**The school bus tracking (M)**

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1. **Project overview**

**This project for parents to track bus school easily-**

**-Technical side:**

**We will make a mobile app connected to the GPS on the bus by using flutter, for back end we will use AI for monitoring the bus , IOT for GPS.**

**-Economic side:**

**First, it will be free for a period of time for test and fame, after that money is paid from schools that contract with them and parents as well for premium copy to see all additional features like, cameras on bus, alarms sent to each one when his son arrives.**

**-Organizational side:**

**Sponsors: Head teacher, Parents affairs director.**

**Users: Parents, Supervisor, driver, student,**

**1.1- The idea:**

**1-A system dedicated to parents, where the school bus locator is placed**

**2- linking the device to an application that is downloaded on the parents’ mobiles, and the guardian registers in the application and fills in the data that the school gives a paper with, and chooses the number of the bus that the children want to continue with, so that the location of the bus that the guardian requested to prepare the children for school or receive the children after school will appear.**

**3-parents deal directly with school to avoid distraction**

**Through this application, the problem of delay in waiting for the bus is eliminated, as well as waiting for the bus before its arrival.**

**1.2 Problem faced:**

**1-mothers can stand waiting a lot under the house, waiting for the school bus to come.**

**1.1-(solution) there will be an alarm so parents can follow the progress bus and its arrival.**

**2-she may be late on the bus for a while because she did not have time to prepare the child.**

**2.1-(solution) it will be available with them, like a bus itinerary, for every father or mother registered on it .**

**3-during the return, the mother’s task remains to know when the child will arrive and how far ahead to prepare lunch, or that she comes back from work, or if she comes back late, she can be assured that the child has arrived home.**

**1.3-(solution) Half an hour before arrival , a notification will be sent to guardian to be ready.**

**4-some people do not trust the school bus system because safety,and the child may be exposed to any harm , incidents , kidnapping .**

**4.1-(solution 1)GPS will link between the child and the bus ,so the parents can be informed of all movements if both in same direction or not.**

**4.2-(solution 2)the bus will be equipped with an alarm , for in case of accidents a warning will be sent to the nearest hospital to deal with the issue quickly.**

**2(a)-Functional Requirements**

**1- (Track student).**

**Parents will know all movements for the students the School will give each student a small device with a GPS system that he wears along the way to communicate all his movements to the parents**

**When registering on the school bus so that if he deviates from the bus path, she can easily know this and locate him as well, to protect the child from any danger.**

**-each student will have a unique id to ease searching about him in need.**

**2- (Have locker).**

**Each student has his own locker inside the bus, contains his belongings for his entertainment.**

**- use it to keep the gps device.**

**-id is important to open this locker.**

**3- (Provide screen).**

**The bus is equipped with screens on which educational songs are displayed for students according to age, in order to prevent boredom along the way and increase the child's enthusiasm and activity**

**-these songs are chosen by teachers**

**4- (Ring call).**

**The system rings a call to the guardian in the event of any accident for the child to move in the same direction as the bus to prevent delays for the health of the child**

**-supervisor should have direct contacts for parents**

**-School deals with all near hospitals to save situation**

**-id should be used ease the filtration for jurnied students.**

**5-(Send notification as a tone)**

**when the bus arrive the application send notification in the form of a tone the parents understand that bus will be at home after 5 minutes and send another Tone that mean the bus under the home to avoid the bus dose not wait for along time for the children**

**6-(Ride wrong bus)**

**If the children ride wrong bus the camera will know that the send notification to the Supervisor and parents to know the bus that the ride and the driver and Supervisor and phone number all data they need to continue with them. Then the application will ask the parents if he could take the son from nearest point or the children will be late to arrive**

**7-(Record the absence)**

**We add in our application that the parents can record the absence of the student if the student is unable to go to school so that the bus has knowledge before it passes on the student, so that the bus will not be late for the rest of the students**

**8-(Add a camera)**

**we will add a camera on the school bus and connect its to the application when the children ride the bus the camera will take photo and send notification to parents by photo son to parents make sure that his son has boarded the bus regained for him.**

**9-(Add a platform).**

**We add like a group or a platform through which the parent can chat with the school if he is going to ask about his son’s condition or he is going to inquire about a specific thing in the school and through this platform the parent will be able to ask about everything while he is at home if he is not able to go to school if he is busy in The job**

**10-(Determine the speed).**

**Determining the speed of the bus at an appropriate speed so that it does not endanger the life of the children and establishing a monitoring system to speed so that if the driver exceeds the specified speed, he shall be punished:**

