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Real-Time Dimension Measurement using Stereo Vision

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Abstract: Human eyes has the ability to roughly estimate the distance and size of an object because of the stereo vision of human's eyes. In this project, we proposed to utilize the stereo vision system to accurately measure the dimension (length and breadth) of an object present in front of the camera. Nowadays almost in every field dual camera is replacing single camera setup because using dual camera we can get more detailed information about the picture in terms of depth, picture clarity, and faster focus ability. This allows the camera to simulate human binocular vision and therefore gives it the ability to capture three-dimensional images, a process known as stereo photography. It can be implemented using Open Source Computer Vision Technology (Open CV) developed by Intel.
Keywords: Open CV Technology, Stereo Vision, Camera, RaspberryPi, Python.

I. INTRODUCTION

Object distance and size measurement are becoming more essential in many applications especially in the mobile autonomous system. Information on the distance and size of the surround objects is useful for the navigation and localization of the mobile system. Since most autonomous systems nowadays are equipped with vision sensors or cameras, it is very beneficial that the visual information is utilized to obtained distance and size information that can be used to assist the system.

Recently, several research works have started to utilize multiple vision sensors for the purpose of object distance and size measurement. Most of the works propose to utilize the stereo configuration of cameras. One example is the work of A-Line H, where they utilize stereo vision to measure the safe driving distance of a vehicle. The distance measurement is based on the disparity of the front car in the two-frame capture by the stereo camera. In the work published by Beak H. an improvement in the calculation of the disparity is proposed so that a more accurate object distance can be measured. In their work, they had shown that by using their method the disparity of the object in a larger view area can be obtained.

Most of the work proposed in the literature focused only on distance measurement. As we have stated before, the object size information is also very useful especially in the navigation and localization of an autonomous system. Moreover, the size information also can be used for a short-term object identification which is useful for an autonomous system. In this paper, we proposed to utilize a method of measuring the distance of an object as well as the size of the object using a stereo vision sensor. The method also employs a much faster algorithm so that the measurement can be done in real-time.

Using a single camera for distance measurement, object detection and feature extraction (i.e., finding the length and width of an object) is not yet well researched and there are very few published works on the topic in the literature. Therefore, using this technique for real-world applications requires more research and improvements.

II. LITERATURE SURVEY

In the past few years, the detection of Objects in real time and Image processing has become an active area of research and several new approaches have been proposed. Several researchers have conducted many studies on Object detection-

1) *Title:* Stereo Vision Images Processing for Real-time

a) *Author:* Yasir M Mustafah, Rahizall Noor, HasbullahHasbi, Amelia Wong AzmaInternational Islamic University Malaysia, P.O. Box 10, 50728, Kuala Lumpur

b) *Abstract:* Object Distance and Size Measurements Human has the ability to roughly estimate the distance and size of an object because of the stereo vision of human's eyes. In this project, we proposed to utilize the stereo vision system to accurately measure the distance and size (height and width) of an object in view. Object size identification is very useful in building systems or applications, especially in autonomous system navigation. Many recent works have started to use multiple vision sensors or cameras for a different type of applications such as 3D image constructions, occlusion detection and etc. Multiple cameras system has become more popular since cameras are now very cheap and easy to deploy and utilize. The proposed

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measurement system consists of object detection on the stereo images and blob extraction and distance and size calculation and object identification. The system also employs a fast algorithm so that the measurement can be done in real-time. The object measurement using a stereo camera is better than object detection using a single camera that was proposed in many previous research works. It is much easier to calibrate and can produce more accurate results.

2) *Title:* Estimating the Object Size from Static 2D Image

a) *Author:* OndrejKainz Dept. of Computers and Informatics FEI TU of Kosice Kosice, Slovak Republic ondrej.kainz@cnl.sk, FrantišekJakabDept. of Computers and Informatics FEI TU of Kosice Kosice, Slovak Republic frantisek.jakab@cnl.sk, Matúš W. Horečný Dept. of Computers and Informatics FEI TU of Kosice Kosice, Slovak Republic horecny.matus@gmail.com

b) *Abstract:* In this paper, the real size of the object from a static digital image is estimated. The analysis of selected algorithms used in the area of computer vision is carried out, this includes an introduction of the software tools efficient enough to measure the object size. The proposed solution has to be in compliance with the conditions for correct processing of obtained information, such as a suitable scene for measuring and correct adjustment of the camera. The final software solution calculates the estimated size of the measured object while utilizing substitution variables that were created for this purpose. Such variables are based on the acquired images and their subsequent processing.

