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Real Time Smart Car Lock Security System Using Face Detection and Recognition

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Abstract

In modern world, many new techniques such as biometric recognition technique, image processing technique, communication technique and so on, have been integrated into car security systems. At the same time, the amount of accident of cars still remains high, specially, lost. Traditional car security systems rely on many sensors and cost a lot. When one car is really lost, no more feedback could be valid to help people to find it back. Our project fulfils the need of ca r security so as to prevent car thefts which is easier in case of car locking systems.

Introduction

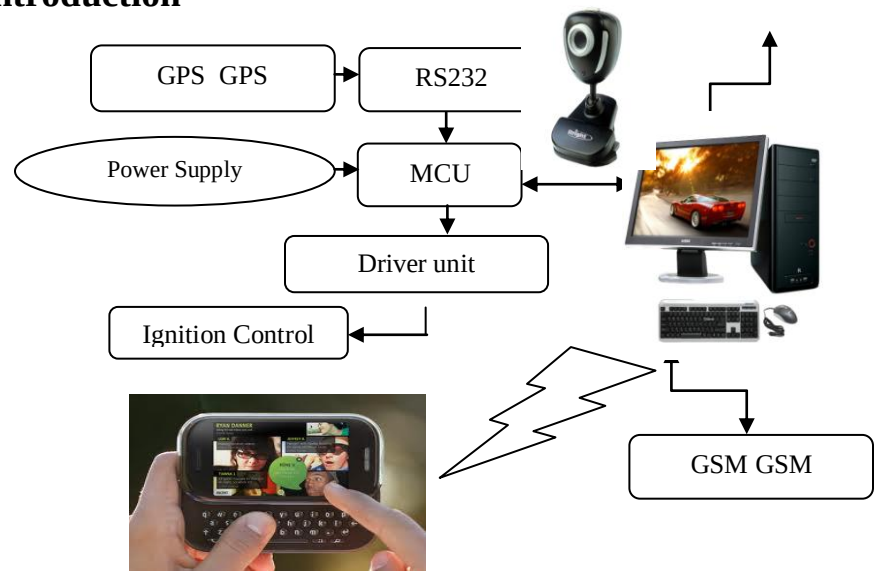


Figure 1: Module wise Block Diagram

Methods

A. Overview of the System

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 AdaBoost 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**.**

B. Lpc2148 Microcontroller

LPC 2148 Microcontroller Architecture. The ARM7 TDMI-S is a general purpose 32-bit microprocessor, which offers high performance and very low power consumption. The ARM architecture is based on Reduced Instruction Set Computer (RISC) principles, and the instruction set and related decode mechanism are much simpler than those of micro programmed Complex Instruction Set Computers (CISC). This simplicity results in a high instruction throughput and impressive real-time interrupt response from a small and cost-effective processor core.

Pipeline techniques are employed so that all parts of the processing and memory systems can operate continuously. Typically, while one instruction is being executed, its successor is being decoded, and a third instruction is being fetched from memory. The ARM7TDMI-S processor also employs a unique architectural strategy known as Thumb, which makes it ideally suited to high-volume applications with memory restrictions, or applications where code density is an issue.

The key idea behind thumb is that of a super-reduced instruction set. Essentially, the ARM7TDMI-S processor has two instruction sets:

- The standard 32-bit ARM set.
- A 16-bit thumb set.

The thumb set's 16-bit instruction length allows it to approach twice the density of standard ARM code while retaining most of the ARM's performance advantage over a traditional 16-bit processor using 16-bit registers. This is possible because Thumb code operates on the same 32-bit register set as ARM code. Thumb code is able to provide up to 65% of the code size of ARM, and 160% of the performance of an equivalent ARM processor connected to a 16-bit memory system

C. Pca For Image Compression

Using PCA for image compression also known as the Hotelling or Karhunen and Leove (KL), transform. If we have 20 images, each with 4 pixels, we can form vectors, each with 20 dimensions. Each vector consists of all the intensity values from the same pixel from each picture. This is different from the previous example because

before we had a vector for image, and each item in that vector was a different pixel, whereas now we have a vector for each pixel, and each item in the vector is from a different image. Now we perform the PCA on this set of data. We will get 20 eigenvectors because each vector is 20-dimensional. To compress the data, we can then choose to transform the data only using, say 15 of the eigenvectors. This gives us a final data set with only 15 dimensions, which has saved us _.o1 of the space. However, when the original data is reproduced, the images have lost some of the information. This compression technique is said to be lossy. Because the decompressed image is not exactly the same as the original, generally worse.

