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AUTOMATION OF VEHICHLE THEFT IDENTIFICATION SYSTEM USING WLD TECHNIQUE

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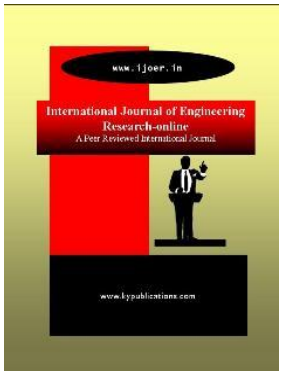

ABSTRACT

Vehicle theft is one of the major problems in the world. To reduce the vehicle theft, a low-cost vehicle theft control unit for embedded smart car security system which consists of an ICU, a GPS module, a MMS module and a control platform is introduced. In the data base, the image of the vehicle owner is stored. So, the authorized person can only use the vehicle. If a unauthorized person tries to theft the vehicle, immediately the ICU system will compare the image stored in the database with image of the unauthorized person taken by the camera in real time. The alert message with the photo of the thief is sent to the owner with the help of the MMS. At the same time the location of the moving vehicle is gathered through the GPS. The owner will also be able to stop the vehicle by engine control. In this modern world, several new techniques have been incorporated into car security systems like biometric recognition technique, communication technique, image processing technique and so on. At the same time, the amount of vehicle theft still remains high. Conventional car security systems rely on lot of sensors and cost a lot. When one car is lost, no more feedback could be valid to help the people to find it back. This ICU fulfills the need of car security so as to prevent car thefts which is easier in case of the car locking systems.

Key Words: ICU, MMS, GPS, engine control, locking systems

INTRODUCTION

In recent years, vehicle thefts are most important crux in the world. At the present time the available anti theft vehicular systems are much more expensive. Many people are installed the vehicle theft control system in

their vehicle for avoiding the theft. Here, the main goal is to reduce the vehicle theft with the developing of simple and low cost control scheme. The main components of this scheme are microcontroller, one hidden camera, a GPS and one mobile. The mobile makes the communication between the vehicle owner and the control module placed in the vehicle. The MMS is the one of the most and popular application in the mobile. Everyone has to be used that application easily. In this scheme the MMS helps to identify the thieves' image for further processing. Nowadays the thieves are theft the vehicle very easily even it is secured. But this scheme, act as a critical threat for the vehicle thieves. By this scheme, the vehicles are easily located with higher accuracy. The control unit is based on the MMS technology, which is very developed now. The exact location of the vehicle information is gathered through the GPS module. This control scheme can be developed with low cost and it is more suitable to the practical implementation.

II.PROPOSED SYSTEM

In the image comparison unit the photo of the vehicle owner is stored as data base image. If an unauthorized person will try to theft the vehicle, the camera will capture the photo of the theft person. The photo of the unauthorized person and database image will be compared with the help of the face detection system. If the image does not match means the photo of the unauthorized person is sent to the vehicle owner through MMS [7]. Then the vehicle owner will able to control the vehicle using engine control [4],[6]. The exact location of the vehicle position is detected with the help of the GPS module [4]. The vehicle location information is sent to the owner's mobile. So, the vehicle owner easily identifies the theft vehicle. Here ARM 7 controller has been used.

In the ICU section, the first stage of recognition starts with face detection module. The face detection helps to crop only the face region. The cropped face region has the normalized intensity size and shape of the original face image. The granulation process and feature helps to match the face image before and after the face detection process. The Gaussian operator performs the convolution of each of the constituent images by iterative with a 2-D Gaussian kernel and generates the low pass filtered image sequences. Then, DOG pyramid will be formed from successive iterations of Gaussian images. To provide the edge information, noise, smoothness, blurriness and noise present in a face image, the facial features are segregated at different resolutions by this granulation approach. In features extraction stage, WLD descriptor represents an image as a histogram of differential excitations and gradient orientations, and has several properties like noise and illumination changes, detection of edges and powerful image representation. These features are useful to distinguish the maximum number of samples accurately and it is matched with already stored original face samples for identification. The simulated result will be compared with the data base image features. Finally the output will be provided by the decision unit.

