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Object Detection and Dimension Measuring using OpenCV

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ABSTRACT: Real time object detection and dimension measuring is very important topic in computer vision problem. This topic has very important aspect from an industrial point of view. This topic study presents technique for object detection and their dimension measurements from device such as webcam. For this we are using IOT technologies like OpenCV libraries and Webcam respectively. OpenCV involve many more algorithms and libraries which is going to use in this project.

This project technique has four main steps:

1. Capture image
2. Object measurement
3. Save output
4. Display output

KEYWORDS: Webcam, OpenCV, Computer vision, Object size measurement, Numpy.

I. INTRODUCTION

Now a days machines are very important part of human life therefore working well of that Machines is the main part. Machines are working well only if the parts fits well. If parts cannot fit properly in machine than working of machine is not possible. Therefore dimension measuring is required for industry. Real time object detection and dimension measuring is very important topic in day to day life. Measuring object means Finding dimensions of each object. Capturing the image by using IOT device like Webcam. This topic is very important according to industry sector. There are fewer chances of human error in measuring therefore this technique is implemented. In this research we are using OpenCV (Open Source Computer Vision) library. There are two main parts in this system, the first part is object detection and second is dimension measurement. Here we required plane white paper background. Canny edge detector is used for detecting edge of object. Gaussian blur is used for blurring the object to find the accurate edge of object. Dilation and Erosion is the basic morphological processing operation used for removing noise from image and remove gap between the edge of the object. Here we are going to find out dimensions like height and width.

II. LITERATURE REVIEW

Nashwan Adnan Othman, Mehmet Umut salur, Mehmet Karakose, Ilhan Aydin, The system proposed enhanced technique for detecting objects and computing their measurements in real time from video streams. System suggested an object measurement technique for real-time video by utilizing OpenCV libraries and includes the canny edge detection, dilation, and erosion algorithms. The suggested technique comprises of four stages: (1) identifying an object to be measured by using canny edge detection algorithm, (2) using morphological operators includes dilation and erosion algorithm to close gaps between edges, (3) find and sort contours, (4) measuring the dimensions of objects. In the implementation of the proposed technique, we designed a system that used OpenCV software library, Raspberry Pi 3 and Raspberry Camera.[1]

Shweta Pardeshi, Pranali Pawar, Nikhil Raj, This study presents an augmented technique for detecting objects and computing their real-time measurements from an IoT video device such as a webcam. We have suggested an object measurement technique in real-time using AI and IoT technologies like OpenCV libraries and webcam respectively. OpenCV includes many libraries and algorithms that are used in this project. The technique has four stages:



(1) capturing image (2) object measurement process (3) save output (4) displaying output.[2] T.Dhikhi, Allagada Naga Suhas, Gosula Ramakanth Reddy, Kanadam Chandu Vardhan, In this project, we proposed the measuring of dimensions of an objects present in the picture and the distances between the objects is computed. Computing the measurements of the objects in a picture is similar to finding the distance to an object from the camera. First of all, we have to find the value of pixels per a given metric. To find this value, we have to select one reference object from the image by considering two major properties. First property is that dimensions (width & height) of the reference object should be known and in terms of (inches or mm) and the other property is that identification of the reference object should be easy.[3]

Sukesh Jiwane, Ashutosh Panda, Yash Basutkar, Avinash Golande, This paper shows how an IOT video device, such as camera, may also be used to recognize objects and compute their real time measurements. Based on Numpy, OpenCV libraries, and cameras we proposed an IOT based real time object measuring technique for calculating measurements and dimensions of objects. Many modules and algorithms from OpenCV are used in this project.

There are five stages to this technique, which are as follows. Capture a picture, Measurement of an object, Calculating the area, Saving the output, Displaying the measurements.[4]

Dr.Sonal Sharma, Pooja Gupta, Deeshu Rajput, Akshay Aggarwal, In this research paper, algorithm are implemented in object detection while making use of OpenCV library python 2.7, improving the efficiency and accuracy of Object detection are presented. The paper will show some differences between the python and other languages.

Object detection is a computer technology related to computer vision and image processing that deals with detecting instances of semantic objects of certain class(such as humans, buildings, or cars) in digital images and videos. An object can be classified according to its special features. If the object is partially obstructed from direct view they can even be recognized by using more effective algorithms.[5]

Neha Mogre, Shreyash Bhagat, Kartik Bhojar, Harshal Handke, Praful Ingole, In this paper, system proposed a method to detect the object and height measurement. Real time object detection and height measurement are important and challenging task in computer vision. The automatic photo and video analysis will boost up the availability of video surveillance camera and powerful computers. Every surveillance video camera require object tracking algorithm for monitoring the suspect. It is process of detecting an object or multiple objects either the object is static or dynamic. With the help of this object detecting and height measuring algorithm can easily monitor the suspect and measures height of the suspect. Not only using this real time detection and measurement algorithm for suspecting the suspects from video surveillance camera but also it will get use in many online shopping platforms.[6]

III. PROBLEM STATEMENT

Develop a system for object detection and dimension measuring by using python and OpenCV.

