FUJITSU TEN LIMITED has been developing High Quality Image Processing Technology, which analyzes vividness and color of the images for on-board displays and achieves higher quality images with most appropriate and real-time compensations, collaborating with FUJITSU LIMITED and FUJITSU LABORATORIES LIMITED.

This report describes a new LSI, "Vivid View Processor", which we have developed with the technology mentioned above.

In accordance with the spread of DVD videos and digital terrestrial televisions, the time for enjoying videos in a vehicle is increasing. The LSI compensates for the best "contour", "contrast" and "color", analyzing the contour characteristic, color, gradation distribution by each image scene, in addition to the conventional image quality compensation. The textures of the subjects, the expressions of luster and the vividness look are greatly improved, and "sharp / clear / vivid" videos are displayed. Besides, this LSI achieves image quality compensation appropriate for on-board displays, slim-downed circuit, downsized packaging, and lower power consumption, and those enable the LSI to be installed in the AVN display unit.

This LSI is installed in the new Wide VGA*-type AVN products released in June 2007 of "ECLIPSE": FUJITSU TEN car AV products.

*Wide VGA: Wide Video Graphics Array (800x400 pixels)

Abstract

FUJITSU TEN LIMITED has been developing High Quality Image Processing Technology, which analyzes vividness and color of the images for on-board displays and achieves higher quality images with most appropriate and real-time compensations, collaborating with FUJITSU LIMITED and FUJITSU LABORATORIES LIMITED.

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Introduction

Overview of High Quality Image Processing LSI

2.1 Overview

2.2 Characteristics

Contour compensation part

Color Compensation Part

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System Configuration and Issues

3.1 System Configuration

3.2 Issues for Commercialization

3.3 Issues for High Quality Image Processing

Algorithms for On-vehicle Products

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Notable points

- Properly managed work is divided into small tasks and is completed in a timely manner.
- Careful attention is given to quality assurance, ensuring accuracy in all aspects.
- Timely reviews and evaluations are conducted to track progress and make necessary adjustments.

- Consistent adherence to standard procedures ensures reliability.
- Continuous improvement and innovation are encouraged for better efficiency.
- Effective communication among team members fosters a collaborative work environment.

- Regular training programs are conducted to keep the team updated on the latest technologies.
- Strong leadership skills are necessary to guide the team towards success.
- Performance metrics are established to measure and reward team members.

- Clear and concise documentation is maintained for future reference.
- Strong safety protocols are in place to prevent accidents and ensure a safe working environment.
- Team building exercises are organized to foster a healthy workplace culture.
4.2.1 Dynamic Color Compensation

In order to enhance the image quality, dynamic color compensation is applied. This process adjusts the color temperature of the image based on the ambient light conditions. The system monitors the light intensity and adjusts the color balance accordingly. This ensures that the image appears natural even under varying lighting conditions.

4.2.2 Static Color Compensation

Static color compensation is used to correct for any color shifts that may occur during the manufacturing process. This process involves adjusting the color temperature of the image to match the desired color profile. The system uses a color lookup table to adjust the image colors, ensuring that the final output matches the desired color accuracy.

5.1 Downsizing and Lower Power Consumption

To achieve both downsizing and lower power consumption, the Vivid View Processor employs advanced image processing techniques. The system uses a combination of hardware and software optimizations to reduce the power consumption while maintaining high image quality. This is achieved through efficient algorithms that minimize the computational load and reduce the amount of data that needs to be processed.

5.2 Individual Parameter and Fast Boot Function

The individual parameter function allows for fine-tuning of certain image processing parameters, enabling customization for different applications. The fast boot function ensures that the processor can quickly start operating, reducing the time needed to initialize and ready the system for use.

5.3 Dual screen Display Processing

The Vivid View Processor supports dual-screen display processing, allowing for the display of different images on each screen. This is achieved through a combination of hardware and software solutions that enable seamless switching between the two screens. The system uses advanced algorithms to ensure smooth and fast switching between the two displays, providing a seamless user experience.

These advancements in image processing technology are crucial for improving the overall performance of vehicles, enhancing safety and user experience. The Vivid View Processor demonstrates Fujitsu Ten’s commitment to developing cutting-edge technology that meets the evolving needs of the automotive industry.
5.4 Display Adjustment Screen

5.5 Noise Reduction Method

6.1 Parameter Adjusting

6.2 Subjective Evaluation

Effect Confirmation

Evaluation method

- Rating in 5 Different Images
- Best Choice in 5 Models
Profiles of External Writers

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Entered FUJITSU LABORATORIES LTD in 1990. Since then, has engaged in research and development of image processing technology, mainly in color processing. Currently the Senior Researcher of the ITS Research Center.

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