

ARM 9 BASED REAL TIME CONTROL AND VEHICLE THEFT IDENTITY SYSTEM

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Abstract - In today's world as the population increases day by day the numbers of vehicles also increases on the roads and highways Because of uncertain environment the ratio of vehicle loss or theft increases rapidly. Because of this is company of car has the authority for taking steps to protect the permission for the owners and also in built the anti theft system to prevent the vehicle from theft or loss. The aim of this is to give security to all vehicles and protect them for unauthorized approval. The proposed security system for smart and advance cars used to protect them from loss using Advanced Reduced instruction set computer Machine (Advanced RISC Machine) processor. It Calculate the real time user validation using face recognition, by using the Principle Component Analysis (PCA) algorithm. According to the Real time comparison result (valid or not), ARM processor performs certain actions. If the result is not matched means ARM generate the signal to block the car approvals(i.e. Generate the signal to car engine to stop its Certain action) and inform the owner about the unauthorized approval via Multimedia Message Services with the help of Global System for Mobile (GSM) modem. Also it can be send the real time location of the vehicle using the Global Positioning System (GPS) as a Short Message Service (SMS). This system enables the owner to observe and track his/her vehicle and find out vehicle movement and past activities of the vehicle.

1. INTRODUCTION

In today's world as the population increases day by day the numbers of vehicles also increases on the roads and highways. A vehicle tracking system consists of an electronic device installed on a vehicle so that it could be track by its owner or a third-party for its position. The aim of this is to give security to all vehicles. This system enables the owner to observe and track his/her vehicle and find out vehicle movement and past activities of the vehicle.

2. PROPOSED SYSTEM

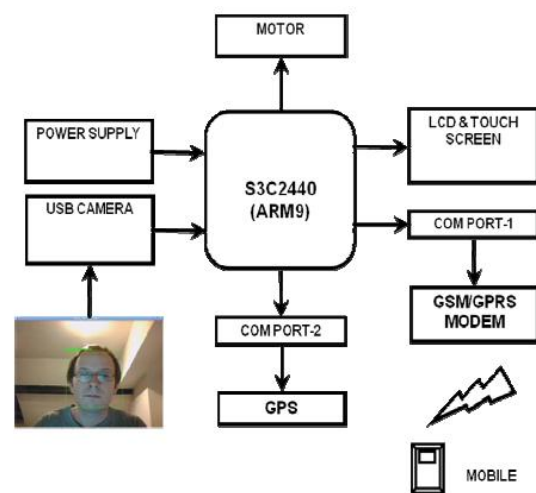


Fig -1: Block Diagram of Proposed System

In our project, we propose extendable emergency response system for smart vehicle to protect them from theft using Advanced RISC Machine (Advanced RISC Machine) processor (RISC means Reduced Instruction Set Computing). In this method, the Face Detection Subsystem

Key Words: Advanced RISC Machine (ARM), Reduced Instruction set Computing (RISC), Multimedia Message Services (MMS), Principle Component Analysis (PCA), Short Message Services (SMS).

(FDS) aims at detect somebody's face (who try to access the car). We can get the common Eigen values of the person using PCA algorithm and it compares the Mathematical Value of database image. If the person matches vehicle starts or owner will get MMS and GPS values of the vehicle location as SMS.

2.1 Face Detection System (FDS)

Face is one of the most acceptable biometrics - based authentication methods, because of its nonintrusive nature and because it represents a common method of identification used by humans in their visual interactions. This algorithm extracts face portion alone from the photo taken by a Camera.

2.1.1 Image Acquisition Subsystem

A camera installed in the vehicle, which capture image and sent it to face detection and face recognition stage. The acquired images should produce distinguishable features that can facilitate the subsequent image processing. In real vehicles, a moving vehicle presents new challenges like variable lightening, changing background and vibrations that must be haven in mind in real systems.

2.2 Principle Component Analysis (PCA)

The PCA algorithm is based on an information theory approach that divide face images into a small set of similar feature images called "Eigen faces." which is the principal components of the images in database. Process of recognition is performed by projecting a new image into the subspace spanned by the Eigen faces ("face space") and then classifying the face by comparing its position in face space with the position in face space with the positions of known individuals. Fig. 3.2 shows the flow chart of PCA algorithm.

