

NEW UNIVERSAL SMART VISION SENSORS AND NEW INTUITIVE PROGRAMMING METHODS FOR VISUAL QUALITY MEASUREMENTS

Dietrich Hofmann, Paul-Gerald Dittrich

Steinbeis Transferzentrum Qualitätssicherung & Qualitätsmesstechnik, Jena, Germany, dietrich-hofmann@t-online.de

Abstract: The main purpose of the paper is to present a new kind of universal smart vision sensors and a new method for intuitive programming with icons on touch screens to overcome the existing well-known problems of subjective visual quality measurements by man. Practical examples will be demonstrated during the presentation.

Keywords: smart vision sensors, intuitive programming.

1. INTRODUCTION

Quality measurement is an organized examination or formal evaluation process. It involves measurements, tests, and gauges applied to certain characteristics in regard to a product or process. The results are usually compared to specified requirements and standards for determining whether the product or process is in line with the targets.

Optical visual quality measurements are fast, contact-free and non-destructive. To get these highly productive features most visual quality measurements still provided subjective by man. Visual quality measurements by man have three significant disadvantages:

1. The human inspector must be specialized
2. The human inspector is expensive
3. What human inspect in subjective visual perception is not simply a translation of the image on the retina. Thus people interested in perception have long struggled to explain what visual processing does to create what we actually see. This problem is unsolved till today.

Therefore an increasing interest is observable to use objective vision sensors and algorithmic image processing for visual quality measurements.

Digital cameras, embedded computers, affordable touch screens, standardized interfaces, robust image processing algorithms and colored icons are the fundamentals of a new class of image processing systems for visual quality measurements. The fast progress of micro and optical technologies belonging to applications to consumer goods are fundamental prepositions of convenient, reliable and affordable instrumentations in quality measurements.

It will be practically demonstrated that the new smart vision sensors and the new intuitive programming method are milestones in the digitalization of measurements and therefore a breakthrough in measurement theory and practice as well as in education and training.

2. SMART VISION SENSORS

Smart vision sensors are a new kind of measuring instruments on the market (Fig. 01)

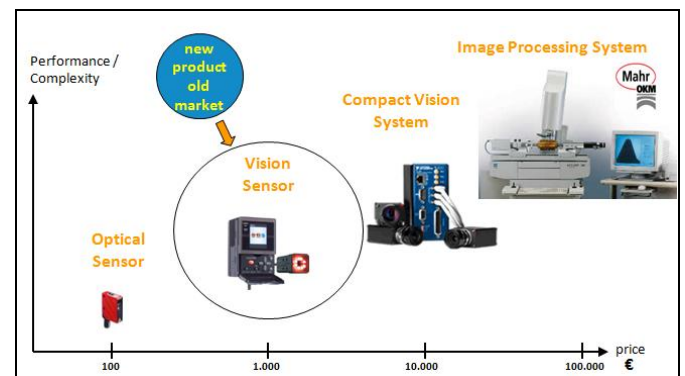


Fig. 01 The position of smart vision sensors

The ZFX-C Smart Vision Sensor is a total image processing system that includes everything from a camera with an integrated light source to an image-processing unit (Fig. 02)



Fig. 02 The OMRON ZFX-C smart vision sensor system
http://www.ia.omron.com/product/family/1892/index_fea.html

With Omron's newly developed proprietary measurement algorithms, the parameters can be set through

only a few steps involving the operation of a touch-panel color monitor (Fig. 03).

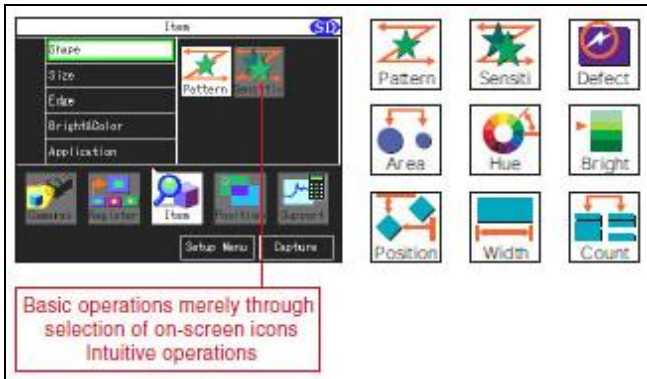


Fig. 03 colored icons for intuitive programming
http://www.ia.omron.com/product/family/1892/index_fea.html

3. SEE&CLICK OPERATION INSTRUCTIONS

To accomplish the operation of the above mentioned smart vision sensors we developed the so called See&Click operation instructions (Fig. 04).

