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インテリジェント カー 統合 システム

【画像情報処理：レポート】

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1) 自動車 の 運転支援 システム における 周囲環境 の センシング 技術 として 、 ステレオ カメラ を 搭載 し た 場合 の 利点問題点 を 述べよ 。

1) Among environment sensing technologies in car drive assist system, please describe advantage and disadvantage of using a stereo camera.

With the improvement of Digital Image Processing technology, recognition technology and hardware such as FPGA and DSP, More and more automotive are equipped mounted with cameras.

Among the car mounted camera technology, stereo camera is a prominent technology as it can detect more kinds of information than multi separate camera.

Stereo is a method of reproduction that creates an illusion of multi-directional perspective. Stereoscopy creates the illusion of three-dimensional depth from given two-dimensional images. Human vision, including the perception of depth, is a complex process, which only begins with the acquisition of visual information taken in through the eyes; much processing ensues within the brain, as it strives to make sense of the raw information. One of the functions that occur within the brain as it interprets what the eyes see is assessing the relative distances of objects from the viewer, and the depth dimension of those objects. The *cues* that the brain uses to gauge relative distances and depth in a perceived scene include.

[PIC 1-1 car mounted stereo camera]   [PIC 1-1 car mounted stereo camera]

So the advantage of the stereo camera system is get three-dimensional information from two –dimensional images. And detecting the lane's width and the proximity of an object on the road, classifying objects and determining distance. What's more, Information from more than one stereo pair can be combined to produce a more complete mapping of points over the area. A ground surface finder is then used to find the ground for portions of the scene, which may be tilted slightly relative to the assumed horizontal coordinate system.

Disadvantage are given by:
A stereo camera system in a motor vehicle, in particular for classifying objects and determining distance. In order to ensure secure installation and precise positioning of the camera system, in particular fixing of its lateral position, the camera system is provided with

at least two camera modules, and a mount, in which camera modules are installed at a specified lateral distance apart. As the vehicle vibrating in different frequencies and amplitudes, the stereo camera system need to be calibrated frequently. In addition, due to the limitation of display technology, present product may reduce the driver's attention, when the emergency situation was been detected. At last, camera system is sensitive to temperature, it's hard to adapt to severe environment, which would cause to increasing the cost of development, verification, care and maintenance.

２）画像認識 LSI の 利点 、 問題点 について 説明 せよ 。

２）Please describe advantage and disadvantage of image recognition LSI

Most general-purpose microprocessors and operating systems can execute image recognition algorithms successfully, but are not suitable for use in all the situations because of efficiency, power and speed constraints. A specialized image recognition LSI, however, will tend to provide a lower-cost solution, with better performance, lower latency, and no requirements for specialized cooling or large batteries.

The architecture of an image recognition LSI is optimized specifically for digital signal processing. Most also support some of the features as an applications processor or microcontroller, since signal processing is rarely the only task of a system. Some useful features for optimizing image recognition algorithms are realized.

Image recognition LSI can recognize, in real time, traffic lines, vehicles, daytime and nighttime pedestrians, cyclists, traffic signs, etc. around the vehicle on which they are mounted, using image data from one to four cameras, thus enabling various advanced driver assistance applications. Possible applications include lane departure warning, forward/backward collision warning, forward/backward pedestrian collision warning, traffic sign recognition, and top-view parking assistance.

In the meantime, as image recognition LSI's Special purpose and requirement, the Development & Verification Cycle of it are much longer and more expensive than traditional IC, so it need more time and sales to Lower average cost .

[PIC 2-1 Image Recognition of Vehicle]
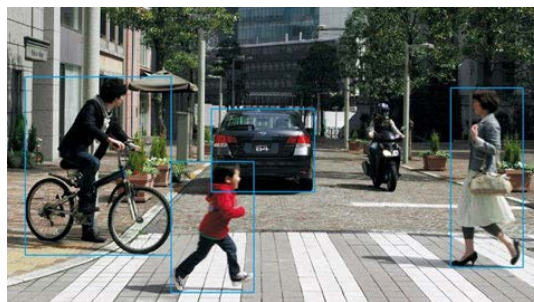
[PIC 2-2 Image Recognition of Vehicle]

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