SCHOOL BUS TRACKING AND SECURITY SYSTEM

Mr. B. Muthukrishna Vinayagam, M.E.,

(Assistant Professor CSE, Kamaraj college of engineering and technology, Virudhunagar, Tamilnadu, India)

Arunachalam M, Saanmuga kumaar K, Karkuvelayyanar T

(CSE, Kamaraj college of engineering and technology, Virudhunagar, Tamilnadu, India

Email : 16ucse025@kamarajengg.edu.in, 16ucse010@kamarajengg.edu.in, 16ucse005@kamarajengg.edu.in)

----------**********----------

Abstract:

It is important for every school to have a trustworthy and secure transportation service to ensure the safety of the students. The proposed system provides real time information about various parameters of the vehicle like the location, the route. In this system, we make use of face recognition and GPS technologies. GPS module is used to find the current geographic coordinates of the vehicle's location. Camera identifies each student as they board or alight the vehicle. The information can be accessed by the parents through a mobile application and school administration this helps them track their wards effectively.

----------**********----------

I. INTRODUCTION

Children security has always been a priority problem whose solution must constantly be improved. Children safety is importance to their parents. Despite the best safety measures, children, due to their lack of skills to protect them. School bus plays an essential role in carrying most of children everyday all over the world. Millions of children needs to be moved a from home to school and vice versa every day. For parents, obtaining a safe transport for their children is a crucial issue**.**

The commute of students from home to school and back has always been a source of concern for parents. Students often get on the wrong buses and get off at the wrong stops. Bus drivers may not be able to identify all the students and will not know in time if a student is missing. Parents have no way of knowing if their ward is safe until the evening when the bus returns. The proposed system describes a low cost comprehensive school bus monitoring device that tracks the location.

Real time tracking of the bus allows the children to have more time for activities instead of waiting for a delayed bus and the notification system ensures the individual safety of each student. The tracking is achieved by reading the geographic coordinates of the bus from the GPS module and uploading in to a database. This information can then be accessed by a user base that includes the parents, bus drivers and school administration through a mobile application which takes the location from the database and plots it on a map. The notification system alerts the parent when the face recognition from their child's face is read by camera.

II. ARDUINO

Arduino is an open-source platform which is used to build electronics related projects. It consists of a microcontroller and software. This Integrated

Development runs on computer which is used to Write and upload computer code to the physical board.

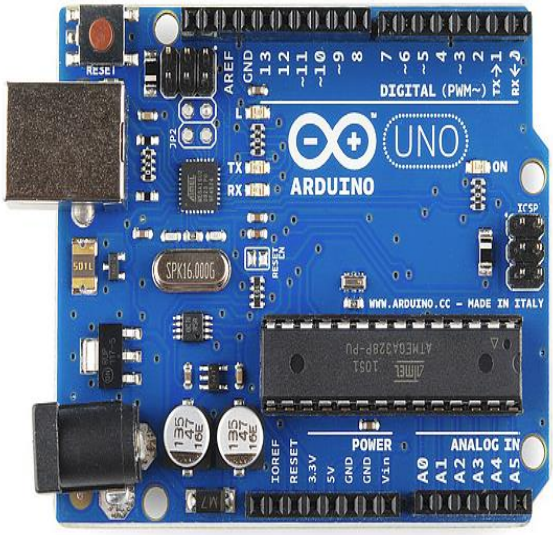

Fig 1.1 Arduino

III. GLOBAL POSITIONING SYSTEM (GPS)

GPS Stands for "Global Positioning System". GPS is a satellite navigation system used to determine the ground position of an object. GPS technology was first used by the United States military in the 1960s and expanded into civilian use over the next few decades.

A Global positioning System is used to find the location and time information. It display the latitude and longitude of a particular location with help of software. This GPS device is connected to Arduino board. The navigation devices, GPS receiver obtain the signal from GPS system

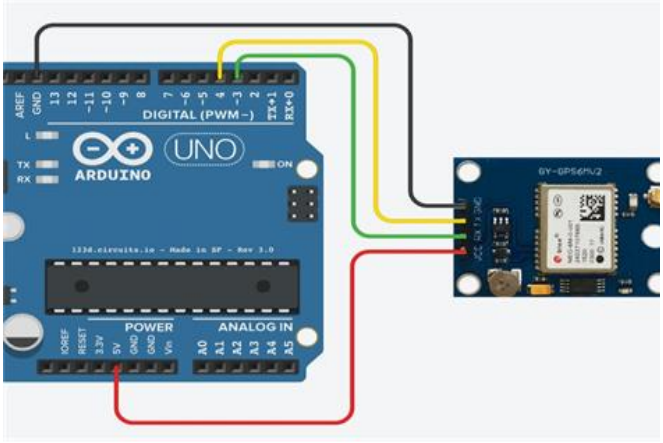

Fig 1.2 GPS module.

