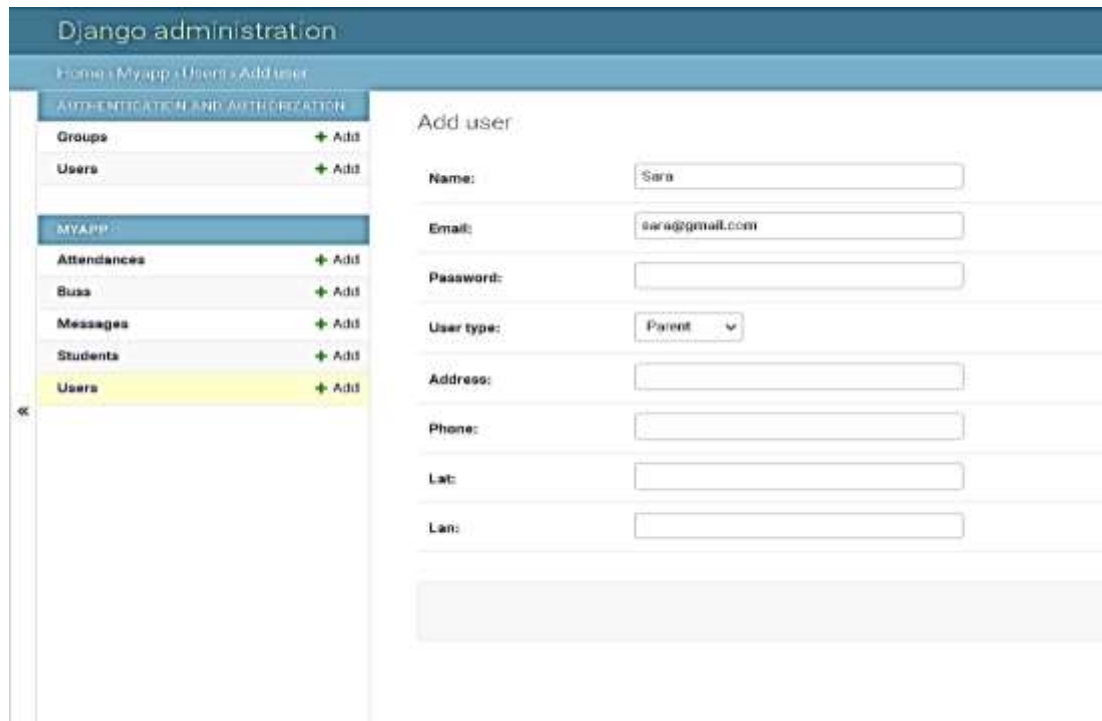
Image 4: The list of the main users (parent, Driver, manger)
