Biometric School Bus Security System

C. Anitha, S. Keerthi, G. Sathish Kumar and S. Susikala

***Abstract*---**In present time due to increase of kidnapping and road accident cases. Parents always worry about their children. This paper recommends a SMS based solution which assists parents to track their children in real time. To identify the identification of the child a face recognition and finger vein recognition is used which is in built in the system. Whenever a child boards a bus, these recognition techniques are used to identify the children and will send a text message to the parents. The paper also proposes security system such as monitoring the bus for the children entering nearby the wheels.

***Keywords*---**Bus Safety System, GSM Modem, Camera, PIR Sensor.

I. Introduction

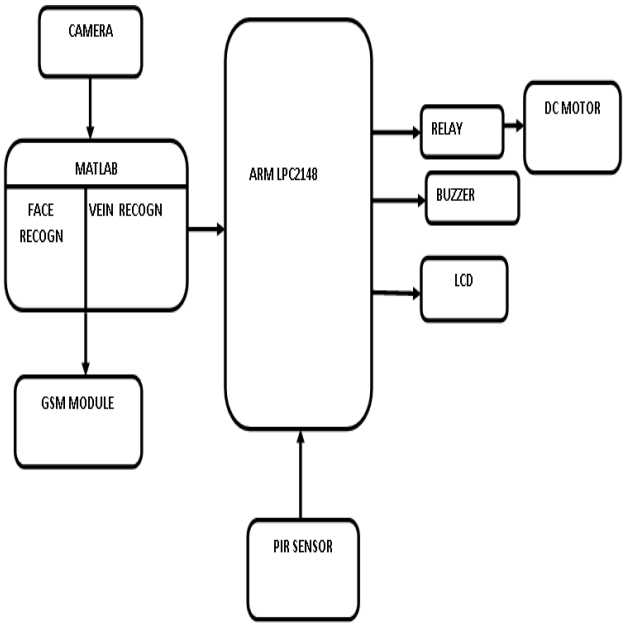
IN millions of children need to commute between homes to school everyday. Safer transportation of school children has been a critical issue as it is often observed that, kids find themselves locked in the school bus at the bus stop after going to school, they miss the bus, or ride the wrong bus with no way to track them. Student during their entry and exit from the difficult to be controlled by drivers. This has often led to the death of many students on account of suffocation due to lack of attention of drivers.

II. Existing System

There are many existing methods are available for the biometric school bus security system but those method are not available in the market at the lower price**.** GPS and SMS Based Tracking, RFID Tag and ID card based Tracking, No automatic alerts on bus station, Children identity can only monitored by ID Cards, Child to carry an extra kit every time he goes to the school.

III. Proposed Method

Present a system using biometric features for e.g. the school children track biometric system while entering into the bus pupils scan their face and finger vein across a camera and PIR Sensor used for monitoring a children in bus whether they are move near to the wheels of the bus. If the image captured by the camera resembles in the database then only the DC motor gets run and the bus door gets opened



A. ARM Processor

16/32-bit ARM7TDMI-S microcontroller in a tiny LQFP64 or HVQFN package. 8/16/32 KB of on-chip static RAM and 32/64/128/256/512 KB of on-chip flash program memory.128-bit wide interface/accelerator enables high-speed 60 MHz operation. In-System Programming/In-Application Programming (ISP/IAP) via on-chip bootloader software. Single flash sector or full chip erase in 400 ms and programming of 256 B in 1 ms. Embedded ICE RT and Embedded Trace interfaces offer real-time debugging with the on-chip Real Monitor software and high-speed tracing of instruction execution Up to nine edge or level sensitive external interrupt pins available. 60 MHz maximum CPU clock available from programmable on-chip PLL with settling time of 100 µs.

