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Prototype of a Fingerprint Based Licensing System for Driving

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ABSTRACT:
The main aim of this project is to offer an advance security system in automotives, in which consists of a face detection subsystem, a GPS (Global Positioning System) module, a GSM (Global System for Mobile Communications) module and a control platform. The face detection subsystem bases on optimized Ada Boost algorithm and can detect faces in cars during the period in which nobody should be in the car, and make an alarm loudly or soundlessly. The other modules transmit necessary information to users and help to keep eyes on cars all the time, even when the car is lost. This system prototype is built on the base of one embedded platform in which one SoC named "SEP4020" (works at 100MHz) controls all the processes. Experimental results illuminate the validity of this car security system.

1. INTRODUCTION:

1.1 LITERATURE SURVEY:

The advent of solid-state fingerprint sensors presents a fresh challenge to traditional fingerprint matching algorithms. These sensors provide a small contact area (_ 0:6"_0:6") for the fingertip and, therefore, sense only a limited portion of the fingerprint. Thus multiple impressions of the same fingerprint may have only a small region of overlap. Minutiae based matching algorithms, which consider ridge activity only in the vicinity of minutiae points, are not likely to perform well on these images due to the insufficient number of corresponding points in the input and template images. We present a hybrid matching algorithm that uses both minutiae (point) information and texture (region) information for matching the fingerprints. Results obtained on the MSU VERIDICOM database shows that a combination of the texture-based and minutiae-based matching scores leads to a substantial improvement in the overall matching performance.

1.2 Existing System:

Though there are many 3D methods which emphasis on the shape of human face is robust in variable environment, they overlook the texture information of human face on the contrary. Therefore, in order to get better efficiency, face data should be sufficiently used and both 2D and 3D face information should be considered.

1.3 Proposed System:

The biometric fingerprint sensor takes a digital picture of a fingerprint. The fingerprint scan detects the ridges and valleys of a fingerprint and converts them into ones and zeroes. Complex algorithms analyze this raw biometric scan to identify characteristics of the fingerprint, known as the "minutiae". In most systems, if 10 to 20 minutiae match, the fingerprint is considered a match.

1.5 AIM OF THE PROJECT:

The main aim of this project is to offer an advance security system in automotives, in which consists of a face detection subsystem, a GPS (Global Positioning System) module, a GSM (Global System for Mobile Communications) module and a control platform. The face detection subsystem bases on optimized Ada Boost algorithm and can detect faces in cars during the period in which nobody should be in the car, and make an alarm loudly or soundlessly.

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The other modules transmit necessary information to users and help to keep eyes on cars all the time, even when the car is lost.

1.4 DESIGN AND IMPLEMENTATION:

It consists of PC memory unit it stores the different driver fingerprint images. Fingerprint sensor is used to detect the fingerprints 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 SMS. Owner can trace the location through GPS. This system owner can identify the theft image as well as the location of the car. The biometric fingerprint sensor takes a digital picture of a fingerprint. The fingerprint scan detects the ridges and valleys of a fingerprint and converts them into ones and zeroes. Complex algorithms analyze this raw biometric scan to identify characteristics of the fingerprint, known as the "minutiae". In most systems, if 10 to 20 minutiae match, the fingerprint is considered a match.

2. PROJECT DESCRIPTION:

INTRODUCTION:

Unlicensed driving is a matter of concern for several reasons. It is possible that drivers who have not undergone appropriate training and testing may be deficient in some aspect of the knowledge and skills required to drive safely and efficiently. Also, drivers who are unauthorized may have less incentive to comply with road traffic laws in that they would not be influenced by the rewards and penalties set up under the licensing system. On this argument, drivers who do not hold a valid license may disregard the threat of license sanctions or the benefits of reduced insurance premium due to not having made a claim. It is noticeable in the literature [1] that the term "unlicensed" is used interchangeably to mean one of the below subcategories, as follows:

A) Drivers who drive but who have never possessed any form of license;
B) Drivers who have previously held a license but who have been disqualified; and
C) Drivers possessing only a provisional license