**- We will communicate the speed of the bus via the app, which will send a notification to the speed school if the driver exceeds the speed limit**

**- Notifications to the school in the event that the driver exceeds a certain speed, by sending a notification from the GPS feature to parents and the school in the event that the bus speed increases, and thus we take feedback to the driver and ensure the safety of children**

**11-(Determine a nearest maintenance center)**

**In the event of a bus breakdown, the application can show the nearest workshop or maintenance center, by linking the application to the global positioning system (Gps), which will determine the nearest maintenance center for the bus to go to for maintenance as soon as possible, so as not to delay children from school, and the bus arrives in the least time maybe**

**12-(Presence of direct messages).**

**The presence of direct messages to facilitate communication between parents and bus supervisors, through text messages that are exchanged between parents and school bus supervisors to report the occurrence of any emergency situation during the course of the school bus, or if the child needs something or has anger. Also, the bus supervisor can communicate with his guardian, which is considered This communication is very important to increase the reassurance of parents about their children, and also helps bus supervisors to communicate quickly with parents in the event of an emergency situation.**

**13-(Determine best route).**

**We determine the best route for the bus by receiving notifications from the GPS feature that helps it avoid crowded paths and informs it of areas that have traffic congestion as a result of an emergency situation, such as traffic repairs or an accident. The scheduled time is to arrive without any obstacles.. This helps in facilitating the process of walking on the road and also reduces the amount of fuel used.**

**14-(Provides a technical support team)**

**The application provides a technical support team, so that if a problem occurs, they will be contacted through the application to solve the problem**

**15-(remember time of payment)**

**By determining the date of payment the app will send a notification for the parent to remember him about payment it guarantee that there is no break down will happen like forbidden the children from using the bus**

**16-(Detecting AI Camera)**

**Using the camera in bus parents will assure that their children are good and in case of any fatigue by detecting face recognition of the children the app will send notification for the parent that the children is ill and the alarming device will give an alarm that one of the children is ill to make attention of the supervisor of illness**

**17-(Using Simple Interface)The app will be easy to use by any user, children or parent or the school management by using simple GUI and low space in memory so any one can load it**

**18-(evaluate the bus)**

**Options Evaluates the bus parents (how to deal and arrests) and saw boys in supervisors**

**19-(determine the supervisor ,driver)**

**permission Choose the guardian of the bus, the driver and the supervisor**

**20-(pay fees by app)**

**Options Pay the bus fees through the application so that the father can pay from home if they are busy**

**21-(put gps for child)**

**GPS for every child is not busy and it can set the child if it has friends, for example**

**22-(Notification The number of children in the bus)**

**Send message for school and parent the number of student in the bus that will be more secure to parent and more affection for school and the system will use it if any is damaged will use this inform**

**22-(Notification for forgotten important things)**

**By using notification if the children tell his supervisor that he forgot an important thing the supervisor send message across the app to parent that they could bring the thing to the school or someone could bring it to school but with money.**

**23. (Notification when arrive)**

**by sending notification to the parent that the bus will be arrive that save the time, if the parent is so busy the app will reminded them that the bus will be arrive (come back) that will be so fast and sending notification for school that the student ride the bus**

**24. (Guide for feature) If anyone has not use any app before (impossible), we will provide a guide to help anyone to use the app with a simple GUI colorful and helpful.**

**25. (Take all data about driver and supervisor)**

**for more safety to the parent the app provide all data about the driver and supervisor like (photo ,id full name ,address ), if he is a premium user he can ask for more information or any data he want**

**26. (Track the road)**

**To make the parent allow the rode if there was an accident or more cars in the rode**

**27. (Send weekly report)**

**with camera in every bus and by using AI the app will be able to send a report per week to parent and school about the children that help everyone to take action that will be help the children in the future**

**28. (Ask School if student arrive School or not)**

**when student ride a bus he can arrive School and does not enter the School so the parent can Ask School and make sure that the student is fine and in the School**

**29-16-(Detect student movements)**

**Using the camera in bus parents will assure that their children are good and in case of any fatigue by detecting face recognition of the children the app will send notification for the parent that the children is ill and the alarming device will give an alarm that one of the children is ill to make attention of the supervisor of illness.**

**30. (Using different pay system)**

**If he have the cash now he can use the bank system or online system or fawry system .**

**2(b)-Non-functional Requirements**

**2.1 security**

**Your child's school administration will provide you with a username and password that will enable you to access your page on the website and also the mobile application.**