The stepwise algorithm for face recognition is as follows:

1. All training set images are resized and converted into a single vector.
2. The test image is resized and converted into a single vector.
3. The mean image of all training set images plus test image is calculated.
4. Then the mean image is subtracted from each image of the training set as well as from the test image. After subtraction we will get new images called as difference images.
5. All difference images of training set as well as test image are converted in to a column vector i.e. column-wise concatenation of all images.
6. Then using covariance matrix the Eigenvector and Eigen values are calculated. Each Eigenvector belongs to one of the Eigenface.

7. Using product of each Eigen-images difference images will get the weight vector of each class as well as the weight vector of the test image.

8. Then the weight of the test image is subtracted from each weight vector of the difference image.

9. Then the distance of each class of the images in the database is calculated.

10. The class having the minimum distance, the test image belongs to that class.

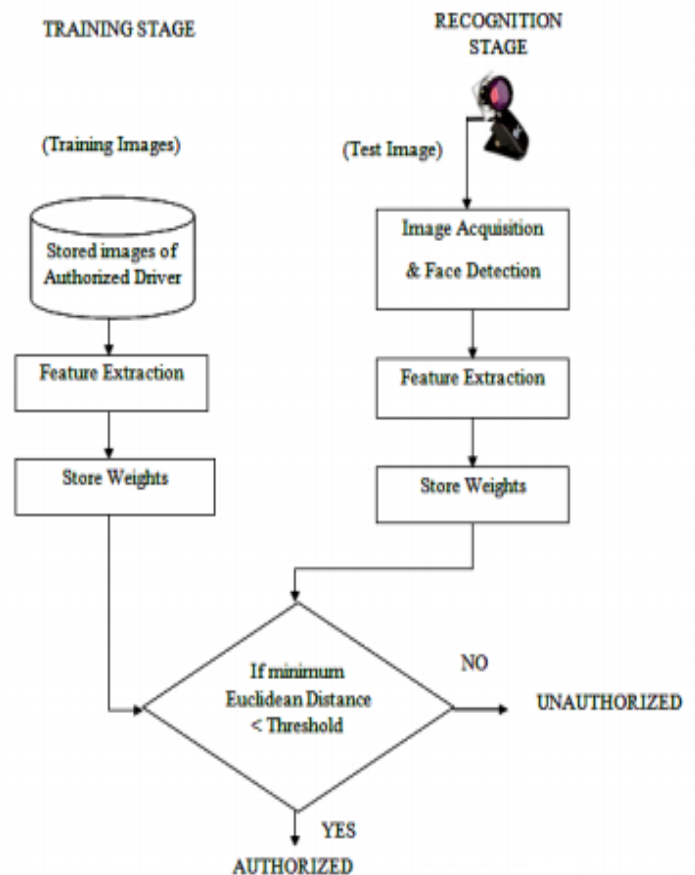


Fig -2: The flowchart for PCA algorithm

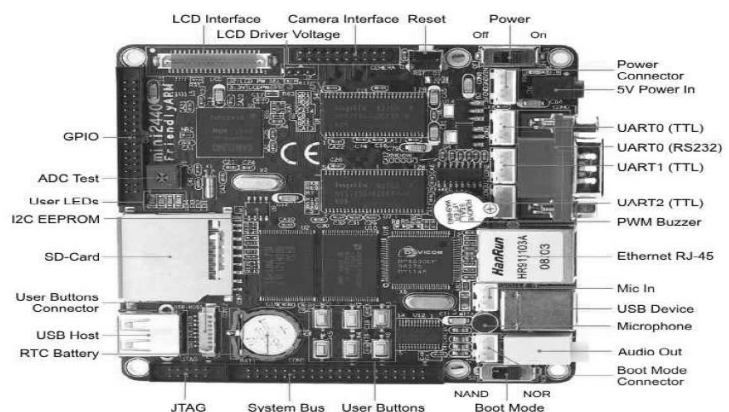


Fig -3: The ARM Mini2440

2.4 GPRS/GSM Module

A GSM module that works with a GSM wireless network. When a GSM modem is connected to a personal Computer, it allows the Personal computer to communicate over the mobile network by using the GSM modem. A GSM modem can be an external device (specially used for laptop systems). Usually, GSM modem is connected through USB cable. Like a mobile phone, a GSM modem requires a SIM card.

