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STEREOVISION BASED OBJECT FINDING ROBOT

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ABSTRACT

The aim of this paper is to discuss about the system that has been implemented using raspberry pi. Two cameras are interfaced with the controller to capture images. The algorithm used is Sum of Absolute Differences. The disparity between the two images captured by the cameras is calculated using this algorithm. This is used to calculate the distance between the robot and the object. As disparity and distance are inversely proportional to each other more the disparity, less will be the distance and vice versa. The robot moves towards the object that is closest to it. The controller sends signals to the motors through the drivers to move the robot.

KEYWORDS – Stereo-vision, two cameras, tracking, recognition, distance calculation, positional differences.

I.INTRODUCTION

In the world today, many applications require the use of robots for specialized tasks. These tasks may be difficult for humans to perform or the work environment may be too hazardous for them to work in. Robots make the jobs easier and the risk to human life can be minimized. The human visual system comprises of the two eyes that are separated by a small distance. This separation between the eyes produces two images that are processed by the brain. The images are combined to produce a single image. The advantage of such a system is that the differences in the positions of an object in these images help in determining the distance from the visual system. The stereo-vision based object finding robot uses two cameras to capture two different images of an object. The distance to the object is calculated by determining the disparity in the two images, i.e. the differences of the position and pixel values of the two images. As distance and disparity are inversely proportional, if the disparity is less, the distance is more and vice versa.

II.LITERATURE REVIEW

NAME SR.NO	TOPIC	AUTHOR NAME	YEAR OF PUBLICATION	METHODOLOGY USED
1.	Ball Detection And Predictive Ball Following Based on a Stereoscopic Vision System	Davide Scaramuzza, Stefano Pagnotelli, Paolo Valigi	2005	Pixel to pixel algorithm

2.	A method For Stereo-Vision Based Tracking For Robotic Applicatio-ns	Pubudu N. Pathirana, Adrian N. Bishop, Andrey V. Savkin, Samitha W. Ekanayake.	2008	Nonlinear perspective projection and image velocity measurement.
3.	Design And Implemen-tation of Stereo-Vision Guided Omni-Directional Mobile Robot For Real Time Object Tracking.	Sho-Tsung Kao, Chung-Yi Yen, Ming Tzu Ho	2010	Perspective projection camera model.

III.METHODOLOGY

1. Capturing images.
2. Calculation of distance to nearest object.
3. Moving the robot to nearest object.

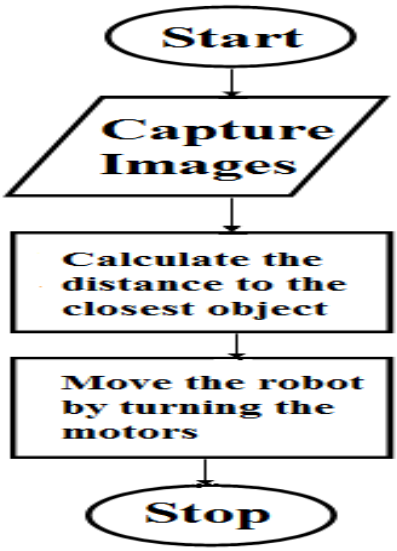

Fig.No.1 FLOW CHART FOR OBJECT DETECTION

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IV.BLOCK DIAGRAM

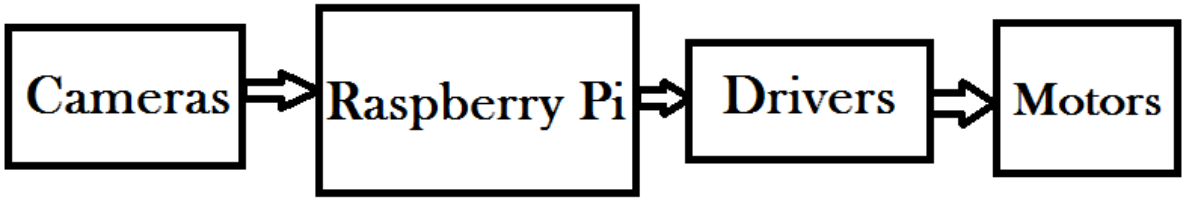

Fig.No.2 BLOCK DIAGRAM OF STEREO-VISION BASED OBJECT FINDING ROBOT

V.COMPONENTS USED TO IMPLEMENT IDEA

1. Raspberry Pi (3)- CPU: Quad-core 64-bit ARM Cortex A53, GPU: 400MHz VideoCore IV multimedia, Memory: 1GB LPDDR2-900 SDRAM, USB ports: 4, Power source: 5 V via Micro USB or GPIO header
2. 2- High Definition Cameras
3. 2- Motors- Operating voltage 12VDC, 300 rpm.
4. 1- Motor Driver- Supply voltage range 4.5V to 36V, 600mA output current capability.

VI.MODEL OF STEREO-VISION BASED OBJECT FINDING ROBOT

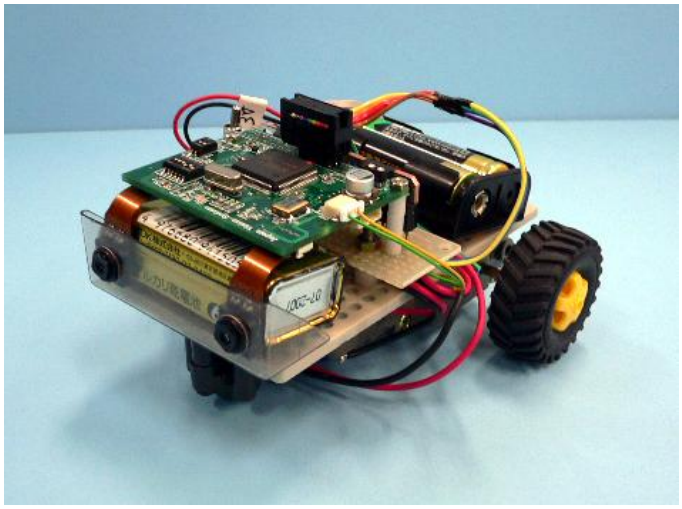

FIG. MODEL OF STEREO-VISION BASED OBJECT FINDING ROBOT

VII.ADVANTAGES

1. The system can be easily modified for any application.
2. The efficiency of the system is high as it calculates the shortest path to the appropriate object.
3. Computational speed is high due to use of raspberry pi 3.

VIII.APPLICATIONS

1. It can be used for rescue operations where a person is not easily accessible.
2. It can be used for providing supplies in military applications.

IX.CONCLUSION

Different algorithms can be used to calculate the disparity in the images captured by the two cameras. As disparity and distance are inversely proportional to each other, if the disparity in the images is high, the distance between the robot and the object is less and vice-versa. The sum of absolute differences is the measure of the similarity between the image blocks. It is calculated by taking the absolute difference between each pixel in the original block and the corresponding pixel in the block which is being used for comparison. These differences are summed to obtain a single value which is the disparity between the two images.

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