IV. SOFTWARE BACKGROUND

Python IDLE: IDLE is Python's Integrated Development and Learning Environment.

IDLE has the following features:

- coded in 100% pure Python, using the `tkinter` GUI toolkit
- cross-platform: works mostly the same on Windows, Unix, and macOS
- Python shell window (interactive interpreter) with colorizing of code input, output, and error messages
- multi-window text editor with multiple undo, Python colorizing, smart indent, call tips, auto completion, and other features
- search within any window, replace within editor windows, and search through multiple files (`grep`)
- debugger with persistent breakpoints, stepping, and viewing of global and local namespaces
- configuration, browsers, and other dialogs



Numpy

NumPy (Numerical Python) is an open source Python library that's used in almost every field of science and engineering. It's the universal standard for working with numerical data in Python. The NumPy library contains multidimensional array and matrix data structures. It adds powerful data structures to Python that guarantee efficient calculations with arrays and matrices and it supplies an enormous library of high-level mathematical functions that operate on these arrays and matrices.

OpenCV

It is an open-source library used in computer vision, machine learning, image processing. There are various applications and functionality of OpenCV which makes it versatile.

Imutils

It is python library. A series of convenience functions to make basic image processing functions such as translation, rotation, resizing, skeletonization, and displaying Matplotlib images easier with OpenCV.

Scipy.Spatial

SciPy is built to work with NumPy arrays, and provides many user-friendly and efficient numerical routines, such as routines for numerical integration and optimization. Together, they run on all popular operating systems, are quick to install, and are free of charge. SciPy are easy to use.

Argparse

The argparse module makes it easy to write user friendly command line interfaces. The program defines what arguments it requires, and argparse will figure out how to parse those out of sys.argv. The argparse module also automatically generates help and usage messages and issues errors when users give the program invalid arguments.

IOT Device-Webcam:

A device with various applications. Webcam with a mid-level pixel reading ability is perfect. Device driver software needs to be installed and should work well for the program to be executed.

V. OVERVIEW

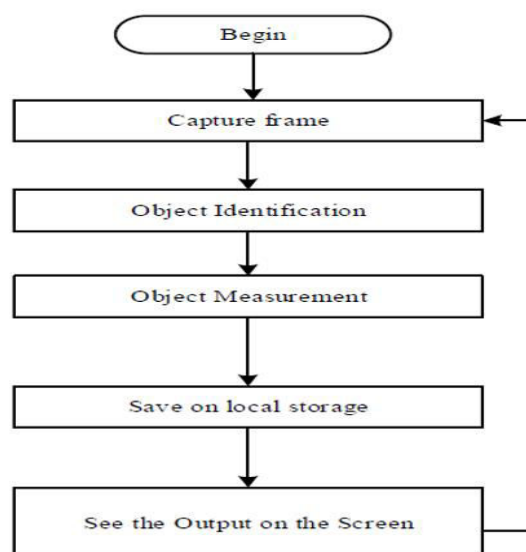


Fig 1: Flowchart of purposed system



The system consists of two parts which are object detection and object measurement. In the first part, IOT device like Webcam is used to achieve the frames. In the second part, computer vision module will be applied to the captured frames to determine the objects, then, we will measure each object.

The detected object of the current frame immediately will be processed to extract dimensions of objects.

In the proposed system, firstly, we need to pre-process our image. The camera will capture a frame and the frame will convert to grayscale to increase quickness and accuracy. Objects are detected via canny edge detector algorithm. It is used to detect only one object or multiple objects. By the help of canny edge detector, the converted image will be processed. The canny edge algorithm scans the entire image. After that, execute dilation and erosion algorithm to close holes among edges in the edge frame. Figure1, shows that the flow chart for the purposed system.

VI. APPLICATION AND ADVANTAGES

1. It is convenient and easy to use.
2. It has accuracy.
3. Fewer chances of human error.
4. It will save money on instruments that we normally use to take measurement.
5. It is easy to use and will save time and effort.
6. It is used in mechanical industry for measuring dimensions of parts.
7. It is useful for cloths shopping to detect the height of the cloths.

VII. FUTURE SCOPE

Machines are used in every part of human life. Machines work according to us but in today's world, we work according to machines. The rush to soar high is immense. Hence, machines are important and so are the parts of them. If the parts do not fit well a machine cannot work properly. The dimensions of the objects surely make a great impact. It is convenient and easy to use. It also gives accuracy and assurance of the manufactured product. As it is a one-time investment it surely has a great future scope.