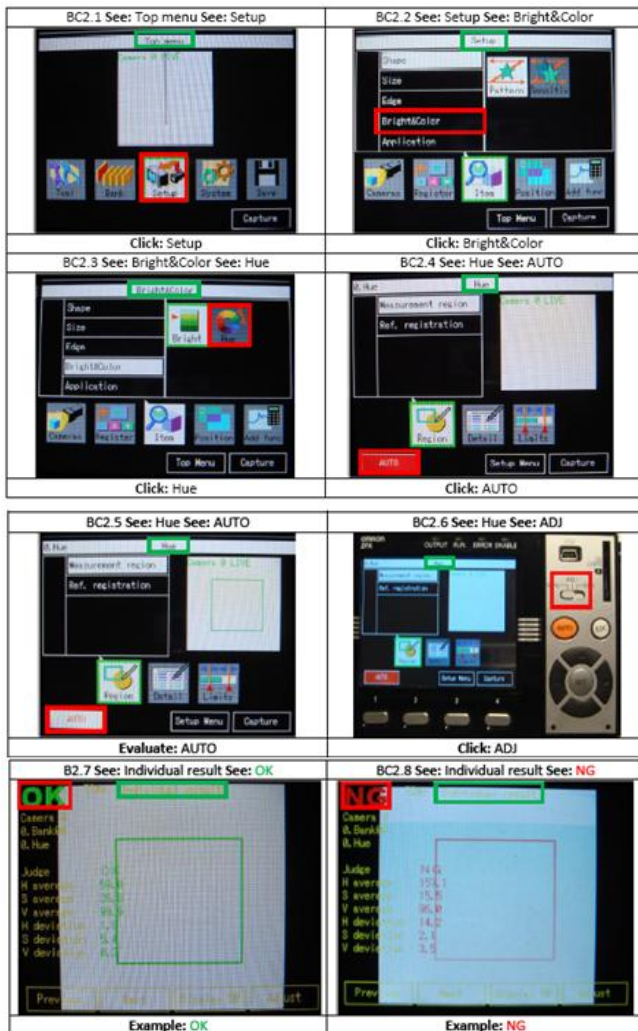


Fig. 04 See&Click operation instructions

The smart user interface with the coloured icons plus the See&Click operation instructions provide simplicity of usage giving anyone all they can need to perform a complete visual quality measurement. Thus the combination of smart vision sensors with See&Click operation instructions makes visual quality measurements convenient, reliable and affordable also for non-qualified users.

4. WEB 2.0 IN EDUCATION AND TRAINING

To enable the application of the See&Click operation instructions for the users independent of space and time they have been included in the VisQuaNet/SpectroNet portal for visual quality assurance with digital image processing and spectral imaging (Fig. 05).



Fig. 05 VisQuaNet/SpectroNet portal
<http://www.spectronet.de> > Netzwerkarbeit > Bedienungsanleitungen > SaC für OMRON ZFX > 071118_09_sac_hue.pdf

5. CONCLUSIONS

The main purpose of the paper was to present a new kind of universal smart vision sensors and a new method for intuitive programming with icons on touch screens to overcome the existing well-known problems of subjective visual quality measurements by man. **Practical examples will be demonstrated during the presentation.**

The new technology and style of the ZFX-C as well as the new technology and style of See&Click operation instructions pave the way to a new era of visual quality measurements with smart vision sensors.

ACKNOWLEDGEMENTS

Thanks are due for excellent collaboration to the OMRON ELECTRONICS GmbH www.omron.de, to the partners in the NEMO networks VisQuaNet www.visquanet.de and SpectroNet www.spectronet.de and to the German Ministry of Economy and Technology www.bmwi.bund.de. The investigations have been promoted within the NEMO-projects 021302N and 011902N.