2.5 GPS Module

The Global Positioning System (GPS) is the receiver system that collects data from the satellites and calculates its location anywhere in the world based on data it gets from the satellites. It provides reliable positioning, navigation services to worldwide users on a continuous basis in all day and night.

2.6 Algorithm for Proposed System

Following steps explain the working of the project:

1. Initially switch ON the power supply for boards ARM9, GPRS and GPS.
2. Take the image from the camera.
3. Then save the image.
4. Like this capture and save the image for 16 times.
5. From 16 images retrieve the common Eigen values.
6. Create database of 16 images
7. Store generalized Eigen values in XML file.
8. Now click on the recognize button.
9. Then it compares the Eigen values of the face.
10. If the image matched, start the motor.
11. If not matched buzzer initialized and send MMS of the face.
12. Send GPS values as SMS.

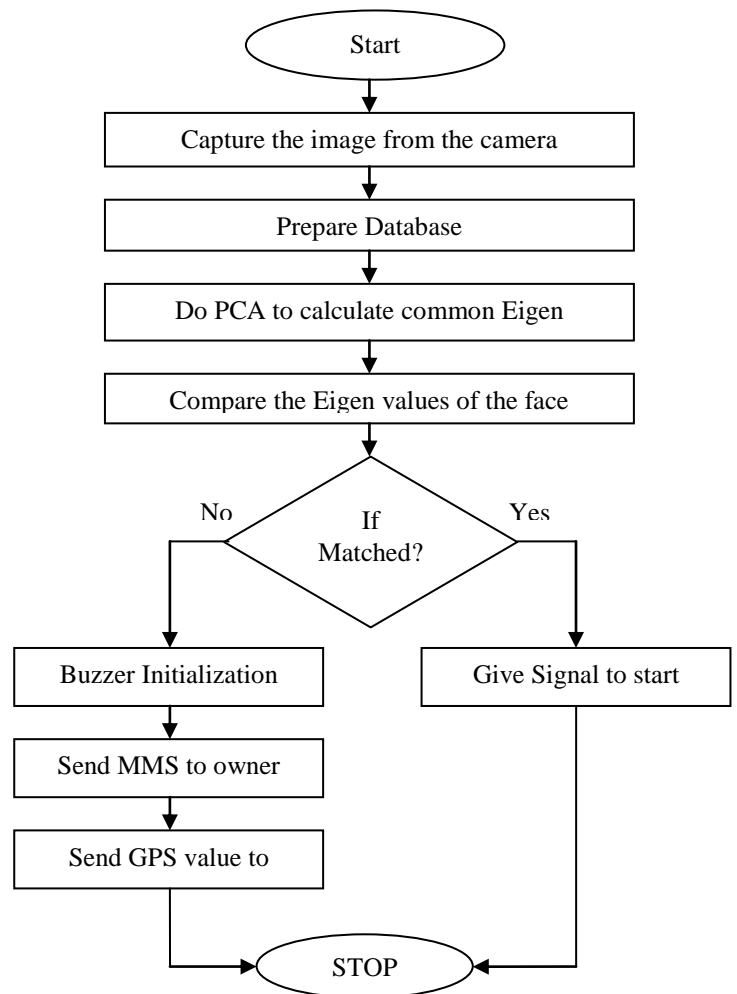


Fig -4: Flowchart of Proposed System

3. EXPERIMENTAL RESULTS

In this project, the real time face recognition is performed by using the PCA method with the help of web camera.