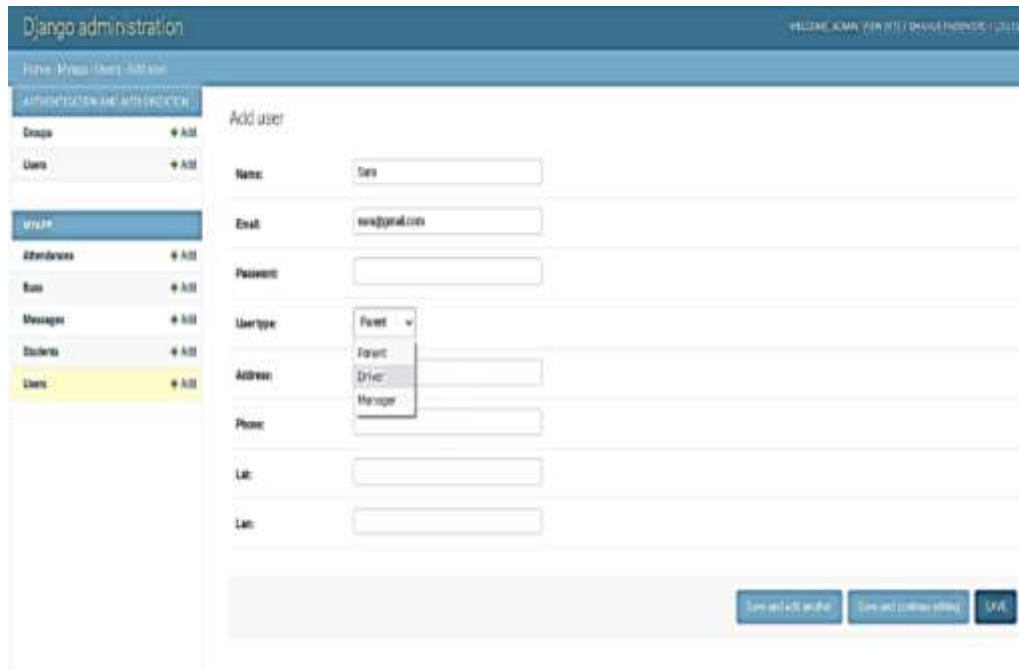
Image 5: The Parent interface
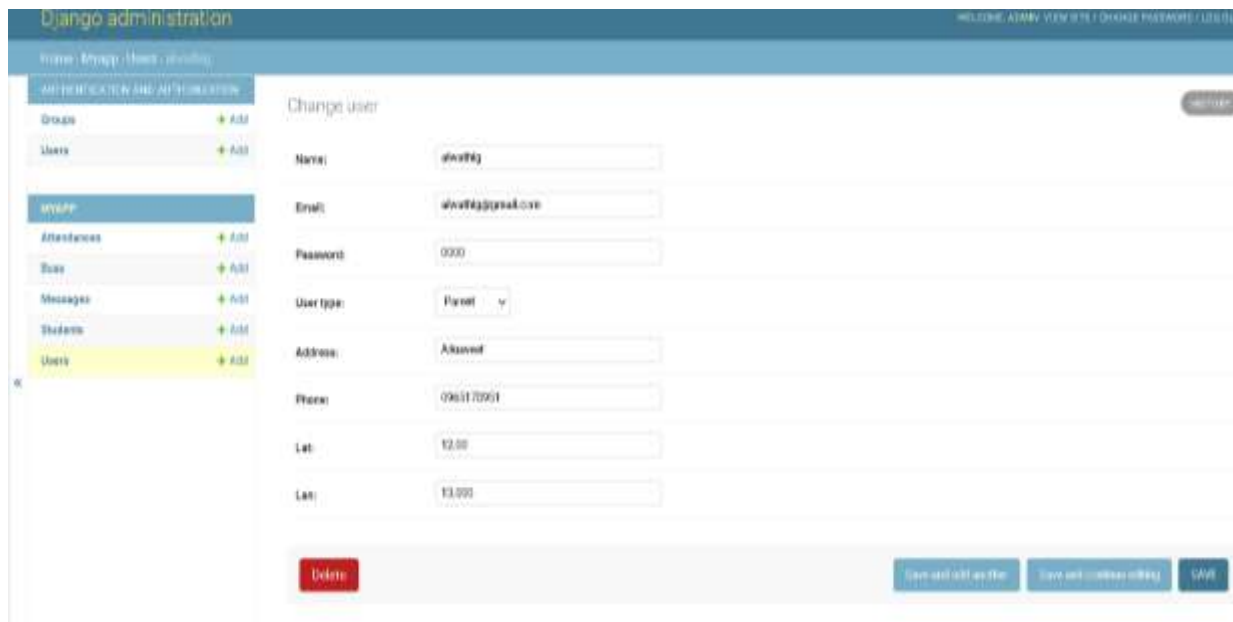
Image 6: Addition of Parent information