III. ICU SYSTEM

The technique presents robust face recognition based on granular computation and spatial features extraction [2]. The face biometric based person identification plays a major role in wide range of applications such as surveillance and online image search. It is process to extract face regions from input image which has normalized intensity and uniform in size. The appearance features are extracted from detected face part which describes changes of face such as furrows and wrinkles (skin texture).In this system model, an executable (.dll-dynamic link library) file is utilized to extract face region. It is used for face detection process is based on haar like features and adaptive boosting method. The face region will be described by extracting its appearance by weber's local features extractor. This process involves two stages of features detection such as differential excitation and gradient orientation. This features detector will be analyzed the image locally to extract spatial information for discriminating an illumination changes. This approach is used to represent the facial information in several parts to extract the features and discriminate presence of variations such as pose, expression and illumination. To detect face granules, 2D Gaussian low pass filter is used to generate difference of Gaussian between two successive filtering at each reduced version of image. At each iteration level, the

image will be down sampled to desire size to make difference of Gaussian pyramid. These granules are used to provide facial features such as smoothness, edge details and blurriness.

It is fast and easy approach and it has better discriminate power than features extraction methods. The simulated results will be shown that used granulation and hybrid spatial features descriptors has better discriminatory power and recognition accuracy in the process of recognizing different facial appearance.