3) *Title:* Image Processing and Object Detection

a) *Author:* Nidhi, Dept. of Computer, Applications, NIT Kurukshetra, Haryana, India.

b) *Abstract:* With the advancement of modern technologies areas related to robotics and computer vision, real-time image processing has become a major technology under consideration. So, I tried a novel approach for capturing images from the computer webcam in real time environment and process them as we are required. By using an open source computer vision library (OpenCV for short), an image can be captured on the bases of its hue, saturation and color value (HSV) range. The basic library functions for image handling and processing are used. Basic library functions are used for loading an image, creating windows to the hold image at runtime, saving images, and to differentiate images based on their color values. I have also applied a function to threshold the output image in order to decrease the distortion init. While processing, the images are converted from their basic scheme Red, Green, and Blue (RGB) toa more suitable one that is HSV.

III.METHODOLOGY

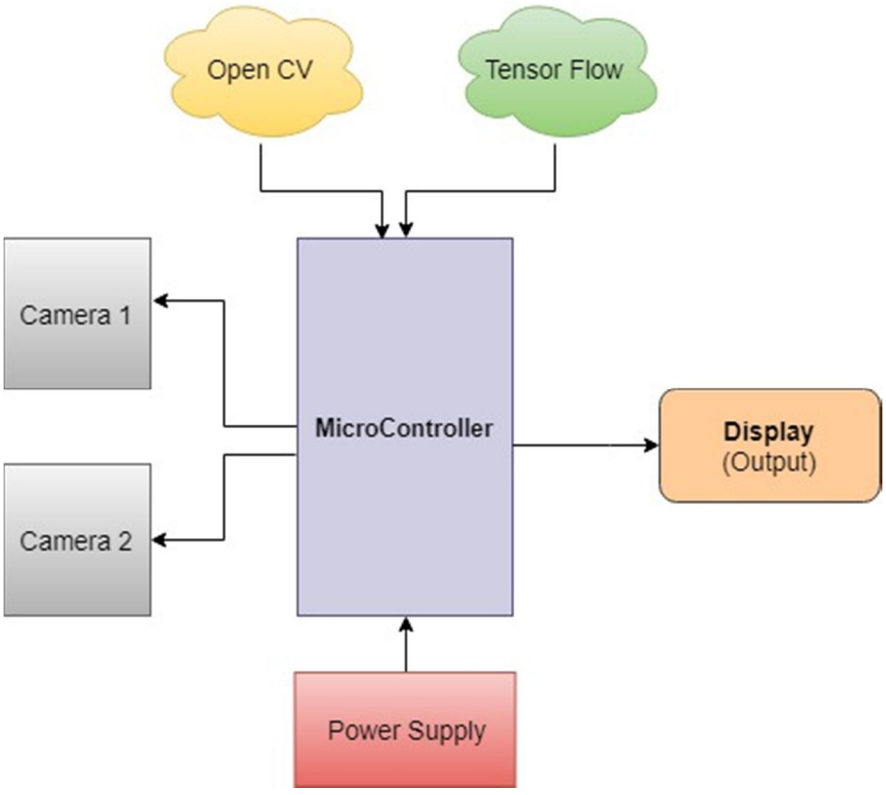


Fig:- Block Diagram

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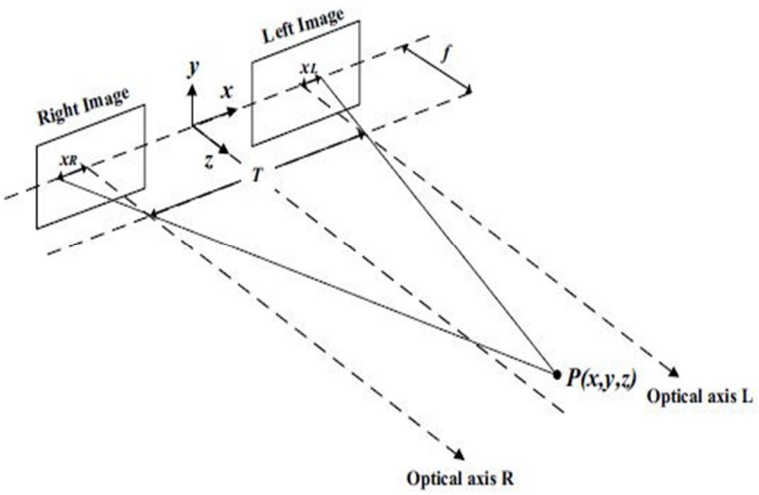


Fig: Stereo Image Capture

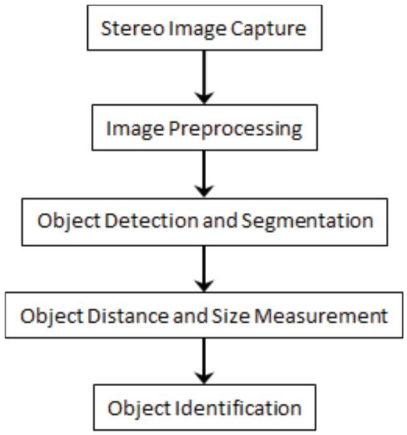


Fig: The flow of the proposed object size measurement system utilizing stereo camera

A. Proposed Work

The Proposed system has been in different aspects of development in previous various projects. The system mentioned in this paper uses a different approach of calculating the dimension of an object. It uses the concept of disparity between the left and right captured image and then helps in optimizing the entire system.