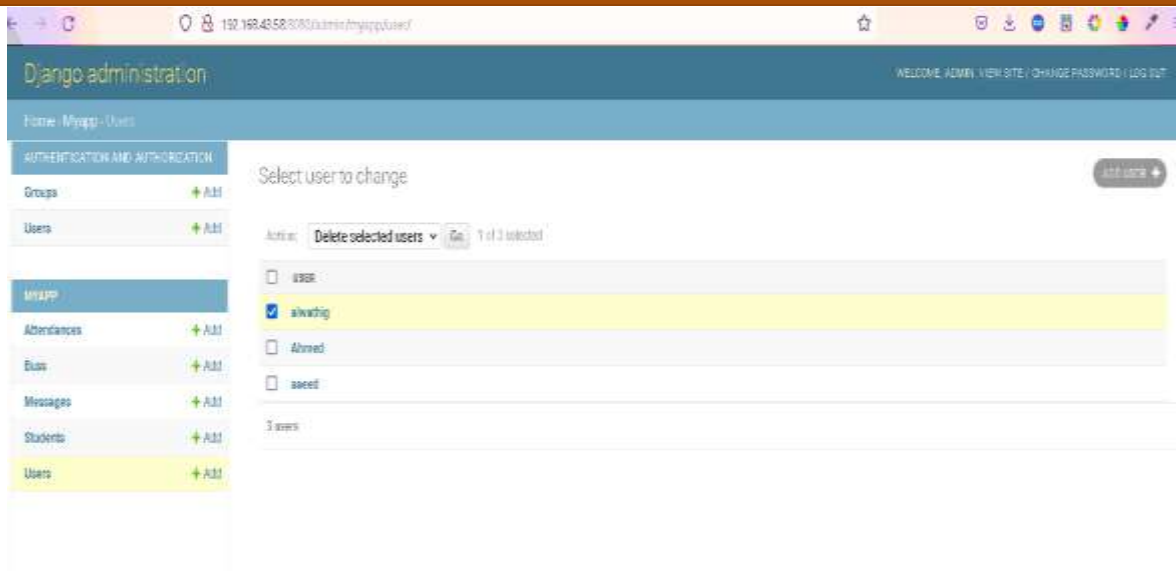
Image 7: How to delete user
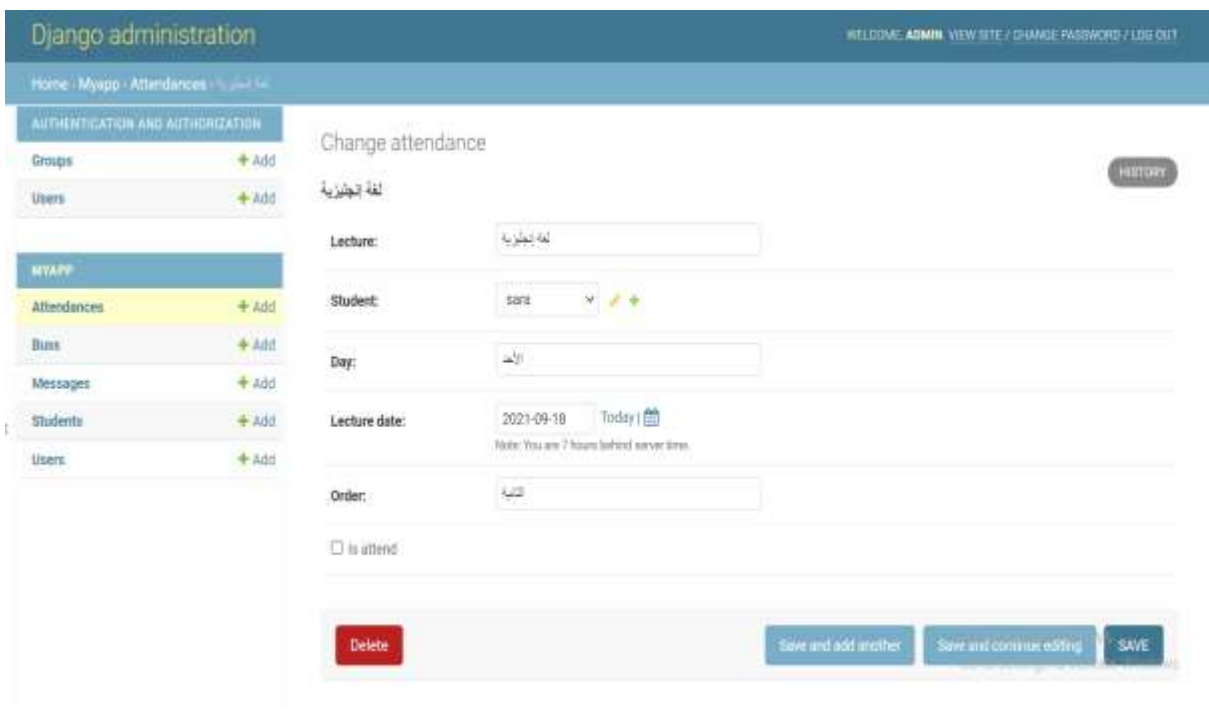