IV. Face recognition

The face recognition access control system has quickly become the mainstream choice for access control because it is contact-less, user-friendly, and expandable. FacePass is an upgraded facial recognition access control module, one that quickly conducts facial detection, capture, recognition, and many more functions. A piece of equipment embedded with the HVC-P2 can detect and presume attributes and conditions of a user coming in its vicinity, without the user knowing the presence of a camera, making it possible to provide services deemed most suitable in view of the user's attributes.

Fig 1.3 Camera Module

V. MODULES

A. CAPTURE THE IMAGE

Viola-Jones was designed for frontal faces, so it is able to detect frontal the best rather than faces looking sideways, upwards or downwards. Before detecting a face, the image is converted into gray scale, since it is easier to work with and there's lesser data to process. The Viola-Jones algorithm first detects the face on the gray scale image and then finds the location on the colored image. Viola-Jones outlines a box (as you can see on the right) and searches for a face within the box. It is essentially searching for these haar-like features, which will be explained later. The box moves a step to the right after going through every tile in the picture. In this case, I've used a large box size and taken large steps for demonstration, but in general, you can change the box size and step size according to your needs. With smaller steps, a number of boxes detect face-like features (Haar-like features) and the data of all of those boxes put together, helps the algorithm determine where the face is.

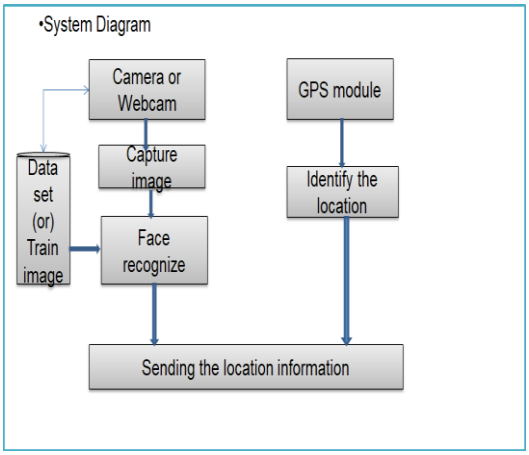

Fig 4.1 System diagram

B. TRAIN IMAGE AND STORE

The algorithm shrinks the image to 24 x 24 and looks for the trained features within the image. It needs a lot of facial image data to be able to see features in the different and varying forms. That's why we need to supply lots of facial image data to the algorithm so it can be trained. Viola and Jones fed their algorithm 4,960 images (each manually labeled). For some images, you can feed the mirror image of a particular image, which would be brand new information for a computer.

You would also need to supply the algorithm non-facial images so it can differentiate between the two classes. Viola and Jones supplied their algorithm 9,544 non-facial images. Within these, some images may look similar to features in a face, but the algorithm will understand which features are more likely to be on a face and which features would obviously not be on a face.

C. FACE RECOGNIZE

- Viola–Jones algorithm which make it a good detection algorithm are:
- Robust – very high detection rate (true-positive rate) & very low false-positive rate always.
- Real time – For practical applications at least 2 frames per second must be processed.
- Face detection only (not recognition) - The goal is to distinguish faces from non-faces (detection is the first step in the recognition process).

The algorithm has four stages:

1. Haar Feature Selection
2. Creating an Integral Image
3. Adaboost Training
4. Cascading Classifiers

The features sought by the detection framework universally involve the sums of image pixels within rectangular areas. As such, they bear some resemblance to **Haar basis functions**, which have been used previously in the realm of image-based object detection. However, since the features used by Viola and Jones all rely on more than one rectangular area, they are generally more complex. The figure on the right illustrates the four different types of features used in the framework. The value of any given feature is the sum of the pixels within clear rectangles subtracted from the sum of the pixels within shaded rectangles. Rectangular features of this sort are primitive when compared to alternatives such as **steerable filters**. Although they are sensitive to vertical and horizontal features, their feedback is considerably coarser.