**In this way, your data is preserved, so no one can view your private data except you through your secret password.**

**Also, in the event that you want to change or modify any data, you must first return to your child's school administration again to do so**

**We take feedback from the users... Is there a hack on his data?**

**We will use complex algorithms to encode the data**

**As well as the data server’s protection protocol**

**2.2 Performance**

**Increase the speed of application through backup work to ensure that system does not occur and ease of use**

**And increase. Security of information available on the app through protection systems as well as encryption of data and the functioning of the HWI number for each user of the app**

**2.3. Availability**

**Here we will present an easy user interface in addition to a guide that explains everything you need to do**

**There will be a support system available all the time if there is any problem**

**In addition, he can save any information that pertains to him so that he can communicate it without the Internet**

**the application is easy accessible**

**2.4 scalability**

**The application can grow to handle more users (parents)**

**And data and transactions about everything without compromising performance .parents can provide feedback about driver, bus, etc.**

**The application can increase the number of students. We can provide more options if the parents want**

**2.5-Reliability**

**\* In the first, the application is a group of schools and after that we add another schools and to see affected by the Feature or not mean in the needs will appear for people and people, and we do not try to take the problem. Scalability in the application**

**2.9-Maintainability**

**The application must have the feature Requirements for the feedback in order to be better than the application.**

**\* Every week we ask for an feedback of parents to reside the performance of the driver and the supervisor, even if parents have any additions or amendments to add to the application or in problems with them in the service and do not resolve or not and not and not Help I extend properly, good or not**

**2.6-Interoperability**

**Integration between other systems as the gps system to locate the bus move easily and accurately. And also know if there's any problem.**

**Integration with payment system for payment subscribe bus**

**Performance**

**Increase the speed of application through backup work to ensure that system does not occur and ease of use**

**And increase. Security of information available on the app through protection systems as well as encryption of data and the functioning of the ID number for each user of the app**

**2.7-usability**

**To let the application be used by the largest possible number of parents, and to make the system simple and easy for parents. For example, it is better in the application’s gui, so that it attracts parents to use it**

**2.8-Availability**

**Here we will present an easy user interface in addition to a guide that explains everything you need to do**

**There will be a support system available all the time if there is any problem**

**In addition, he can save any information that pertains to him so that he can communicate it without the Internet**

**2.10-Recovery**

**There will be a backup server on which daily backups will be taken, with the data divided into more than one place**

**2.11-Extensibility**

**The system does not focus only on transporting the child to school or following his path, but it is also concerned with monitoring the child's behavior and determining the way he deals with his friends, and the father is informed so that he can deal with the situation**

**3-functional (System) Decomposition Diagram (FDD).**

The school bus tracking

Absence Registration For child

Evaluation the system

Provide Child ID

Provide assistants

Users

Bus company

Parents

School Manager

Child

Provide buses

1.1-Login

Accept students or not

Evaluate the bus

Provide driversers

Choose seat number

Evaluate the behavior and uniform

Fix busesers

Take care of Children

* ***Use case diagram***

**Identify Actors:**

**The first step in creating a use case diagram is to identify the actors. Actors are external entities that interact with the system. In this case, we have identified the following actors:**

* **Parent**
* **School**
* **Bus Supervisor**
* **Bus driver**
* **Student**
* **System**
* **Technical support**
* **Payment system**

**Identify Use Cases:**

**The next step is to identify the use cases. A use case represents a specific functionality or a set of actions that the system performs to achieve a specific goal. In this case, we have identified the following use cases:**

**• Track student**

**• Submit report**

**• Have locker**

**• Provide screen**

**• Ring call**

**• Send notification as a tone**

**• Ride wrong bus**

**• Record the absence**

**• Add a camera**

**• Add a platform**

**• Determine the speed**

**• Determine nearest maintenance center**

**• Direct messages**

**• Determine best route**

**• Provides technical support team**

**Connect Actors with Use Cases:**

**After identifying the actors and use cases, we need to connect them. We connect actors and use cases using lines called associations. An association represents the interaction between the actor and the use case. In this case, we have connected the actors with the use cases they are associated with. For example, the parent is associated with the use case "Track student" because the parent wants to know the location of their child.**

**Add Include and Extend Relationships:**

**Use cases can be related to each other using include and extend relationships. An include relationship means that one use case is always included in another use case. An extend relationship means that one use case can be extended by another use case under certain conditions. In this case, we have identified the following include and extend relationships:**