Image 8: Addition in the attendance list
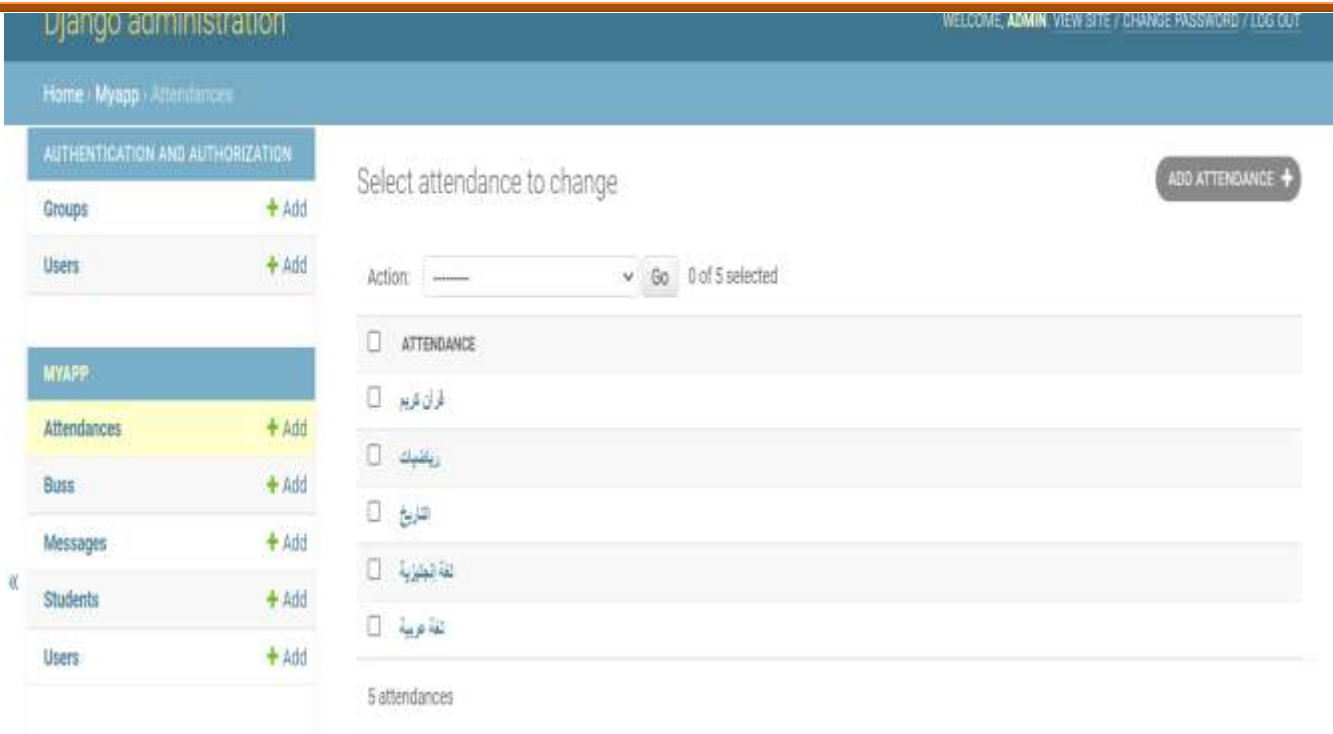
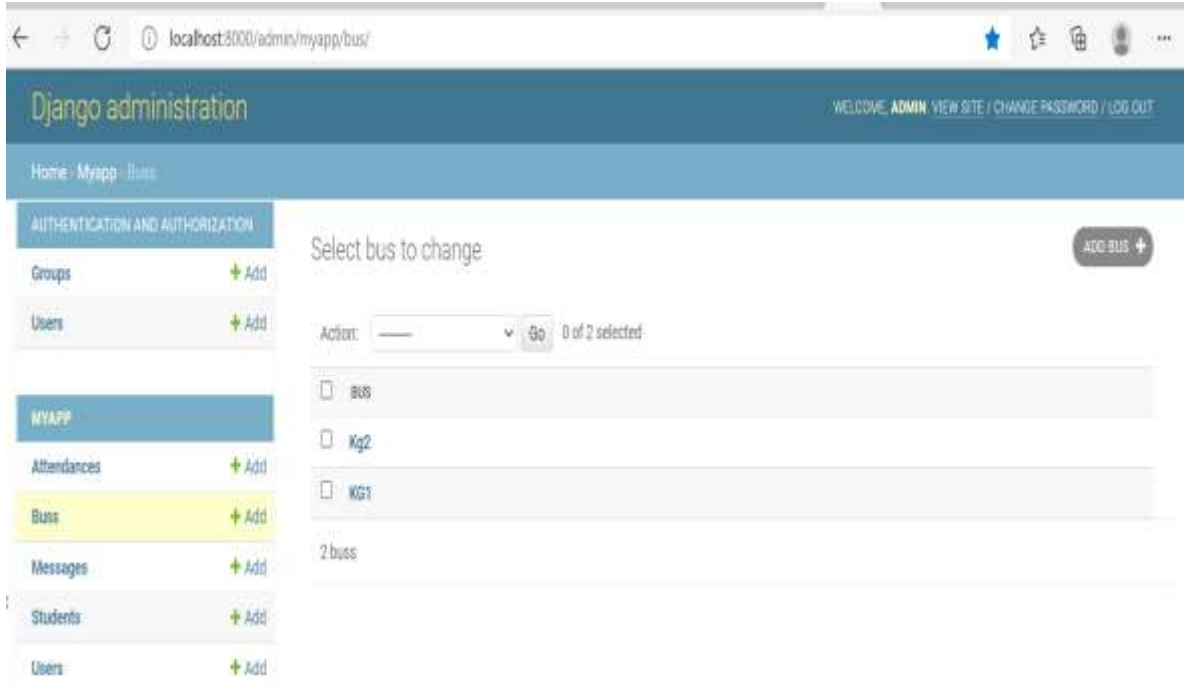Image #9: The list of school subjects
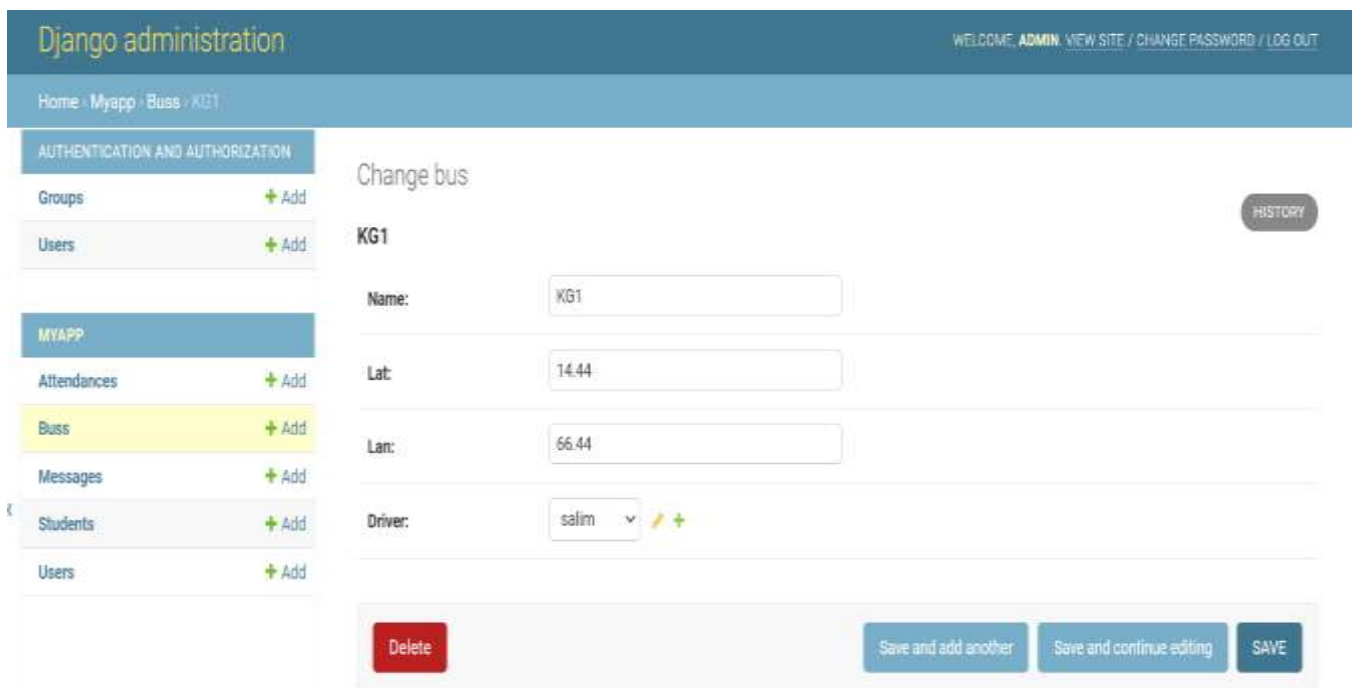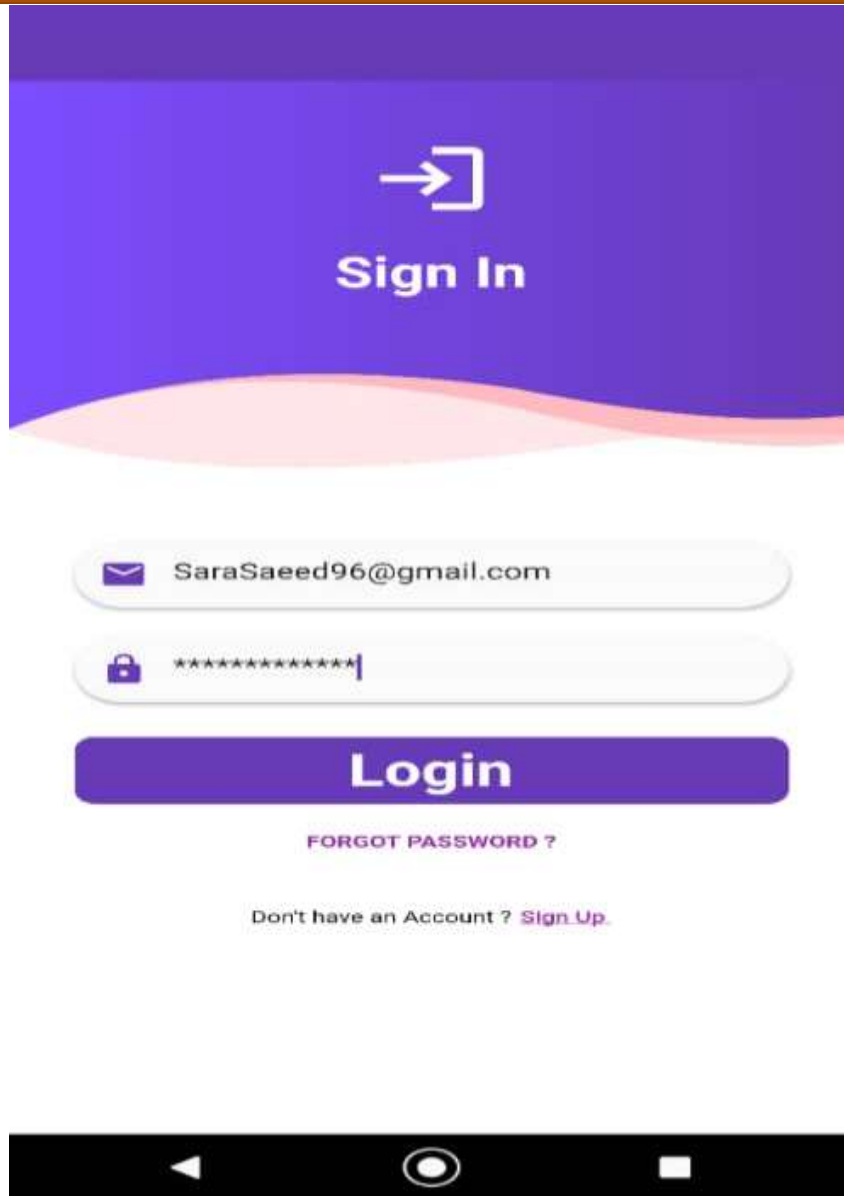