- Edge features
- Line-features
- Four-sided features

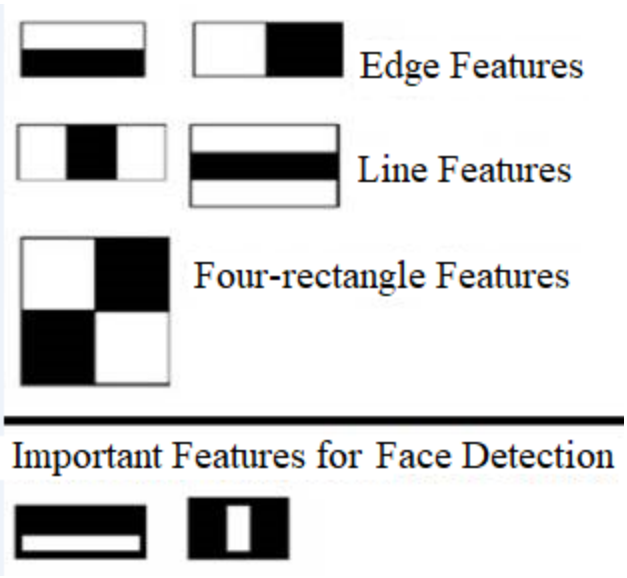

Fig 5.2 Face detection

D. GPS MODULE

The **Location** object represents a geographic location which can consist of a latitude, longitude, time stamp, and other information such as bearing, altitude and velocity. A Global positioning System is used to find the location and time information. It display the latitude and longitude of a particular location with help of software. This GPS device is connected to Arduino board. The navigation devices, GPS receiver obtain the signal from GPS system.

Fig 5.3 Location Tracking

E. NOTIFICATION

Short Message Service (SMS) is a text messaging service component of most telephone, World Wide Web and mobile device systems. It uses standardized communication protocols to enable mobile device exchange short text message.

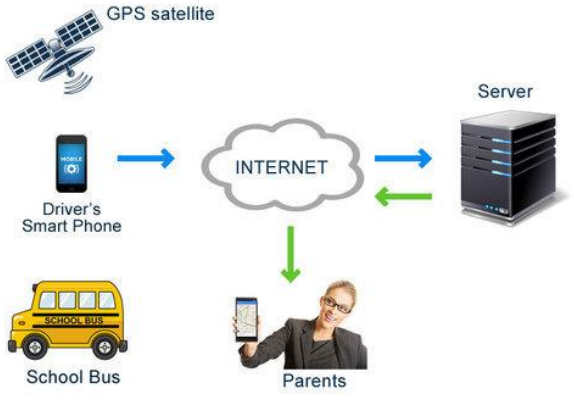

Fig 5.4 Notification.

VI.1 CAPTURE THE IMAGE

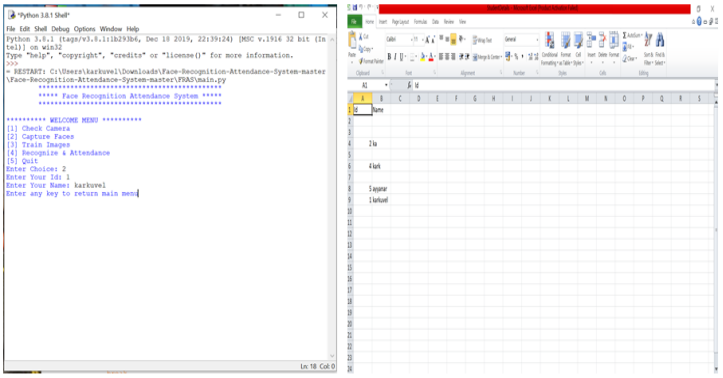

Fig 6.1 Get the student information

The **fig 8** shows the to get the information for each student and store the information to CSV (comma-separated values) file and capture the image for corresponding student.