**In this diagram, each actor (supervisor, driver, parent, and student)**

**has several use cases associated with them. Here's a brief description of each use case:**

**• Track student: This use case allows parents to track their child's movements using a GPS device provided by the school.**

**• Submit report: This use case allows the school to submit weekly reports on workers and students.**

**• Have locker: This use case allows students to have a locker on the bus to keep their belongings.**

**• Provide screen: This use case allows the bus to have screens that display educational songs to prevent boredom.**

**• Send notification: This use case allows the system to send notifications to parents when the bus is approaching.**

**• Ride wrong bus: This use case allows the system to detect when a student has ridden the wrong bus and notify the parents and supervisor.**

**• Add camera: This use case allows the system to add cameras to the bus to ensure the safety of students.**

**• Add platform: This use case allows parents to communicate with the school through a platform or group chat.**

**• Determine speed: This use case allows the system to determine the speed of the bus and notify the school if it exceeds the speed limit.**

**• Direct messages: This use case allows parents and supervisors to communicate directly in case of an emergency.**

**• Determine best route: This use case allows the system to determine the best route for the bus to avoid traffic and arrive on time.**

**• Technical support: This use case allows users to contact technical support if they encounter any problems.**

**use case models:**

\*Brief model

a) Nasem

(Primary actor: bus assistant)

-Main function (Tracking student)

When students enter the bus the supervisor gives each one gaps device which connected to central database to let all their movements be seen by parents .and she search if each one has the id or not to open the locker for saving things.

b) Mariam

(Primary actor: parents)

Main function: pay fees by system.

The parents can pay the fees by the same system of the tracking bus by the phone if they cannot go to school. It is easier. And to save the time and effort.

C) Wala

(Primary actor: bus assistant)

-Main function (Record the absence)

When children can't go the school the parents can record the absence of the student if the student is unable to go to school so that the bus has knowledge before it passes on the student, so that the bus will not be late for the rest of the students.

d) Dalia

Primary actor: (bus assistant)

-Main function (Direct messages as a chat) the 🡪Parents logs in to the system, and then the home page appears, they choose a chat icon from the page, and stars talking and interacting with the bus supervisors.

Title chosing the safest road

Primary actor GPS

Using gps to track and determine the safest road

**Casual model**

**A) Names**

**Primary actor (assistant)**

**-Main function (Entertainment student)**

**Within the route assistants who are psychologically qualified operate educational songs and videos according to age**

**- Alternatives scenario: if screens aren't found assistant can tell students stories about specific subject each day or she can help them to make friendship between students by many ways like ask them same question to see similar answers which lead to similar characters.**

**B) Mariam**

Absence registration

(Primary actor: parents”)

Main success scenario:

**Registration mark for Child when he riding the bus by the system.**

**Alternative scenario:**

**If parents cannot register in the system. Can call the assistant in the bus**

**.or the driver .or call the school**

**c) Wala**

**(Primary actor: parents)**

**Main success scenario: -**

**1-The parents logs in to the system, and then the main page appears**

**2-The parents chooses a chat icon from the page, and then starts talking and interacting with the rest of the users of the system**

**3-As soon as the parents clicks on that icon, he will see a platform for school**

**Alternative scenario: -**

**If the system is unable to provide the chat or the platform to the parent, let it be made offline or an assistant, or the parent can go to school himself**

**Primary actor system**

**Sending a notification for the parent to inform hem about the appointment of the payment**

**Alternative**

**If any breakdowns , system will add the fees to the next month and will send a notification later to the parent to information hem**

**\*Dalia**

**(Determine a nearest maintenance center) Primary actor: (driver) Main success scenario: -**

**Linking the application to the global positioning system (Gaps), which will determine the nearest maintenance center for the bus to go to for maintenance as soon as possible**

**Alternative scenario: -**

**If there is no maintenance center close to the bus location or it is not available 24 hours, we make the system provide a technical support team, and then the driver communicates with the team at any time in order to solve the problem as soon as possible.**

**Fully dressed:**

**1-Use case name : presence of direct messages (chat)**

**2-Scope : the school bus tracking**

**3-Level : users goal(parents )**

**4-Primary Actors : parents communicate with the bus supervisor to reassure parents about their children children**

**4-Stakeholder and interests :**

**-parents : will know the condition of the child, in need of something or not, even in any emergency situation**

**-supervisors :You will tell parents easily through chat**

**6-Precondition :Before the parents enter the chat icon, you need to create an account in order to communicate with the children**