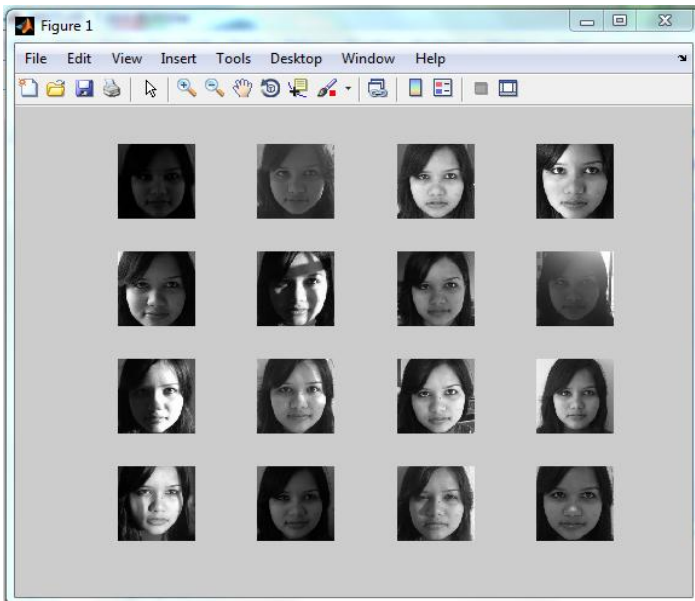


Fig -5: Screen Shot 1

Fig 5 shows the screen shot after the collection of the gallery images. Then any person getting in to the carry it will compares if matched motor will starts i.e it will signal to the car to start otherwise the unauthorized person image will send as MMS to the owners mobile which shows the below Fig 6.

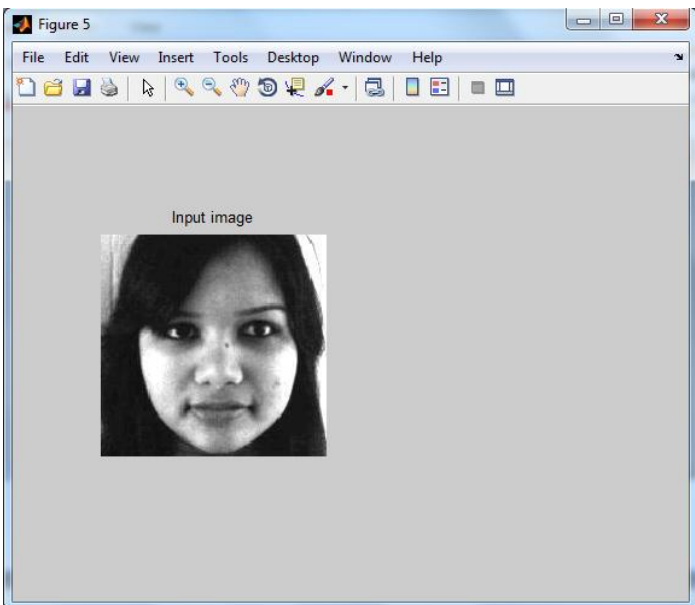


Fig -6: Screen Shot 2

Then any other person want to start vehicle it will compares If the result is not Valid means ARM Generate the signal to block the car approval and the unauthorized person image will send as MMS to the owners mobile which shows the below Fig 7.

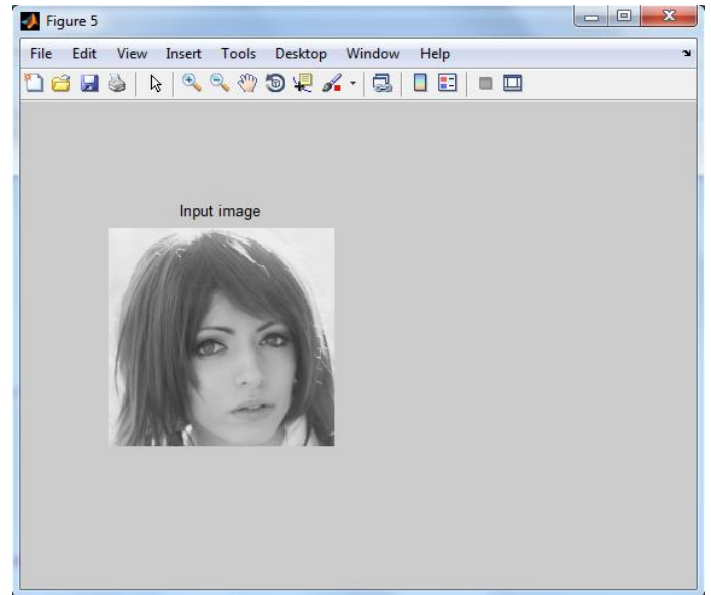


Fig -7: Screen Shot 3

4. CONCLUSIONS

When compared with the existing system the advantage of this project is that we can prevent the vehicle theft by using face recognition. In the existing methods the camera captures owner's image only. If the other person wants to start the vehicle it will not start. To overcome this one, we can store multiple faces into the memory. If anybody wants to start the vehicle, the system compares the person's image with the all stored images. If the image is matched the motor will start otherwise, the intruder person's image will go to the owner's mobile. In future we can extend this by sending the information to police control room for taking certain action.

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