VIII. CONCLUSION

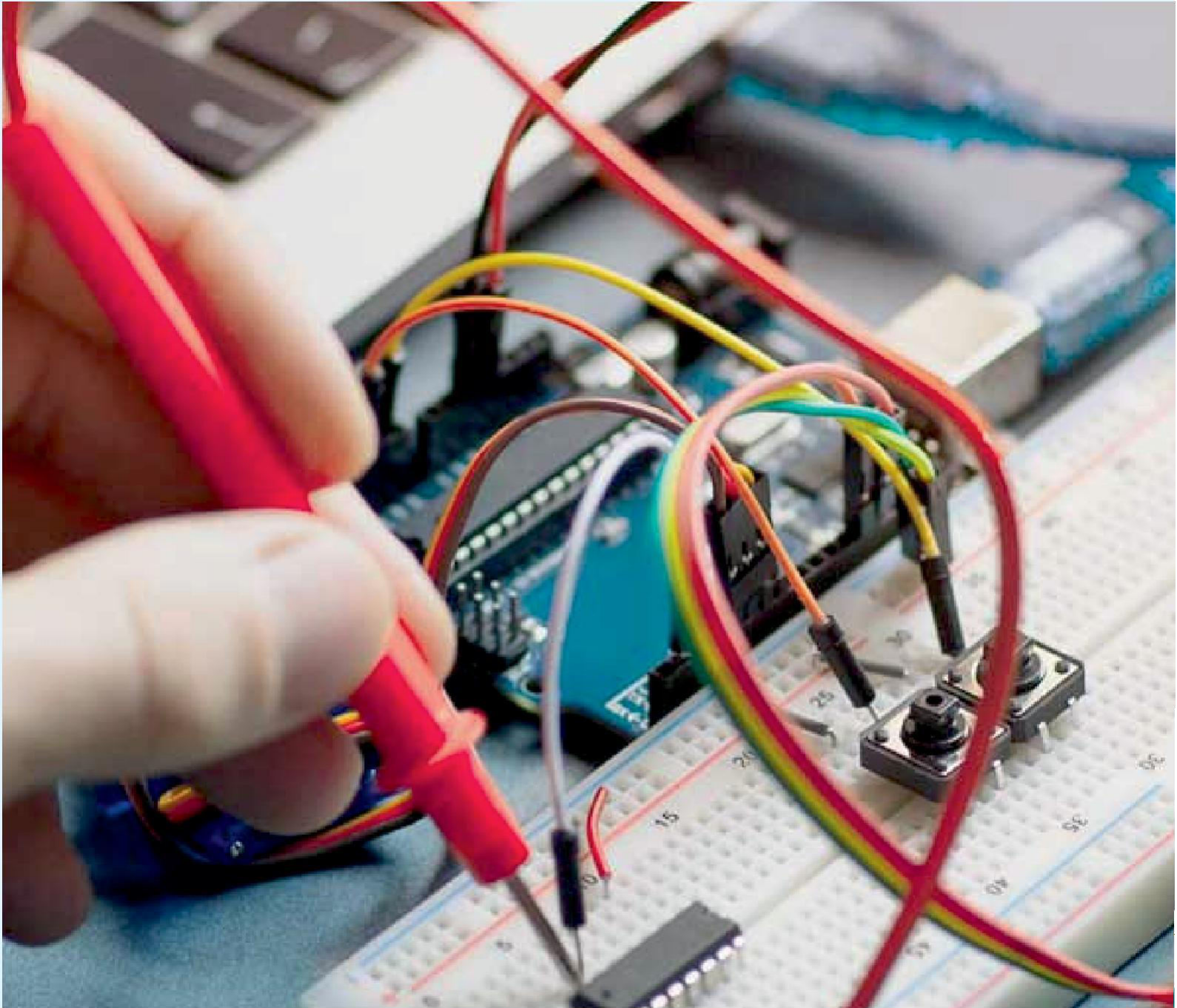
In this study, real time object detection and dimension measurement method is proposed for industrial systems. In the offered system, Open Source Computer Vision used to detect and measure objects. The system can detect and measure objects in a real time image. After the object has been detected by using canny edge detector, the size is obtained for each object by using OpenCV functions. We enhanced the canny edge detector algorithm through utilizing Morphological operations like dilation and erosion. This procedure can add some benefits to eliminate extra noises. Furthermore, where eliminating the extra noises it likewise smoothens the shape and keeps the outline and size of each object. Thus, the outlines of the different objects in the scene were kept. The proposed technique works very fast and five frames can be processed pending one second. To develop this system we are using device like webcam.

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