**7-Postcondition :After making this function in the system, it facilitated communication between parents and bus supervisors, and the system was also developed**

**8-Main Success Scenario :** **The problem of communicating via chat is the weakness of the internet during correspondence, and messages will arrive late**

**If the system is unable to provide the chat or the platform to the parent, let it be made offline or an assistant, or the parent can go to school himself.**

**10-Special requirements: for the parents,in order to enter the chat they need advice and account for loging**

**11- frequency of occurrence: the function will be sometimes by the parents when they need to communicate with supervisors**

**1-The parents logs in to the system, and then the main page appears**

**2-The parents chooses a chat icon from the page**

**3-As soon as the parents clicks on that icon, He can contact the bus supervisor to follow up on the child's condition**

**\_ Scope: In the same system**

**\_ Level: having the both user goal and managerial goal**

**\_Stake holders parents, school, drivers**

**Primary actor parents, supervisor**

**Precondition**

**1-parents and supervisor will give weekly reports**

**2-reports will be filtered by the manager**

**3- Manger will take an action based on the reports**

**\_post condition**

**It will enhance the attitude of the students and the feedback of the school and more parents will use the system to upload reports**

**\*Salma**

**Casual use case:**

**(Notification for forgotten important things)**

**• Title: Notification for Forgotten Items**

**• Primary Actor: Children, Supervisor, and Parents**

**• Goals in Context: Notify parents if their child forgets an important item and provide options for the item to be brought to school.**

**• Preconditions: Child must inform the supervisor of the forgotten item.**

**• Main Success Scenario: The supervisor sends a message to the parent via the app, offering options for the item to be brought to school.**

**(Notification when arrive)**

**• Title: Arrival Notification**

**• Primary Actor: Parents and Children**

**• Goals in Context: Notify parents when the bus will arrive and remind them if they are busy.**

**• Preconditions: None**

**• Main Success Scenario: Parents receive a notification when the bus will arrive and a reminder if they are busy.**

**Brief use case:**

**(Guide for feature)**

**• Title: App Guide**

**• Primary Actor: Users**

**• Goals in Context: Provide a guide to help users navigate the app.**

**• Preconditions: User has not used the app before.**

**• Main Success Scenario: The user is able to navigate the app with the help of the guide.**

**(Take all data about driver and supervisor)**

**• Title: Driver and Supervisor Information**

**• Primary Actor: Parents**

**• Goals in Context: Provide parents with information about the driver and supervisor for safety reasons.**

**• Preconditions: None**

**• Main Success Scenario: Parents are able to access information about the driver and supervisor, including their photo, ID, full name, and address.**

**(Track the road)**

**• Title: Bus Tracking**

**• Primary Actor: Parents**

**• Goals in Context: Allow parents to track the route of the bus and see the other children on the bus.**

**• Preconditions: None**

**• Main Success Scenario: Parents are able to track the route of the bus and see the other children on the bus for safety and convenience.**

**Fully dressed:**

**(Send weekly report)**

**• Title: Weekly Report**

**• Primary Actor: Parents and School**

**• Goals in Context: Provide a weekly report about the children's activities on the bus to help improve safety and behavior.**

**• Preconditions: None**

**• Main Success Scenario: The app sends a report to parents and the school each week, detailing the children's activities on the bus using AI and camera footage.**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_class diagram:-**

**Parent (1) ------------------------------🡪 (1 \*) enrollment**

**Parent (1) ------------------------------🡪 (1 \*) payment**

**Parent (1) ------------------------------🡪 (0 \*) Feedback**

**Student (1) ------------------------------🡪 (1 \*) Locker**

**School (1) ------------------------------🡪 (1 \*) Report**

**School (1) -----------------------🡪 (1 \*) Supervisor**

**Bus Company (1) ------------------------------🡪 (1 \*) Order**

**Bus Company (1) ------------------------------🡪 (1 \*) Bus**

**Bus Company (1) --------------------------🡪 (0\*) Maintains**

**Bus Company (1) ------------------------------🡪 (1 \*) Driver**

**Driver (1) ------------------------🡪 (0 \*) Technical Support**

**Driver (1) ------------------------🡪 (1 \*) GPS**

**Parent (1) ------------------------------🡪 (1 \*) GPS**

**Bus (1) ------------------------------🡪 (1 \*) GPS**

**Bus (1) ------------------------------🡪 (1 \*) Camera**

**Parent (1) ------------------------------🡪 (1 \*) Order**