3. POWER SUPPLY UNIT

3.1 CIRCUIT DIAGRAM:

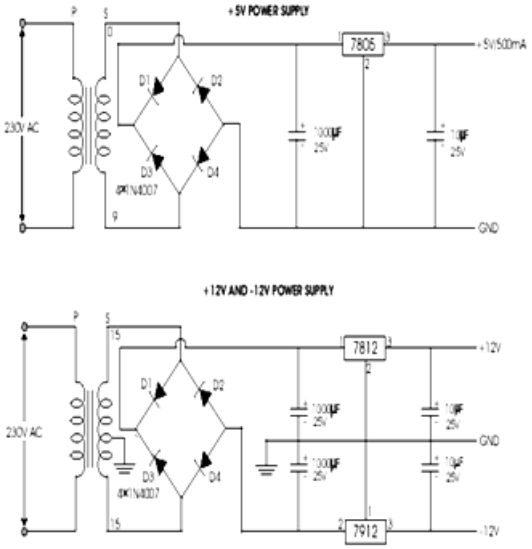
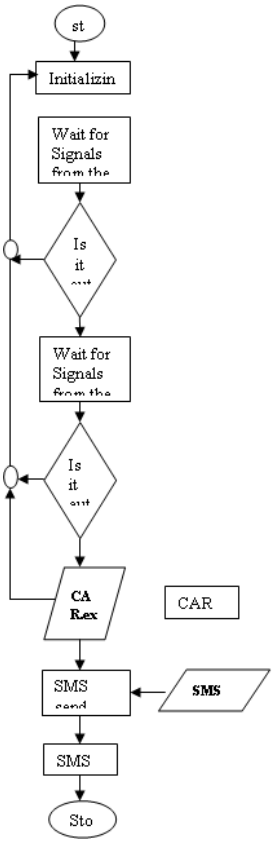


Figure: Circuit Diagram of Power Supply

3.2 Flow Chart:



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3.3 WEB CAMERA:

A webcam is a video capture device connected to a computer or computer network, often using a USB port or, if connected to a network, Ethernet or Wi-Fi. The most popular use is for video telephony, permitting a computer to act as a videophone or video conferencing station. This can be used in messenger programs such as Windows Live Messenger, Skype and Yahoo messenger services. Other popular uses, which include the recording of video files or even still-images, are accessible via numerous software programs, applications and devices.

Figure: Web Camera

Webcams are known for low manufacturing costs and flexibility,[1] making them the lowest cost form of video telephony. The term "webcam" may also be used in its original sense of a video camera connected to Web continuously for an indefinite time, rather than for a particular session, generally supplying a view for anyone who visits its Web page. Some of these, for example those used as online traffic cameras, are expensive, rugged professional video cameras.

4. OVERVIEW DIAGRAM:

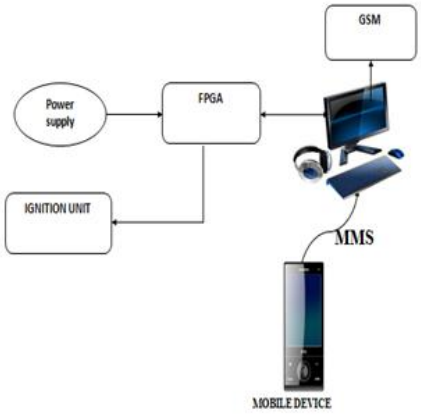

Figure: Over View Diagram

- It consists of PC memory unit it stores the different driver image.
- FDS (face detection subsystem) 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 SMS.
- Owner can trace the location through GPS. This system owner can identify the theft image as well as the location of the car.

4.1 BLOCK DIAGRAM:

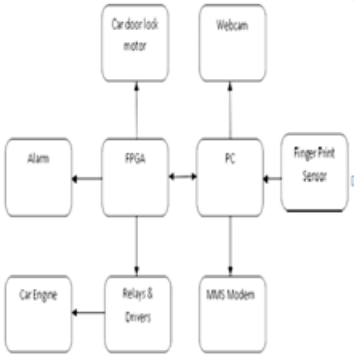

Figure: Block Diagram

5. IMPLEMENTATION:

For implementing signature recognition system for mobile system we mainly require software and hardware requirements. The software required for implementing this project are matlab and Xilinx and hardware required is FPGA GSM, RF transmitter, RF receiver, voice chip, alaram. The implementing software and hardware requirements are explained below.

5.1. SOFTWARE REQUIRMENT: SPECIFICATIONS:

The software used for compressing the image is Matlab (matrix laboratory) which means language of technical computing.

5.1.1 Software Requirements:

If you are new to MATLAB, you should start by reading Manipulating Matrices.

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The most important things to learn are how to enter matrices, how to use the: (colon) operator, and how to invoke functions. After you master the basics, you should read the rest of the sections below and run the demos. At the heart of MATLAB is a new language you must learn before you can fully exploit its power. You can learn the basics of MATLAB quickly, and mastery comes shortly after. You will be rewarded with high productivity, high-creativity computing power that will change the way you work.