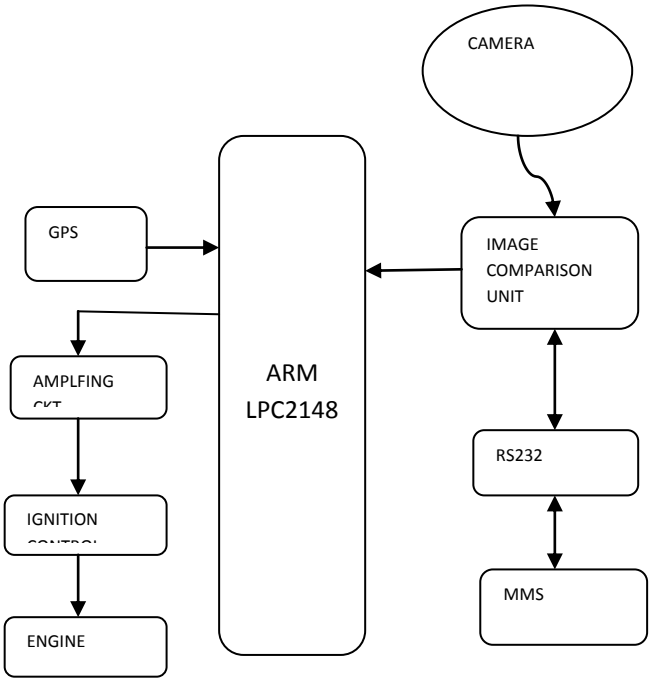

Fig 1 Block diagram

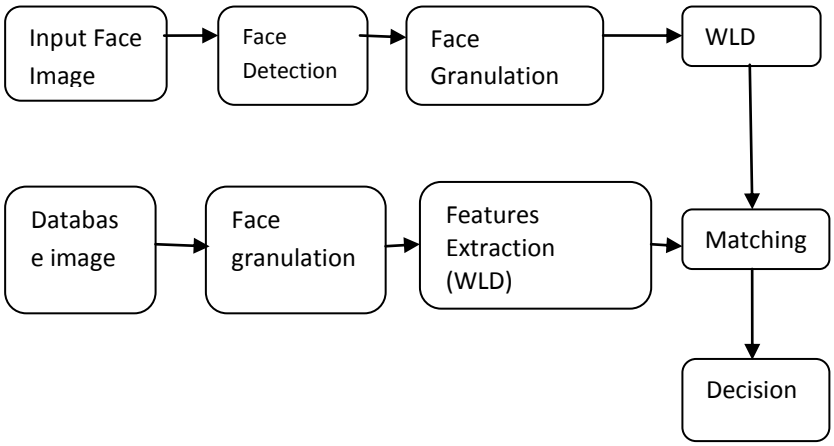

Fig 2 ICU system

A.WEBER'S LAW

WLD descriptor is based on Weber's Law. According to this law the ratio of the increment threshold to the background intensity is constant. Inspired by this law, Chen suggests WLD descriptor for description representation. The computation of WLD descriptor involves the step by step process of finding differential excitations, gradient orientations and building the histogram [2], [3].

Weber's Law, can be expressed as:

$$\frac{\Delta I}{I} = K$$

Where ΔI represents the increment threshold (just noticeable difference for discrimination), I denotes the initial stimulus intensity and k represents that the left side of the equation remains constant even with variations in the I term. The fraction ΔI/I are known as the Weber fraction.

B.DIFFERENTIAL EXCITATION

For calculating differential excitation $\mathcal{E}(Ic)$ of a pixel *Ic* first intensity differences of *Ic* with its neighbors Ii, *i* = 1, 2, *p* are calculated as follows:

$$\Delta I_i = I_i - I_c$$

Then the total intensity difference ratio can be calculated with respect to the current pixel *Ic* with its neighbors Ii is determined as follows:

$$F_{ratio} = \sum_{i=0}^{p-1} \frac{\Delta I_i}{I_c}$$

To enhance the robustness of WLD against noise on the following equation the arctangent function is used as a filter which results in:

$$\varepsilon(I_c)=\arctan[\sum_{i=0}^{p-1} \frac{\Delta I_i}{I_c}]$$

The differential excitation $\varepsilon(I_c)$ result may be positive or negative. If the result is positive means the current pixel is darker than its surroundings and the result is negative value means the current pixel is lighter than the surroundings.

C.GRADIENT ORIENTATION

Gradient orientation is another main component of WLD. The gradient orientation is calculated for a pixel as follows:

$$\theta(I_c) = \arctan[\frac{I_{lr}}{I_{ab}}]$$

Where $I_{lr} = I_l - I_r$ is the intensity difference of two pixels on the left and right of the current pixel *Ic*, and $I_{ab} = I_a - I_b$ is the intensity difference of two pixels directly below and above the current pixel,

$$\theta \in [-\frac{\pi}{2}, \frac{\pi}{2}]$$

IV.SIMULATION RESULTS

A. MATLAB M-FILE

M-file – An M-file is a MATLAB document the user creates to store the code they write for their specific application. **M-file creation is not entirely necessary,** but it is highly recommended. It saves the code that the user has written for their application.

M-file creation –To create an M-file, select **File\New ►M-file**.

Saving – The next footstep is to save the newly created M-file. In the window of the M-file, select **File\Save as…** Select a location as per choice. After creating the M-file, It is not optional that the user work from the disk or drive, so before editing and testing the M-file, it should be move to the hard drive

Writing Code – After creating and saving the M-file, the next step is to begin writing code. The first move is writing comments at the top of the M-file before the code writing. It helps to identify the coding purposes or what the code is for, creation timing, modifying date and creator details. Comments are stated by insertion of a % symbol before the code. In the M-file window Comments are appeared in green. See Figure below, for Example

B.SIMULATION OUTPUT

After completing the coding the output will be getting by clicking the run button. The below figure shows that the face authentication process.

Step 1-The camera will capture the face. In this step the hidden webcam in the vehicle will capture the face of the driver start the vehicle.

