Advance in Electronic and Electric Engineering.
ISSN 2231-1297, Volume 3, Number 6 (2013), pp. 733-738

http://www.ripublication.com/aeee.htm

Automobile Security System Based on Face Recognition Structure Using GSM Network

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Abstract

In this proposed embedded automobile security system face detection system (FDS) is used to detect the face of the driver and compare it with the predefined face. In the night when the vehicle owner is sleeping and someone has theft the vehicle, then FDS obtains the images by one tiny webcam which can be hidden in the steering. FDS compares the obtained image with the predefined if the image doesn't match, then the information is sent to owner through MMS. So now owner can obtain the image of the thief in mobile and trace the location of the vehicle using GPS.The location and speed of the vehicle can also be displayed to owner through SMS. This face detection system uses the optimized algorithm and detects the face in the cars during the period and in which nobody should be in the vehicle and makes an alarm loudly.

1. Introduction

The main aim of this paper is to offer an advanced security system in automotive, in which consists of a face detection system a GPS module, a GSM module and a control platform. The face detection system bases an optimized algorithm and detects faces in vehicles especially four wheelers during which nobody should be in the car, and make an alarm loudly.

This system is built on an embedded platform in which one system on a chip (SOC) named "SEP4020" (at 100MHz) controls all the processes. The automobile security system design and analysis are constantly improving in the embedded

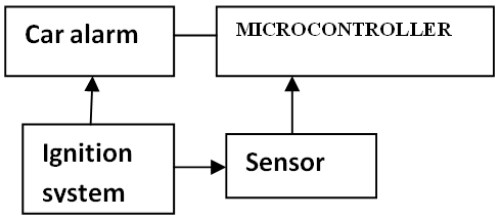
platform. New techniques such as the biometric recognition and image processing techniques have been integrated into the automotive industry.

Face detection system have been studied in the recent years and it is an important computer vision problem with applications to surveillance, multimedia processing and consumer products. Many new face detection techniques have been developed to achieve higher detection rate and faster. In this embedded smart automobile security system, FDS aims at detect somebody's face in the vehicle during the time in which nobody should be in the vehicle.

When FDS detects one face in alarm period, one alarm signal will be sent to the control central of the system. In silent alarm pattern, no direct alarm will be made, but several modules are working at inform owner and the police several important data, for example precise location of the vehicle.

The GPS module obtains the precise locality by parsing received GPS signal. The GSM module can send the information out by SMS and the location of the vehicle. The process is controlled by embedded central module, including images, face detection and communicating by IIC bus interface.

2. Block diagram of the existing system:



Traditional automobile security systems rely on sensors which are more costly. When one vehicle is really lost, no more description could be valid to help people to find it back. We put forth the face detection technique to be applied in security because this kind of technique is effective and fast, and one alarm could be given to make a call to the police and the host soundlessly with the help of the other modules in the system prototype.

3. Description of the block diagram:

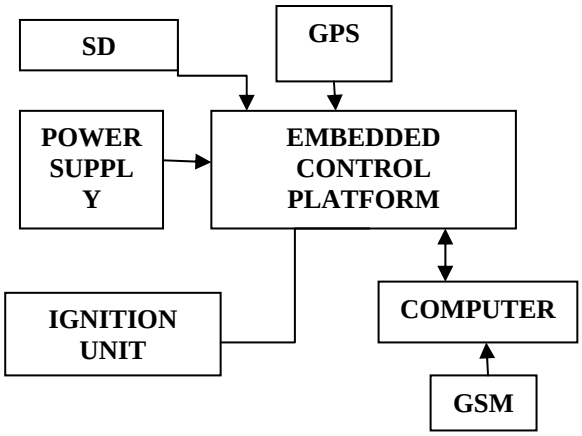
The present existing security alarm system are still of no match to the well-equipped thieves. It is just a matter of seconds to break through the system. This paper introduces and describes a GSM based controlled automobile security system offering higher level of vehicle security features. The mobile controlled vehicle security offers many features of an effective two-way communication between the alarm system and the owner. This system is able to notify the owner immediately when intrusion is detected. Additionally the owner can remotely control any of the features anytime at

anywhere via a phone call. Based on the GSM positioning concept, this system has the potential to provide location information to assist in stolen vehicle recovery therefore providing enhancement over the conventional alarm system.

The existing system has the demerits like only alarm system exists, can't be controlled via a network, after vehicle is theft its position can't be detected, face of the person can't be identified.

4. Smart security system:

4.1 Block diagram:



It consists of a PC memory unit it stores the different driver image. FDS is used to detect the face of the driver and compare it with the predefined image. If the image doesn't match then the information is send to the owner through the multimedia messaging service. Owner can trace the location through GPS. This system owner can identify the theft image as well as the location of the vehicle.