B. PIR Sensor

Passive Infrareds Sensors are electronics devices which are used in some security alarm systems to detect motion of a infrared emitting source usually a human body. The pyro electric sensor made of a crystaline material that generates a surface electric charge when exposed to heat in the form of infrared radiation. When the amount of radiation striking the crystal changes the amount of charge also changes and can then be measured with a sensitive FET device built into the

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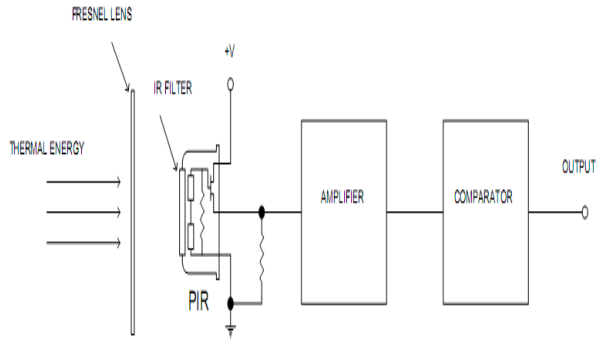
sensor. This radiation is invisible to the human eye but can be detected by electronic devices design for such a purpose.



C. Block Process

The IR325 sensor has two sensing elements connected in a voltage bucking configuration. This arrangement cancels signals caused by vibration temperature changes and sunlight. A body passing in front of the sensor will activate first one and then the other element whereas other sources will affect both elements simultaneously and be cancelled. The radiation source must pass across the sensor in a horizontal direction when sensor pins 1 and 2 are on a horizontal plane so that the elements are sequentially exposed to the IR source. A focusing device is usually used in front of the sensor.

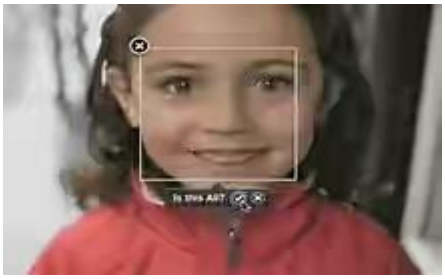
D. GSM Module

SIM900 GSM modem is used in this implementation as it allows sending SMS to the management of the school via internet. This modem is a type of modem that accepts SIM card, and operates through a subscription to a mobile operator. It works like a mobile phone for sending and receiving SMS or MMS through radio waves. It is slim and compact, the main advantage of choosing this particular modem is, I t has low power consumption. This modem has a GPRS feature that allows transmitting the data via the internet in different methods such as SMS, GPRS, or CSD.GSM modems connectivity was tested using TMAS GSM-GPRS modem test program with AT commands that are responsible for sending and receiving SMS calling.

GSM MODULE

E. Face Recognition

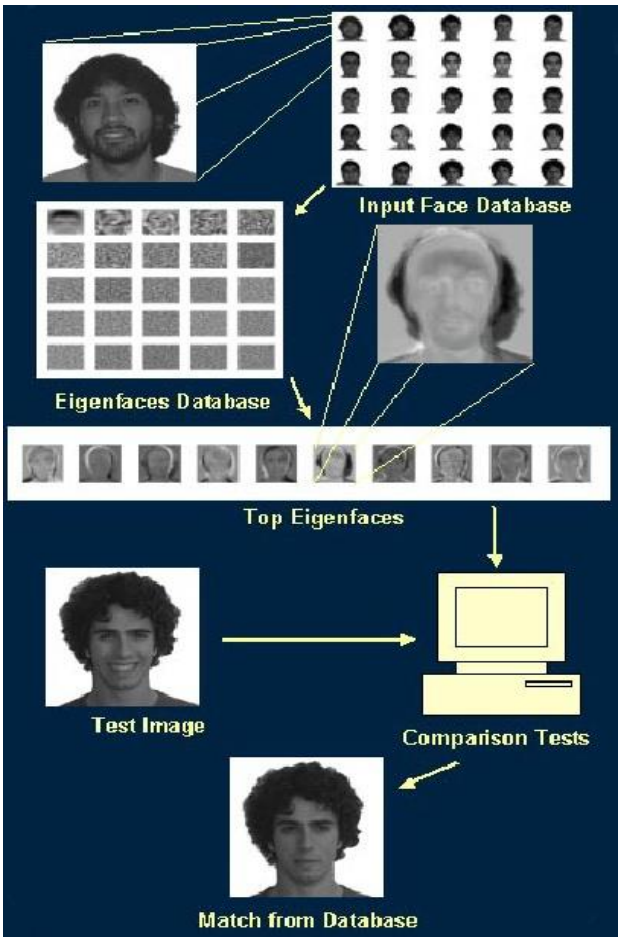
Face recognition consists of finding out if a face image of a person matches face images stored in a database. Face recognition and matching is a difficult problem due to various factors such as different illumination, facial expressions and rotation. However SIFT features invariance to image rotation and scaling, changes in lighting, 3D camera view point and partial occlusion, make them suitable for face recognition. The SIFT algorithm transforms images into scale-invariant coordinates relative to local features and consists of four main stages of computation: scale-space extrema detection, keypoint localization, orientation assignment and keypoints descriptor. The SIFT features extracted from an image consist of 1×128 vectors which are orientation-invariant and 1×4 vectors which represent location, x & y coordinates, scale and orientation. For comparing images, only the 1×128 vectors are used here.



