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A Survey on Product Reliability Measurement and Monitoring System Using FPGA and Smart Phone

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ABSTRACT: In the digital world, everyone expect the reliable equipment. When it fails the result can be catastrophic. The objective of this paper is to introduce the system which enhances the modelling, Integrating & Implementation of Intelligent Visual Inspection System. The main idea of this work is Printed circuit board Image Scanning using real time image processing. The heart of the system is a Field programmable gate array (FPGA) kit. It controls the whole system by receiving the signal from camera, processes it and sends the signal to motor driver unit to controlling robot arm. With the help of Bluetooth used in smart phone will get manual mode so user can control other process. Since these procedures can now be performed through parallel processing offers a reasonable solution. Due to this parallelism in industry many problems solve using multiple tasks handling by robot using FPGA for Product Reliability.

KEYWORDS: Product reliability, FPGA, image processing, smart phone, blue tooth

I. INTRODUCTION

Real-time image processing is a bigchallenge in mobile robot navigation. It is not practical to embed parallel processing computers on a robot which provide reasonable solutions. FPGA as a programmable hardwareis a conventional platform to exploit image processing in order to achieve better performance [2][3][4]. Based on FPGA an intelligent frame grabber (IFG) is designed which grab imagesas well as process images in real time [1].

In the system of product monitoring, classifying the pixels in an image into different colour classes provides solid foundation for navigation, decision-making and self-localization of mobile robots, along with that improves the performance of a vision system significantly. The approach to accomplishing this task includes linear colour thresholding, nearest neighbour classification, colour space thresholding and probabilistic methods. Colour space thresholding has real-time performance, and cannot adapt the variety of lighting conditions, which restricts its use in many real-world applications. Therefore, many researchers devoted to improve the approach and made some progresses [6][7].

The rest of this paper is organized as follows. Section II describes the literature survey for the development of the proposed system. Section III introduces the brief idea of the proposed system. Finally, a brief conclusion is summarized in Section IV.

II. LITURATURE SURVEY

1.Qingrui Zhou, Kui Yuan,et.al. have proposed a real-time colour image classification algorithm for mobile robot navigation based on the Field Programmable Gate Arrays (FPGA) in paper "FPGA-Based Colour Image Classification for Mobile Robot Navigation". They build a 3-D Colour Look-up Table (CLUT) in which only 18 bits are used to represent a kind of colour instead of conventional 24 bit to resolve object overlapping in a colour space. It has higher classification accuracy and lower memory cost than traditional ones.

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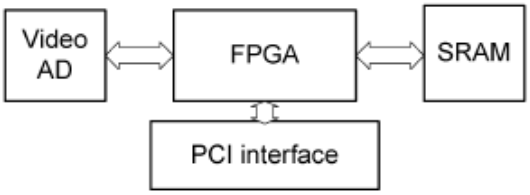

Fig. 1 Architecture of IFG

To reduce the computing burden of imageprocessing and improve the performance of the whole system they designed an intelligent frame grabber (IFG) based on high performance FPGA,

2. The paper titled "FPGA Board Implementation of an Color Tracking Mobile Robot System" by Bold Sanjaa and Seong Ro Lee presents an application of CMOS camera module with monochromatic-based real-time object tracking system implemented on an FPGA. Nexys2 board with some simple processing of RGB values of the signal comes from the camera, OV7670 can be applied to reliably determine the color of LED and other colored sources by calculating the hue value, and then sorting according to hue. For just a few colors widely differing in hue, absolute hue sort ranges can be set at design time. For organizations that must distinguish from several hues, or among similar hues, possible known values should be sampled (measured), and stored by the system. Then during test, the best match of an unknown sample can be seen among the known possible hues.

3. The paper "Hardware and Software Co-design for Robot Arm Position Control Using VHDL & FPGA" by Mrs. Urmila Meshram focuses on hardware and software interfacing. For real time application is very challenging that the interfacing of different hardware blocks with software module and demanding in every field to achieve better command over control through software only without disturbing the hardware. The hardware functional block is to be design in software module with the help of VHDL coding.

4. Again "FPGA Based Robotic Arm With Six Degrees of Freedom" by Shri Lakshmi Pravalika describes the hardware and software interfacing.

5. "FPGA based wireless data logger" by Meenanath D. Taralkar describes the design and development of hardware and software modules for wireless data logger system using Android Smartphone. It also describes data transfer to android smartphone using Bluetooth.