Introduction - describes the components of the MATLAB system.
Development Environment - introduces the MATLAB development environment, including information about tools and the MATLAB desktop.
Manipulating Matrices - introduces how to use MATLAB to generate matrices and perform mathematical operations on matrices.
Graphics - introduces MATLAB graphic capabilities, including information about plotting data, annotating graphs, and working with images.
Programming with MATLAB - describes how to use the MATLAB language to create scripts and functions, and manipulate data structures, such as cell arrays and multidimensional arrays.

5.1.2 Introduction:

MATLAB is a high-performance language for technical computing. It integrates computation, visualization, and programming in an easy-to-use environment where problems and solutions are expressed in familiar mathematical notation. Typical uses include:

•Math and computation
•Algorithm development
•Modeling, simulation, and prototyping
•Data analysis, exploration, and visualization
•Scientific and engineering graphics
•Application development, including graphical user interface building

MATLAB is an interactive system whose basic data element is an array that does not require dimensioning. This allows you to solve many technical computing problems, especially those with matrix and vector formulations, in a fraction of the time it would take to write a program in a scalar no interactive language such as C or FORTRAN. The name MATLAB stands for matrix laboratory. MATLAB was originally written to provide easy access to matrix software developed by the LINPACK and EISPACK projects. Today, MATLAB uses software developed by the LAPACK and ARPACK projects, which together represent the state-of-the-art in software for matrix computation.

MATLAB has evolved over a period of years with input from many users. In university environments, it is the standard instructional tool for introductory and advanced courses in mathematics, engineering, and science. In industry, MATLAB is the tool of choice for high-productivity research, development, and analysis. MATLAB features a family of application-specific solutions called toolboxes. Very important to most users of MATLAB, toolboxes allow you to learn and apply specialized technology. Toolboxes are comprehensive collections of MATLAB functions (M-files) that extend the MATLAB environment to solve particular classes of problems. Areas in which toolboxes are available include signal processing, control systems, neural networks, fuzzy logic, wavelets, simulation, and many others.

The MATLAB System The MATLAB system consists of five main parts: Development Environment This is the set of tools and facilities that help you use MATLAB functions and files. Many of these tools are graphical user interfaces. It includes the MATLAB desktop and Command Window, a command history, and browsers for viewing help, the workspace, files, and the search path. The MATLAB Mathematical Function Library This is a vast collection of computational algorithms ranging from elementary functions like sum, sine, cosine, and complex arithmetic, to more sophisticated functions like matrix

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inverse, matrix eigen values, Bessel functions, and fast Fourier transforms. The MATLAB Language This is a high-level matrix/array language with control flow statements, functions, data structures, input/output, and object-oriented programming features. It allows both "programming in the small" to rapidly create quick and dirty throw-away programs, and "programming in the large" to create complete large and complex application programs. Handle Graphics This is the MATLAB graphics system. It includes high-level commands for two-dimensional and three-dimensional data visualization, image processing, animation, and presentation graphics. It also includes low-level commands that allow you to fully customize the appearance of graphics as well as to build complete graphical user interfaces on your MATLAB applications. This is a library that allows you to write C and FORTRAN programs that interact with MATLAB. It include facilities for calling routines from MATLAB (dynamic linking), calling MATLAB as a computational engine, and for reading and writing MAT-files.

Development Environment This chapter provides a brief introduction to starting and quitting MATLAB, and the tools and functions that help you to work with MATLAB variables and files. For more information about the topics covered here, see the corresponding topics under Development Environment in the MATLAB documentation, which is available online as well as in print. Starting MATLAB On a Microsoft Windows platform, to start MATLAB, double-click the MATLAB shortcut icon on your Windows desk. On a UNIX platform, to start MATLAB, type mat lab at the operating system promp. After starting MATLAB, the MATLAB desktop opens - see MATLAB Desktop. You can change the directory in which MATLAB starts, define startup options including running a script upon startup, and reduce startup time in some situations.

- Quitting MATLAB To end your MATLAB session, select Exit MATLAB from the File menu in the desktop, or type quit in the Command Window. To execute specified functions each time MATLAB quits, such as saving the workspace

Applications:

Applications of FPGAs include digital signal processing, software-defined radio, aerospace and defense systems, ASIC prototyping, medical imaging, computer vision, speech recognition, cryptography, bioinformatics, computer hardware emulation, radio astronomy, metal detection and a growing range of other areas.