1) Advantages

a) Real-time Measurement
b) Flexibility and High-Speed Operation
c) Accurate
d) Easy Installation
e) Portable

2) Applications

a) Car Parking System
b) Dress Size Prediction (e.g. Myntra)
c) Augmented Reality
d) Sorting

IV. CONCLUSION

In this paper, a solution for estimating the object size from static images using one camera was introduced and related software implementation is comprehensively described. The solution itself is simple, fast and yet easy to implement. The detection of an object in a picture is based on the processing of two images taken in the same environment with and without the object, following the given requirements. The detected object is characterized by the coordinates and the size of the displayed object area. The values obtained from the processing of these images are used as input parameters for the
equations to calculate the estimated size. The equations were created according to the basic trigonometric rules and sets of
tests are described in this paper. Based on these tests, while using various objects, different heights and different distances of objects from the camera, it was found that the deviation of the measurement is smaller than 10%.

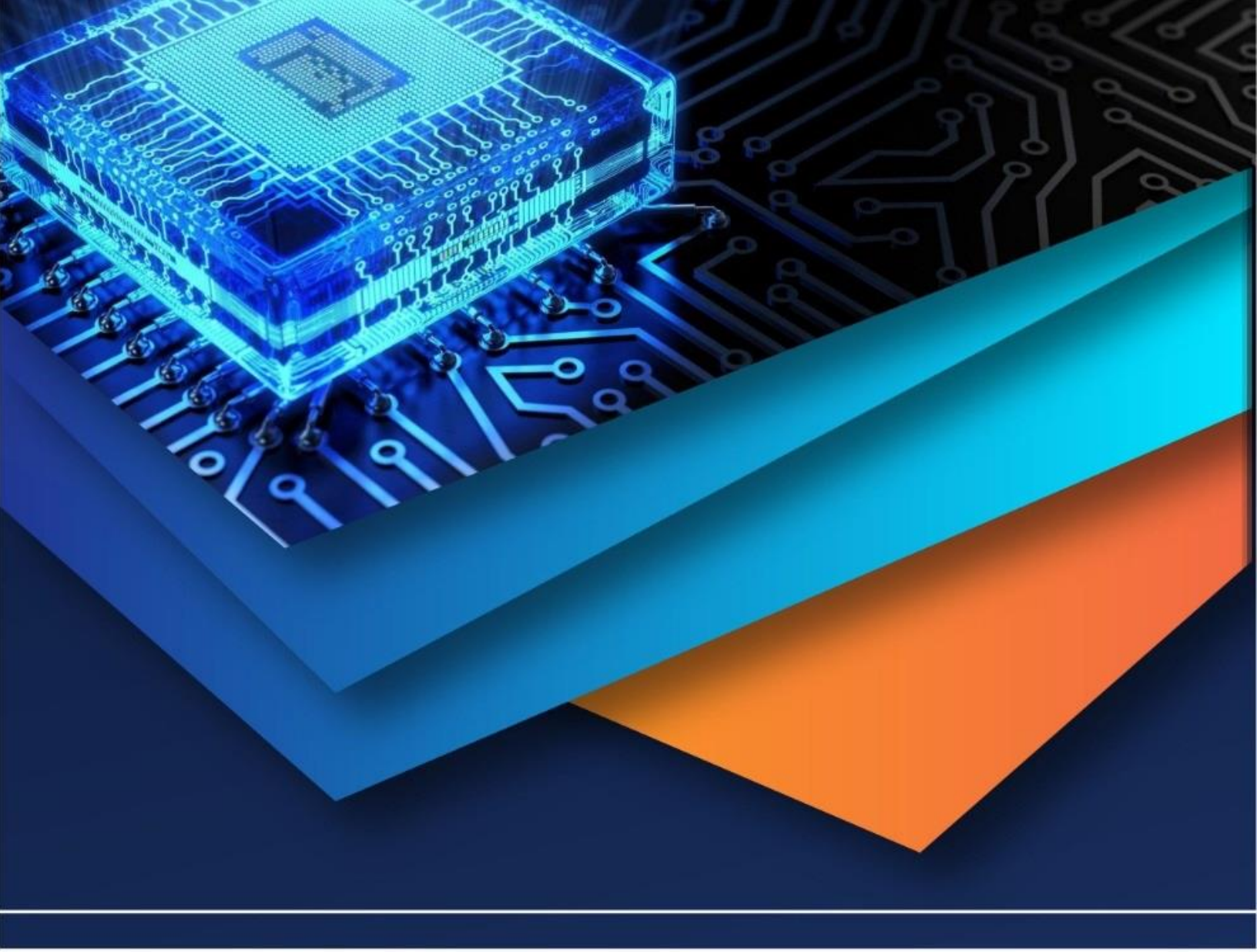
REFERENCES

[1] Rahman K.A., Hossain M.S., Bhuiyan M.A.-A., Tao Z., Hasanuzzaman M., Ueno H., "Person to Camera Distance Measurement Based on Eye- Distance", 3rd International Conference on Multimedia and Ubiquitous Engineering, 2009 (MUE'09), pp.137-141, Qingdao, 4-6 June 2009
[2] Wahab M.N.A., Sivadev, N., Sundaraj, K., "Target distance estimation using monocular vision system for mobile robot", IEEE Conference on Open Systems (ICOS), 2011, pp.11-15, Langkawi, Malaysia, 25-28 Sept. 2011
[3] Kim H., Lin C. S., Song J., Chae H., "Distance Measurement Using a Single Camera with a Rotating Mirror", International Journal of Control, Automation, and Systems, vol.3, no.4, pp.542-551, 2005

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[4] A-Lin H., Xue C., Ying G., Wen-Ju Y., Jie H, "Measurement of Safe Driving Distance Based on Stereo Vision", Proceedings of the 6th International Conference on Image and Graphics (ICIG), 2011, pp.902- 907, Hefei, Anhui, 12-15 Aug. 2011