III. PROPOSED SYSTEM

The proposed system includes camera, FPGA board and robotic ARM. The block diagram of the system is as follows:

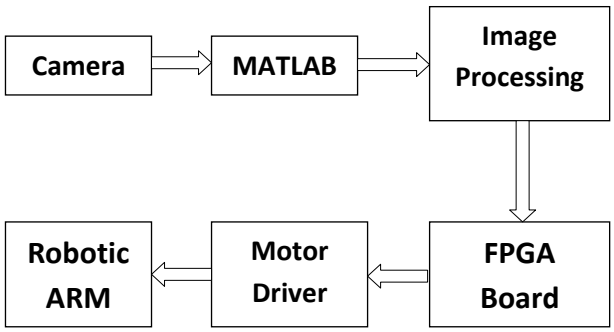

Fig 1. Block Diagram of Proposed System

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First the camera takes the picture. There is database available in the Matlab. The transferred image is compared with the image in the database. If both images are matched then it sends 'T' through the serial port. The serial data input (ASCII code) is transferred to FPGA board through serial port 1 and serial data input 2 is send using Bluetooth module. FPGA Board will take Data from Serial Port and will send control signals to Motor Driver unit and If any signals come from BT it will Process those to control the Motor. The detailed working is shown in below figure.

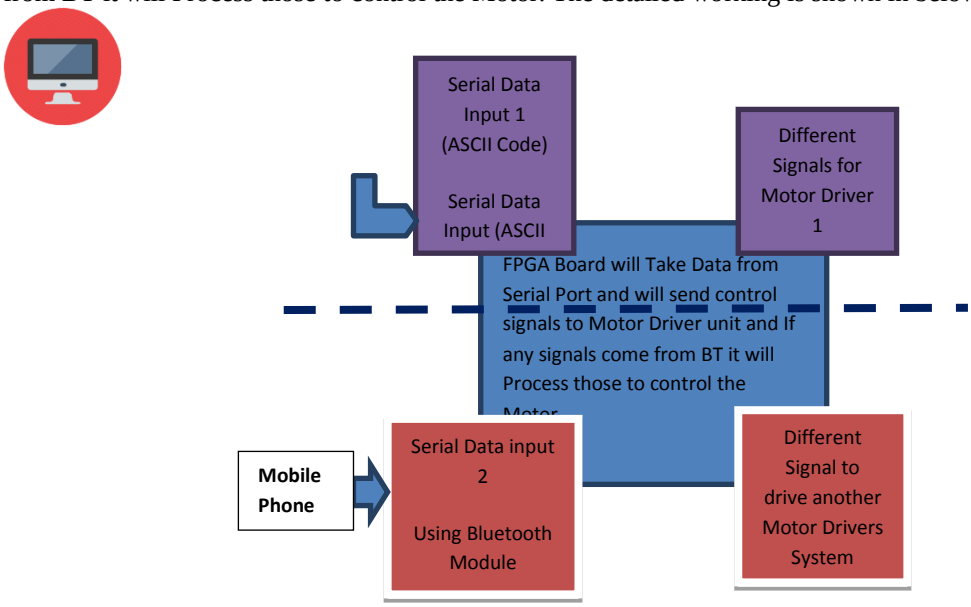

Fig.2 working of the system

Robotics applications are much more needed and mandatory in fast moving industry economy. In these circumstances the development of robotics is also taking up the speed with the help of various technologies directly or indirectly suitable for robotics applications. FPGA takes advantage over microcontroller due to its hardware based parallel architecture. From working with FPGA's task parallelism seems to be another advantage. Robots with multiple sensor inputs could make a good use of such a platform.

REFERENCES

[1] Qingrui Zhou, Kui Yuan, FPGA-Based Colour Image Classification for MobileRobotNavigation,0-7803 94844/05/$20.00 ©2005 IEEE
[2] K Benkrid, A Multiplier-less FPGA Core for Image Algebra Neighborhood Operations. IEEE International Conference On Field-Programmable Technology. Hong Kong, Chinese: 2002. 294-297.
[3] A.S. Dawood, S.J. Visser and J.A. Williams. Reconfigurable FPGAs for Real Time Image Processing in Space. 14th International conference on digital signal processing. Greece: 2002. 845-848.
[4] Stephanie McBader, Peter Lee. An FPGA Implementation of a Flexible, Parallel Image Processing Architecture Suitable for Embedded Vision Systems. Parallel and Distributed Processing Symposium, 2003. Proceedings. International.2003.
[5] D.G. Bariamis, D.K. lakovidis and D.E. Maroulis. An FPGA-based architecture for real time image feature extraction. 17th International Conference on Pattern Recognition. 2004. 801 - 804.
[6] J. Bruce, T. Balch and M. Veloso. Fast and inexpensive colour image segmentation for interactive robots. Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems. 2000.2061-2066
[7]S.W. Tang, W. D. Chen and Q. X. Cao. Multi-Object Colour Tracking
Vision System for Autonomous Robot, Robot, 2003,25(1): 10-14.
[8] J. Pearl. Probabilistic Reasoning in Intelligent Systems: Networks ofPlausible Inference, Morgan Kaufmann Publishers, Palo Alto, CA. 1988

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