VI.2 TRAIN IMAGE AND STORE

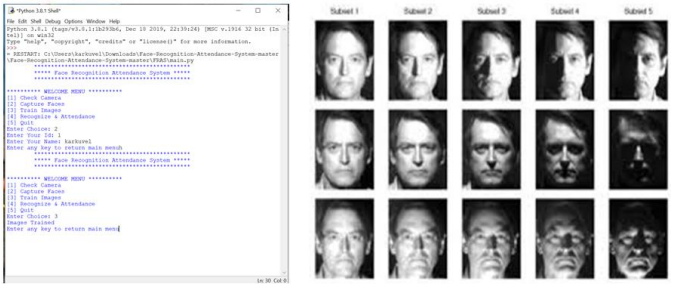

Fig 6.2 Train image

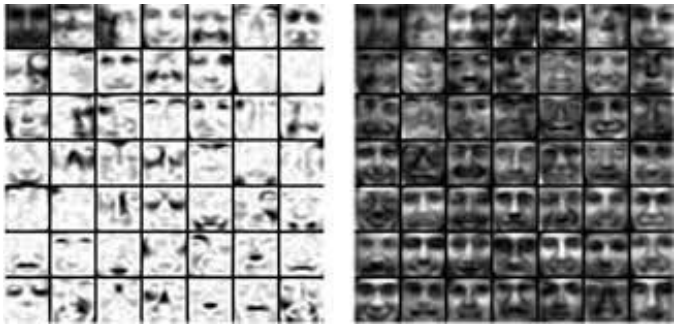

Fig 6.3 Trained image

The capture image to be train using proposed algorithm and store the image. To set the train image to be labeled then the labeled images are arranged at sequence and identify the location.

The train labeled image use to predicate the unknown label image.

VI.3 Recognize and store

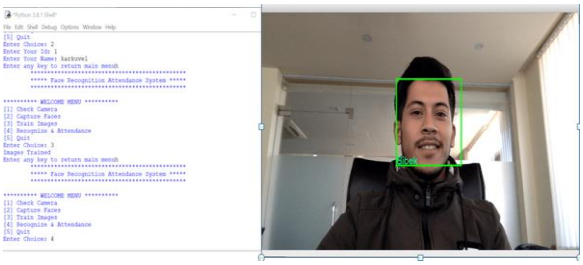

Fig 6.4 Recognize and store

Recognize the face with student id and student name. To compare the capture face to trained image and get information for student.

VI.4 STUDENT INFORMATION

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	Id		Name	Number										
2		5	karkuvel	9791709256										
3														
4		4	hk	9791709256										
5														
6		55	asd	9442092865										
7														
8														
9														
10														
11														
12														
13														
14														
15														
16														
17														
18														
19														
20														
21														
22														

Fig 6.5 Student details

	A	B	C	D	E	F	G
1	Id	Name	Date	Time			
2	1	['kar']	12-03-2020	09:27:12			
3	6	['kj']	12-03-2020	09:27:12			
4	7	['kjh']	12-03-2020	09:27:14			
5	5	['karkuvel'	12-03-2020	09:29:55			
6	8	[]	12-03-2020	09:29:56			
7							
8							
9							
10							
11							
12							
13							
14							
15							

Fig 6.6 Student Information

After a successful recognition the student details are stored in CSV file and sent the location to their parents.

VI.5 Location Tracking

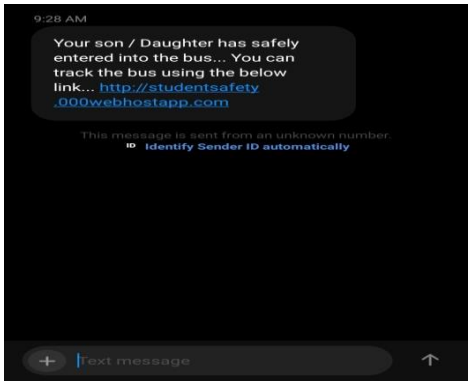

Fig 6.7 Send the location

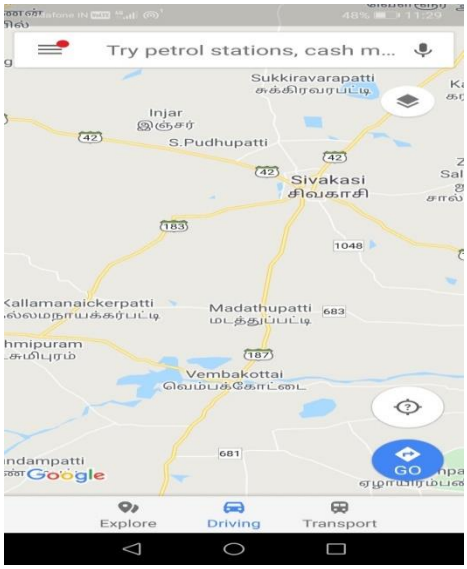

Fig 6.8 Location tracking

After adding the address the location sensor monitor the location using Google Map. When the correct location is reached the notification is sent to their parents mobile number. The location address list are shown in Google map which is represented above.