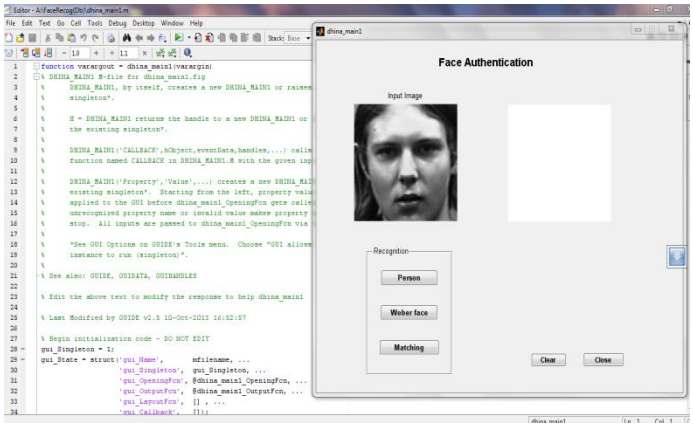

Fig 3Image capturing

Step 2-Select the Weber face button. In this stage gradient orientation and differential extraction are calculated with respected image.

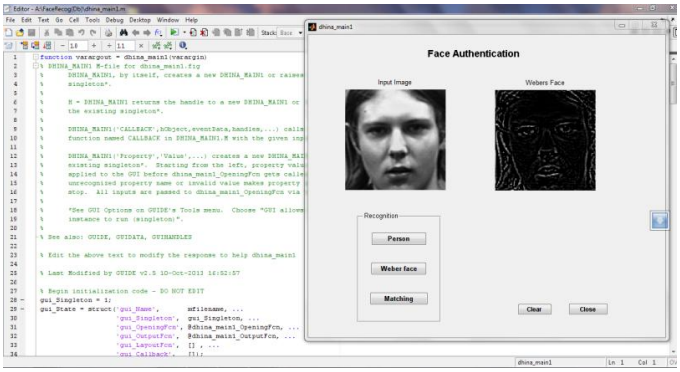

Fig 4 Weber Face Selection

Step 3-Select the matching button

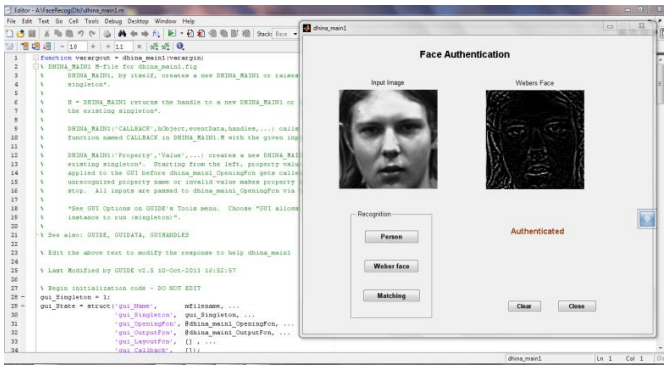

Fig 5 Matching

Finally the output shows that whether the selected image is authenticated or not. If the image is from the database section it will show that the selected image is authenticated.

V.CONCLUSION AND FUTURE WORK

The developed system is least cost vehicle theft control system that could be implemented on any vehicle since the system is developed by using mobile and image comparison technique which is operated by sending and receiving messages. The ignition system controls the vehicle by reading the message received. The system is based on control unit and the owners mobile. The owner of the vehicle interacts with the control module by sending and receiving messages. The mobile uses the GPS system to retrieve the location details of the vehicle. So the owner can able to get the location details and using that the owner finds the vehicle easily. The control unit installed in the vehicle controls the vehicle by receiving the message from the owner. Therefore, the proposed system performs many functions like controlling the vehicle engine by stopping the fuel flow and getting vehicles location information details by the GPS module and send it to the owner's mobile. This system can be deployed on any car and being at the remote place the engine can be controlled. Therefore, the Mobile based Vehicle Theft control Unit (TCU) provides an easier and featured tracking system to the vehicle theft problem.

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