Image 10: Add bus data

Image 11: Bus List

Image 12: Sign in parents to the app

This is the main page, which consists of five sub-lists: daily reports, contact list, list of messages, list of tracking children across the map and the list of bus drivers and each list does a special task.
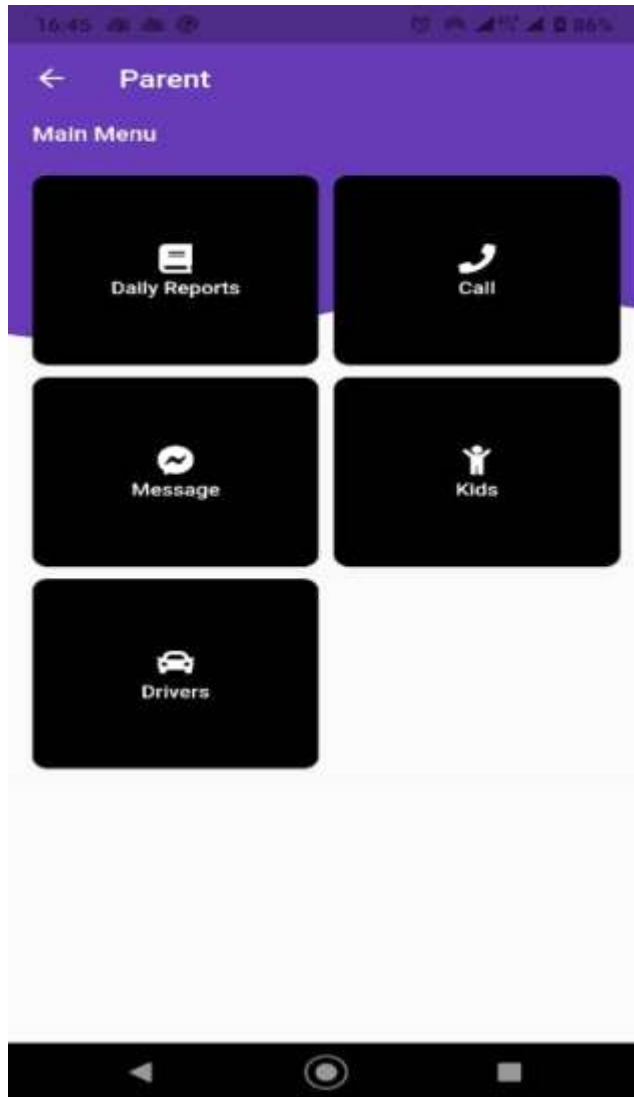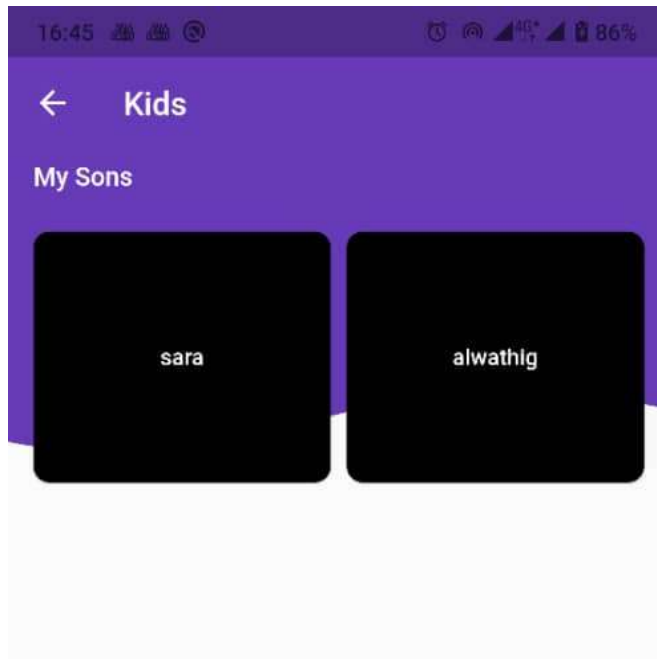

Image 13: Home page of App

Image 14: Kids List

By clicking on the list of (Kids) We have children in case every guardian has more than one son, and each of them is tracked on a map, as in picture 14.
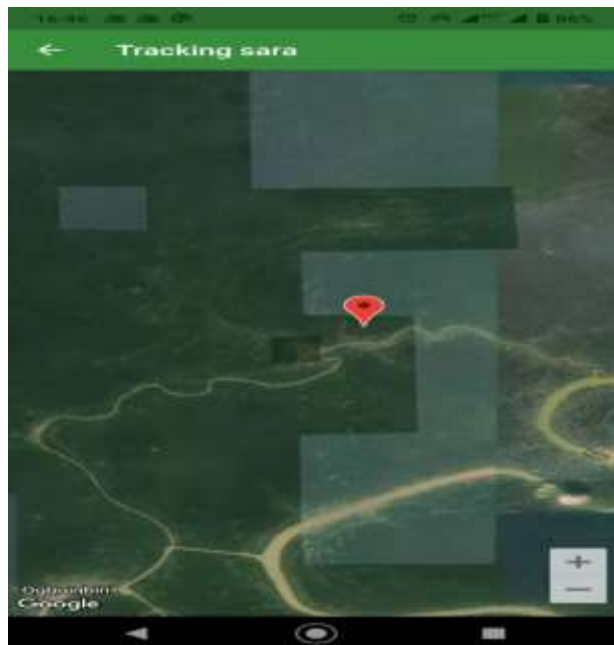