D. Image Recognition

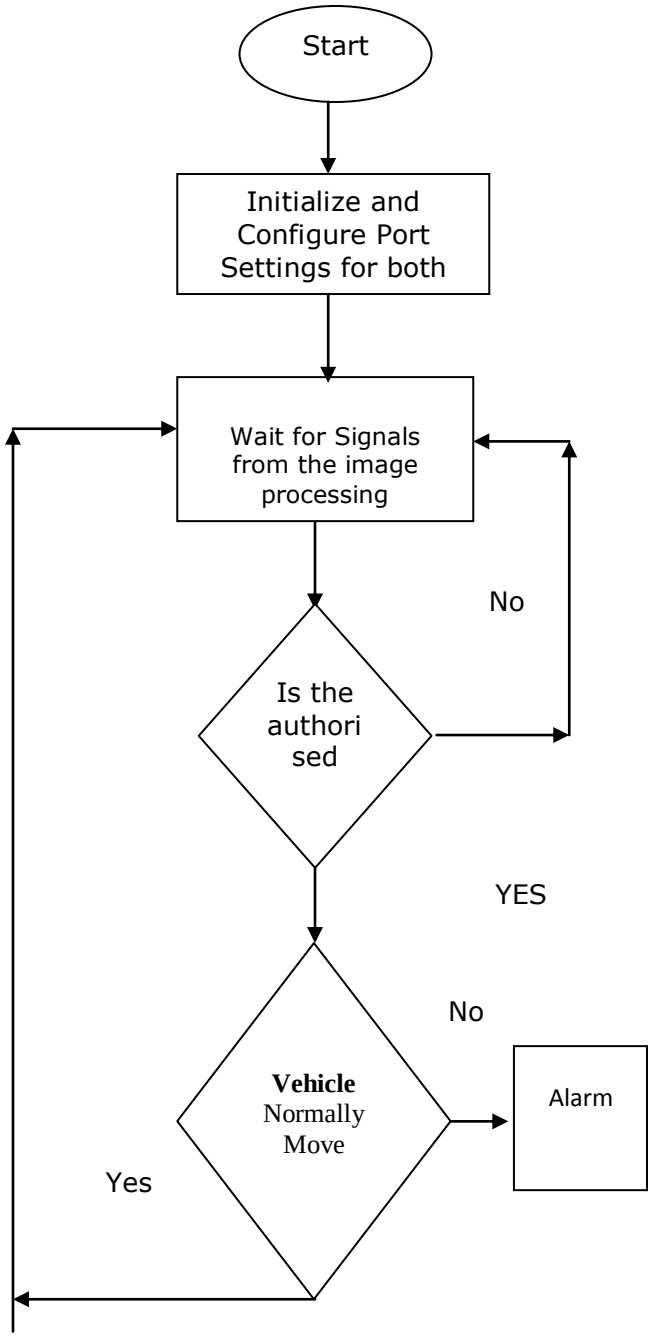
Image recognition is composed of two parts: classification and validation. The classification can be done somewhat easily by statistics of dimensions and pattern features of each type of image. On the other hand, validation is very difficult because we cannot obtain counterfeits that might appear in future, while we can collect plenty of genuine images. Moreover, statistics for a two-class (genuine and counterfeit banknotes) problem has less power because counterfeits could not actually be collected. Our approach is therefore to carefully select observation points at which a physical feature has a small deviation amongst genuine banknotes and looks difficult to imitate

E. Wireless Communication

A GSM modem is a wireless modem that works with a GSM wireless network. A wireless modem behaves like a dial-up modem. The main difference between them is that a dial-up modem sends and receives data through a fixed telephone line while a wireless modem sends and receives data through radio waves.

A GSM modem can be an external device or a PC Card / PCMCIA Card. Typically, an external GSM modem is connected to a computer through a serial cable or a USB cable. A GSM modem in the form of a PC Card / PCMCIA Card is designed for use with a laptop computer. It should be inserted into one of the PC Card / PCMCIA Card slots of a laptop computer. Like a GSM mobile phone, a GSM modem requires a SIM card from a wireless carrier in order to operate. As mentioned in earlier sections of this SMS tutorial, computers use AT commands to control modems. Both GSM modems and dial-up modems support a common set of standard AT commands. You can use a GSM modem just like a dial-up modem.

F. Flow Chart



G. Relay Unit

The coil of a relay passes a relatively large current, typically 30mA for a 12V relay, but it can be as much as 100mA for relays designed to operate from lower voltages. Hence a CB amplifier is used to achieve the current rating of the relay.

Transistors and ICs must be protected from the brief high voltage produced when a relay coil is switched off. The diagram shows how a signal diode (e.g. 1N4148) is connected 'backwards' across the relay coil to provide this protection.

Current flowing through a relay coil creates a magnetic field which collapses suddenly when the current is switched off. The sudden collapse of the magnetic field induces a brief high voltage across the relay coil which is very likely to damage transistors and ICs. The protection diode allows the induced voltage to drive a brief current through the coil (and diode) so the magnetic field dies away quickly rather than instantly. This prevents the induced voltage becoming high enough to cause damage to transistors and ICs**.**

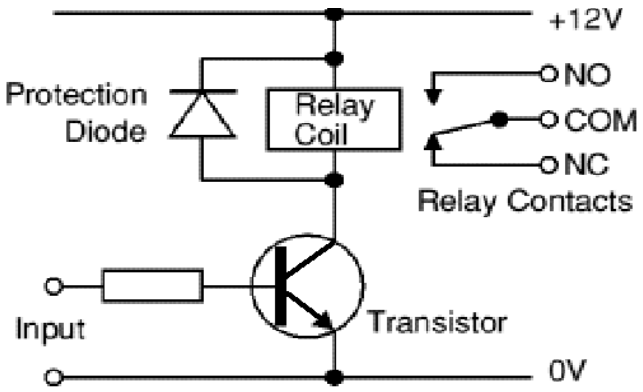


Figure 7: Drive circuit and protection diodes for relays

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.

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