[5] Baek H. S., Choi J. M., Lee B. S., "Improvement of Distance Measurement Algorithm on Stereo Vision System(SVS)", Proceedings of the 5th International Conference on Ubiquitous Information Technologies and Applications (CUTE), 2010, pp.1-3, Sanya, 16-18 Dec. 2010
[6] Open Computer Vision Library (OpenCV), http://sourceforge.net/projects/opencvlibrary/, Last accessed 20th February 2012.
[7] Viraktamath SV, Mukund Katti, Aditya Khatawkar, Pavan Kulkarni, "Face Detection and Tracking using OpenCV," The SIJ Transaction on Computer Networks & Communication Engineering (CNCE), 2013, 1(3).
[8] Pant A, Arora A, Kumar S, Arora RP. "Sophisticated Image Encryption Using OpenCV," International Journal of Advances Research in Computer Science and Software Engineering, 2012, 2(1).
[9] Belongie S, Malik J, Puzicha J. "Shape Matching and Object Recognition using shape contexts," IEEE Transactions on Pattern Analysis and Machine Intelligence, 2002; 24(4):509-522,
[10] Tobias OJ, Seara R. "Image Segmentation by Histogram Thresholding Using Fuzzy Sets," IEEE Transactions on Image Processing, 2002; 11(12):1457-1465.
[11] S. K. Kopparapu, and U. B. Desai, Bayesian Approach to Image Interpretation. Norwell, MA: Kluwer Academic Publishers, 2000.
[12] M. Sonka, V. Hlavac, and R. Boyle, Image Processing, Analysis and Machine Vision. Stamford, CT: Thomson Learning, 2007.
[13] L. Wojnar, Image Analysis: Applications in Materials Engineering. Boca Raton, FL: CRC Press, 1999.
[14] L. Zhao, J. Chen, and J. Benesty, "A multichannel widely linearwiener filter for binaural noise reduction in the short-time-Fourier-transform domain," IEEE China Summit & International Conference on Signal and Information Processing (ChinaSIP), pp. 227 - 231, July 2014.
[15] D. Slezak, S. K. Pal, B.-H. Kang, J. Gu, H. Kuroda, and T.-h. Kim, Signal Processing, Image Processing and Pattern Recognition. Germany: Springer Science & Business Media, 2009.
[16] M. Cheriet, N. Kharma, Ch.-L. Liu, and Ch. Suen, Character Recognition Systems: A Guide for Students and Practitioners. Hoboken, NJ: John Wiley & Sons, 2007.
[17] K. Jeong, and H. Moon, "Object Detection Using FAST Corner Detector Based on Smartphone Platforms," First ACIS/JNU International Conference on Computers, Networks, Systems and Industrial Engineering (CNSI), pp. 111 - 115, May 2011.
[18] W. Burger, and M. J. Burge, Principles of Digital Image Processing, London, UK: Springer, 2009.

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