VI. CONCLUSIONS

School bus tracking and security system is to track the school buses and provide relevant information to their students. The project has described the design and architecture of school bus tracking system. The proposed system is implemented by the use of image processing and GPS location tracker. The system is able to demonstrate its performance to track school bus from any area.

In future the proposed system can be improved and extend the application for all the industries who are all using the transport system. Some other safety measures in security modules will be added, The future implementation also adds the live stream where user can view what is happening inside the bus.

ACKNOWLEDGMENT

We express a unique pleasure and honorable thanking our Secretary **Thiru. S.P.G.C SRI MURUGAN,** our Principal**, Dr. ANANT ACHARY, M.E, Ph.D**., Kamaraj College of Engineering and Technology for giving an opportunity to undertake this project work. We express our immense gratitude to **Dr. M. INDRA DEVI M.E., Ph.D.,** Head of the Department, Computer Science and Engineering and Technology for her encouragement and benevolence in having offered all facilities and accorded all privileges to us to bring out this project successfully. We are greatly indebted to **Mr. B. MUTNUKRISHNA VINAYAGAM, M.E.,** Assistant Professor, Department of Computer Science and Engineering, for his inspiring guidance without which the project wouldn't have attained the level of efficiency it has now. We are indebted to the Department of Computer Science Engineering as a whole for extending their helping hands in completing the project. Last but not least, we would like to thank our teaching and non- teaching staff members who spent their valuable time in giving their ideas during the course of our project. Above all we are grateful to our beloved parents for their moral support.

REFERENCES

Briley Kenney. The best GPS Tracking Watches for Kids: Updated for 2016. Retrieved from http://smartwatches.org/

Barnard, R.W. and Kellogg, C. (2017) "Applications of Convolution Operators to Problems in Univalent Function Theory", Michigan Mach, Vol.27, pp.81–94.

P. Verma, J.S.Bhatia, "Design and Develo Tracking System with Google Map based Monitoring", International Journal of Computer Science, Engineering and Applications (IJCSEA), vol. 3, no. 3, pp. 33-40, 2013.

T. Ahonen, A Hadid, M. Pietikanen, Face Recognition with Local Binary Patterns. University of Oulu, Finland. 2011.

D. Yi, R. Liu, R.-F. Chu, Z. Lei, and S. Z. Li, "Face matching between near infrared and visible light images," in Proc. Int. Conf. Adv. Biometrics, 2014, pp. 523–530.

Manash Pratim Gohain, Speed Governors, GPS must for school buses,The Times of India,February 24,2017

Pham Hoang Oat, Micheal Drieberg and Nguyen Chi Cuong , Development of Vehicle TrackingSystemusingGPS and GSM Modem , 2013 IEEE Conference on Open Systems (ICOS), December 2 - 4, 2013, Sarawak, Malaysia.

Sabira Khanam, Maliha Mahbub, Anuradha Mandal, M. Shamim Kaiser and Shamim Al Mamun,"Improvement of RFID Tag Detection Using Smart Antenna For Tag Based School Monitoring System",International Conference on Electrical Engineering and Information & Communication Technology (ICEEICT) 2014.

Pengfei Zhou; Yuanqing Zheng; Mo Li, "How Long to Wait? Predicting Bus Arrival Time with Mobile PhoneBased ParticipatorySensing,"MobileComputing,IEEETransactions on, vol.13, no.6, pp.1228, 1241, June 2014.

P.J. Phillips, H. Moon, S.A. Rizvi and P. J. Rauss, "The FERET Evaluation Methodology for Face-Recognition Algorithms", *IEEE Trans. Pattern Analysis and Machine Intelligence*, vol. 22, no. 10, pp. 1090-1104, Oct. 2010.