The security system has a built in memory card module to store the image of the owner and family members. During driving the camera will capture the image of the person who is driving and compare it with the original image. If both the images are matched perfectly then there is no problem. The image processing is done such that the skin tone provides a contrast between the face and the background and thus rotation or movement of face is not taken into consideration. If the car is theft then the image processing plays a vital role. The thief photo is captured and it is compared with the photos available in the memory card and suspects that there is no perfect match. At this instant the GSM module is alerted such that the photo of the thief is sent as a multimedia message to the owner as well as to the nearest police station. The GPS tracker will track the location and speed of the vehicle and immediately alert the nearest toll gate to issue that vehicle is stolen and to cease the vehicle.

5. Working:

The AC voltage typically 220V RMS is connected to the transformer which steps down the level of the AC voltage down to level of desired DC output. A diode provides the full wave rectified voltage that is initially filtered by a simple capacitor filter.

The embedded unit basically consists of the microcontroller having four ports. Port 0 is the external port and other three internal ports. The heavy devices like motor, alarm devices are connected to port0. This microcontroller used to transmit and receive the data's.

The serial communication has the MAX 232 IC and two serial ports, one serial port connects the GSM module and other connects the GPS module. Serial communication is basically the transmission or reception of data one bit at a time. Today's computer generally addresses data in bytes. Every characteris actually represented as 1 byte. The serial port is used to convert the byte to a stream of ones and zeros as well as to convert a stream of ones and zeros to bytes. The serial port contains the electronic chip called the universal asynchronous receiver/transmitter (UART) that actually does the conversion.

6. Face Detection algorithm:

Object detection and tracking are important in many computer vision applications including activity recognition, automotive safety, and surveillance. In this we developed a simple face tracking system by dividing the tracking problem into three separate problems:

1. Detect a face to track
2. Identify facial features to track
3. Track the face.

Before we begin tracking a face, we need to first detect it. Use the CascadeObjectDetector to detect the location of a face in a frame. The cascade object detector uses the Viola-Jones detection algorithm and a trained classification model for detection. By default, the detector is configured to detect faces, but it can be configured for other object types.

We can use the cascade object detector to track a face across successive frames. However, when the face tilts or the person turns their head, you may lose tracking. This limitation is due to the type of trained classification model used for detection. To avoid this issue, and because performing face detection for every video frame is computationally intensive, this uses a simple facial feature for tracking.

Once the face is located, the next step is to identify a feature that will help you track the face. For example, we can use the shape, texture, or color. Choose a feature that is unique to the object and remains invariant even when the object moves.

In this paper, we use skin tone as the feature to track. The skin tone provides a good deal of contrast between the face and the background and does not change as the

face rotates or moves.With the skin tone selected as the feature to track, we can now use theHistogramBasedTracker for tracking. The histogram based tracker uses the CAM-Shift algorithm, which provides the capability to track an object using a histogram of pixel values. In this the Hue channel pixels are extracted from the nose region of the detected face. These pixels are used to initialize the histogram for the tracker. Thispaper tracks the object over successive video frames using this histogram.

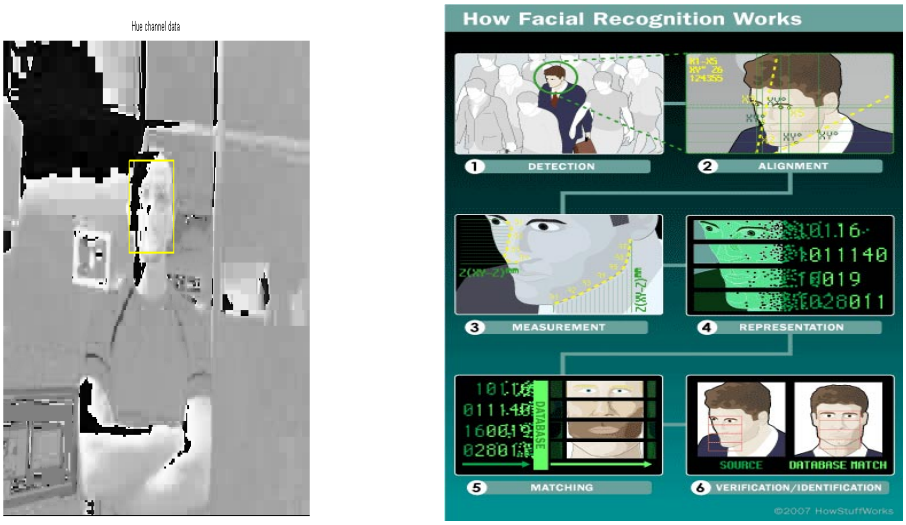


Fig. 1: Face detection algorithm.

7. Conclusion:

From this we implement image recognition techniques that can provide the important functions by advanced intelligent automobile security, to avoid vehicle theft and protect the use of unauthenticated users. Secured and safety environment system for automobile users and also key points for the investigators can easily find out the hijacked image. We can predict the theft by using this in our daily life. This paper will help to reduce the complexity and improve security, also much cheaper and smarter than traditional one's.

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