IV. Details of the Algorithm

The face recognition algorithm was written in Matlab and based on the code provided by Lowes [1]. SIFT usually generates a large number of features and the number of features generated from an image cannot be predicted. For instance, face images tends to have different number of features. To overcome this problem, simple classification such as Nearest Neighbour is used. The code provided by Lowes already contains a classification approach based on K-d tree algorithm. The image set provided for this post contains images of 18 persons. Each person in the set has at least 10 images. Ten images of each person were put in a training set and the rest of the images were used for test images. So the training set consists of 180 images. For the purpose of face recognition, the SIFT features of the training images are extracted and stored in a database. The training images are also assigned a group number such that the face images of the same person have the same group number. Then, to match an image from the test set to the training images, the SIFT features of the test image is extracted and each feature of the test image is compared individually with the training database. The best matching features are found by calculating the Euclidean distance between the features vectors. A feature from the test image matches a feature in a training image if the distance between the 2 features is the least and is below a threshold. The training image with the highest number of matches is said to correspond to the test image. The test image is then assigned to the group number of the training image. The group number therefore tells the user which person is the

closest match with the test image. In cluttered images such as Figure 1 shown above, the SIFT algorithm will extract features from the background as well. Many of these background features will produce false matches. To prevent this, a face detection algorithm based on Viola Jones Object Detection was written and included in the code [2][3]. The Object detection uses Open CV trained classifiers. The face detection locates the face region on the image and then crops the image up to the detected region. The face detection not only reduces the number of features/descriptors but also speed up the image matching computation. To create the training database, the training images are run in a script one by one. The face detection algorithm is run on the image and it is cropped to the detected region. The SIFT algorithm is then run on the cropped image and the resulting features are saved in a structure. For comparing a test image with the training data, the test image is first run through the face detection and then the SIFT features are extracted from the cropped image. Then the keypoint is classified using a classifier. For this post, the classifier used, is based on the code by Lowes.



V. Conclusion

Existing system is studied and finds out there limitation. To overcome limitation of existing system new system is proposed. This proposed system will increases the performance and reliability of school bus security system. Also proposed system is facilitating with USB OTG and graphics LCD for good performance and reliability. Proposed system will overcome the limitations such with memory, cost of system, performance, power consumption, reliability, compactness and good look. With such system parents can know route of bus, location of bus and pick drop point of their children status, alert system, face and vein recognition, without any trouble. Hence need of such system in modern busy life is very essential.

VI. Future Work

We are searching for the face recognition HMM (Hidden Marko Model) and in future we were going to implement this circuit to our project.

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