- FPGAs originally began as competitors to CPLDs and competed in a similar space, that of glue logic for PCBs. As their size, capabilities, and speed increased, they began to take over large and larger functions to the state where some are now marketed as full systems on chips (SoC). Particularly with the introduction of dedicated multipliers into FPGA architectures in the late 1990s, applications which had traditionally been the sole reserve of DSPs began to incorporate FPGAs instead.
- FPGAs especially find applications in any area or algorithm that can make use of the massive parallelism offered by their architecture. One such area is code breaking, in particular brute-force attack, of cryptographic algorithms. FPGAs are increasingly used in conventional high performance computing applications where computational kernels such as Fast Fourier transform or convolution are performed on the FPGA instead of a microprocessor.
- The inherent parallelism of the logic resources on an FPGA allows for considerable computational throughput even at a low MHz clock rates. The flexibility of the FPGA allows for even higher performance by trading off precision and range in the number format for an increased number of parallel arithmetic units. This has driven a new type of processing called reconfigurable computing, where time intensive tasks are offloaded from software to FPGAs.

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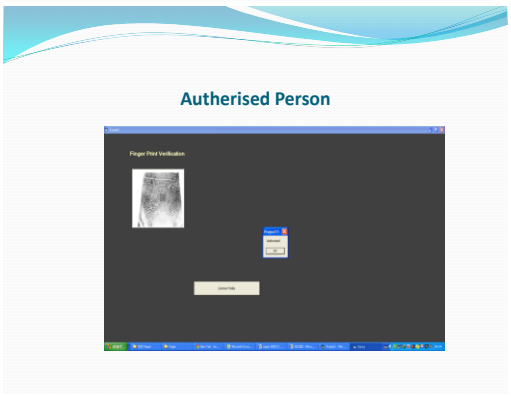
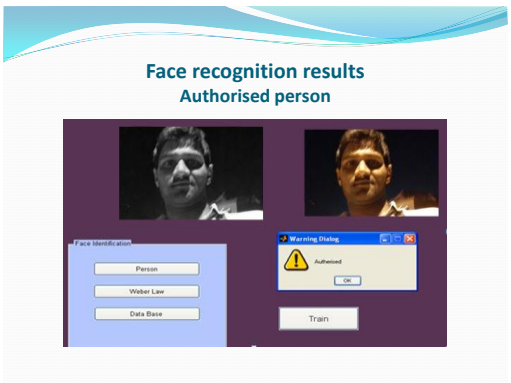
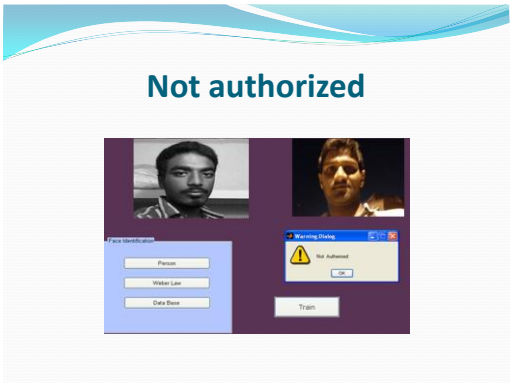
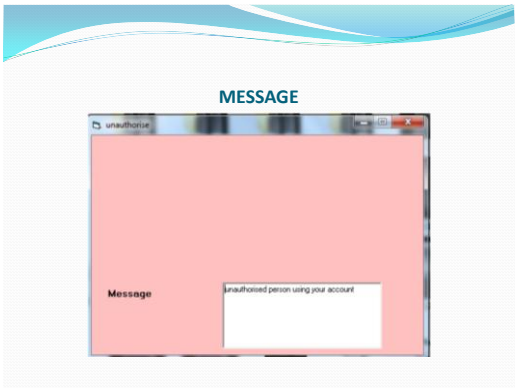
Traditionally, FPGAs have been reserved for specific vertical applications where the volume of production is small. For these low-volume applications, the premium that companies pay in hardware costs per unit for a programmable chip is more affordable than the development resources spent on creating an ASIC for a low-volume application.

6. SCREEN SHOTS:









CONCLUSION:

From this we implement image-recognition techniques that can provide the important functions required by advanced intelligent Car Security, to avoid vehicle theft and protect the usage of unauthenticated users**.** Secured and safety environment system for automobile users and also key points for the investigators can easily find out the hijackers image. We can predict the theft by using this system in our day to day life.

- This project will help to reduce the complexity and improve security, also much cheaper and 'smarter' than traditional ones.

FUTURE SCOPE:

The present module can be interfaced with GPS /GSM module which would be of great use in future. The combined module can be used to monitor from remote location about the vehicle. The data can be used to monitor about the person who is driving the vehicle, by this way, theft can be minimized since it would help to find the person driving along with location details.

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