Image 15: Tracking children via Google Maps

The list of bus drivers through which we can make a call or send an urgent message Via the app for the driver He letter textual If we do not receive any notice or footage from the camera indicating that the child is on the bus.
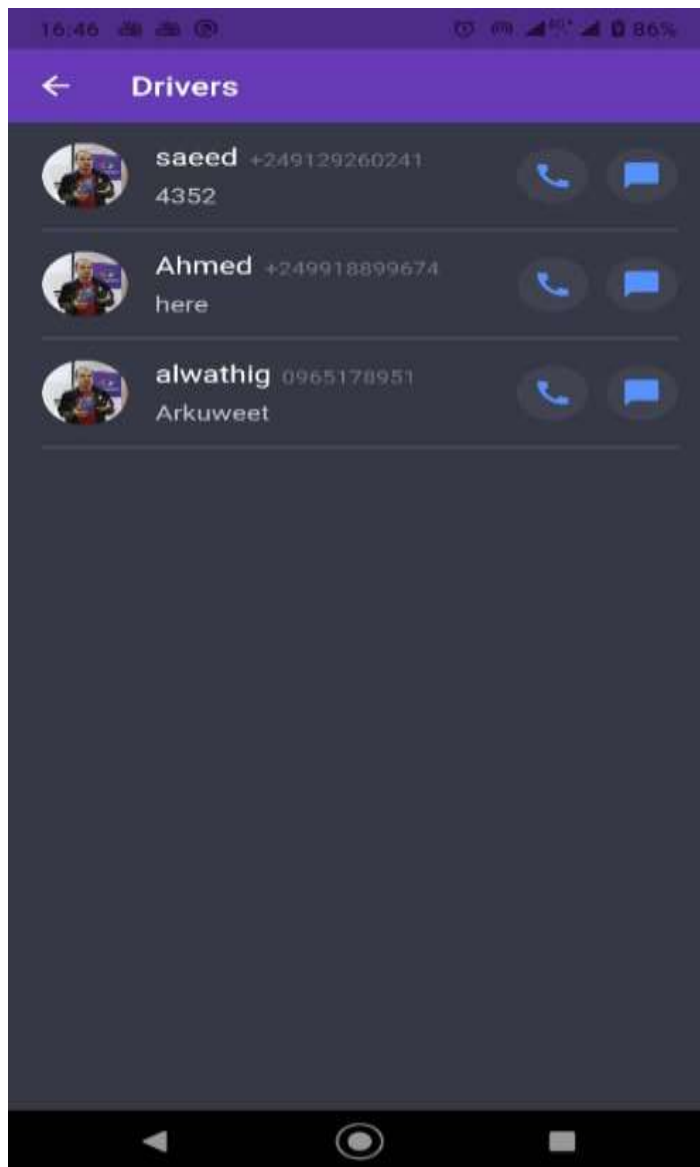

Image 16: List of Bus Drivers

Contact list through which we make an urgent call with the school administration in case no notices have been received indicating that the student has entered the school through various means of notice.

Image 17: a phone call from the parents of the school administration.

The list of reports through which the student's reports are viewed in terms of attendance in the classroom or their absence for any reason whatsoever, which makes the parents always informed of the progress of the educational and behavioral process of their children.

Image 18: Report attending school classes for a student

Here are some of the serials monitor footage taken from Arduino IDE's work environment. It is the development environment for programming electronic parts and writing code.
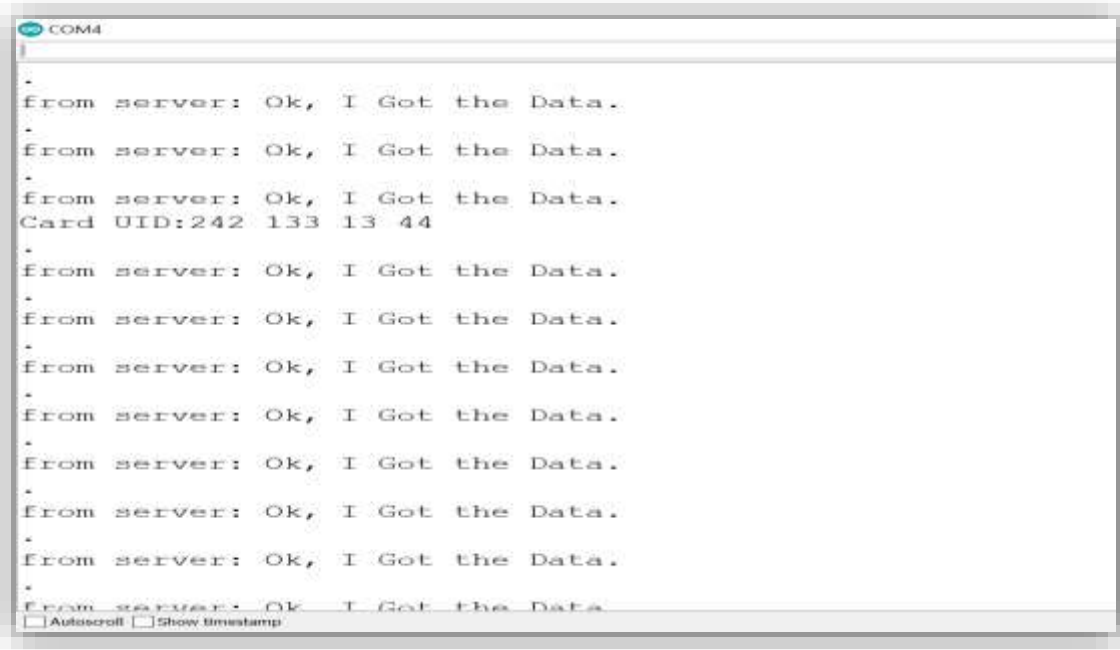
Image 19: The server's connection and data exchange with the rest of the pieces

This shot showed the notification the server receives from the RFID Reader after the RFID chip in the child's shoes is passed on as he enters school.
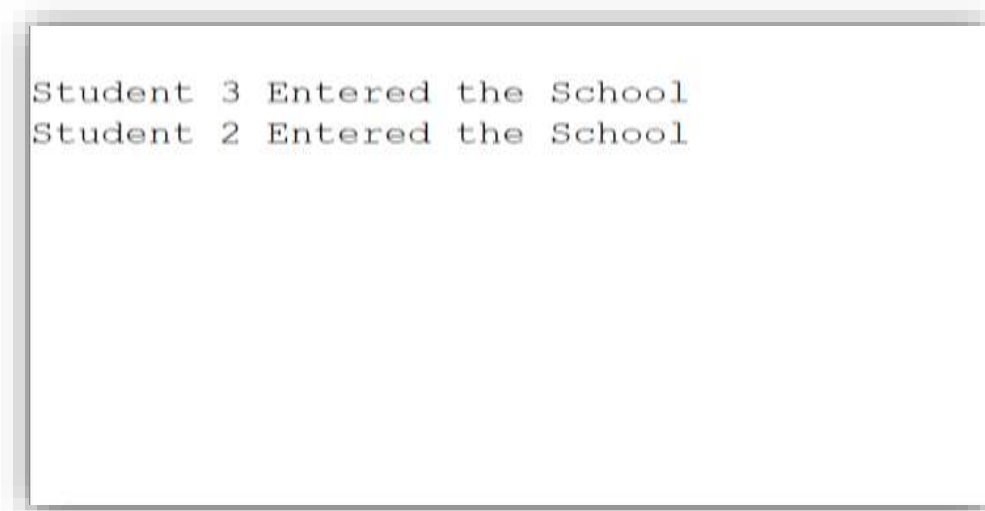

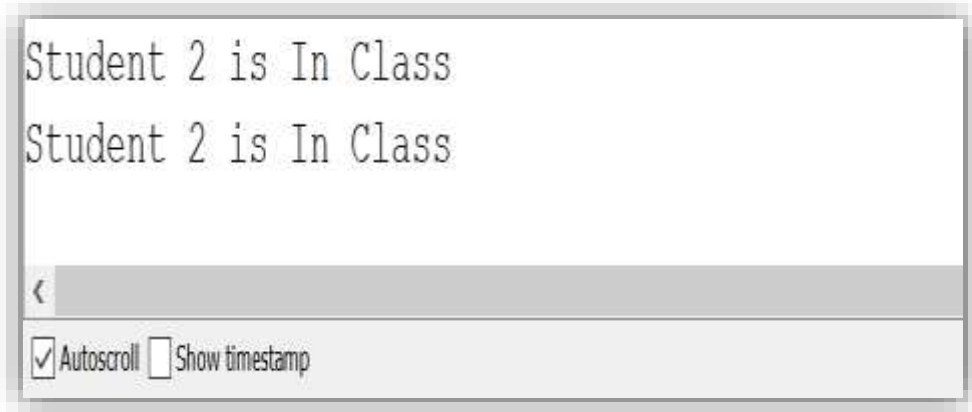Image 20: Slide pass notification (RFID) when the talab enters the school

Image 21: Slide pass notification (RFID) when the students enter the classroom

VI.   CONCLUSION

In this research it has been found that Using RFID adds speed, accuracy, efficiency and security to an increasing range of applications. Moreover, the use of RFID technology in collaboration with security agencies reduces child abductions. In addition to Integrating RFID with other technologies helps more accurately track students to and from home. Also, in this paper the mobile application system has been used with conjunction of DJANGO administration software to let parents now the status of their children.

VII.   REFERENCES

[1] Saranya. J, Selvakumar. J, "Implementation of children tracking system on android mobile terminals," Communications and Signal Processing International Conference, Vol., no., pp.961, 965, 3-5 April 2013.

[2] Mori, Y.; Kojima, H.; Kohno, E.; Inoue, S.; Ohta, T.; Kakuda, Y.; Ito, A, "A Self-Configurable New Generation Children Tracking System Based on Mobile Ad Hoc Networks Consisting of Android Mobile Terminals," Autonomous Decentralized Systems (ISADS), 2011, 10th International Symposium , vol., no., pp.339,342, 23-27 March 2011.

[3] Maraşlı, F., Çıbuk, M. J. B. E. U. J. o. S., & Technology. (2016). RFID based on the design of a new fuel recognition system. 6(2).

[4] Matthews, V. O., Ajala, A. O., Popoola, S. I., & Atayero, A. A. (2017). Smart vehicular traffic management system using RFID technology.

[5] Sahba, F., Sahba, A., & Sahba, R. J. a. p. a. (2019). Helping Blind People in Their Meeting Locations to Find Each Other Using RFID Technology.

[6] Nunes-Silva, P., Hrncir, M., Guimarães, J., Arruda, H., Costa, L., Pessin, G., . . .Imperatriz-Fonseca, V. J. I. s. (2019). Applications of RFID technology on the study of bees. 66(1), 15-24.