

QUALITY CONTROL IN PRODUCTION LINE USING PID ROBOTIC ARM

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Abstract- To make everything less demanding and practical is a prime worry in our everyday life and the microcontroller-based robot introduced here is a MATLAB construct control framework which works on principle of image processing. Camera is filling in as a sensor in this undertaking.

Utilizing a solitary camera for determining length, detecting material and highlight extraction (i.e., finding the length and width of a material) isn't yet all around inquired about and there are not many analyses with the subject in the writing. Along these lines, utilizing this strategy for genuine mechanical autonomy applications requires more research and changes. This theory mostly centers around the determining object dimension estimation and highlight extraction calculations utilizing a solitary camera

In our venture, robot has been designed for which the measurement of material produces a control code which is sent to the controller. The taken pictures of the material are handled utilizing programming MATLAB. Contingent upon the measurement of material, appropriate signals are given to the robot.

KeyWords: PID, Matlab, Image processing, Object Dimension, Microcontroller, Solitary Camera.

1. INTRODUCTION

One of the principle in mechanical vision is to discover the position and introduction of the material encompassing the robot in 3-dimension space, with respect to the reference outline. Deciding the camera's tilt point in a vertical plane and the separation between the camera and the items is fundamental for limiting and exploring. There are two basic strategies to find camera and material distance [1]: i) utilizing the focal length of camera; and ii) utilizing the height of the camera and where material meets the ground. Unlike in the main strategy, the measurement of the material in the second technique is obscure.

1.1 Background

For quite a long time, specialists have been inspired to create proficient strategies to exchange the PC vision capacities to applications and items, for example, car security, producing, video observation and Visual servoing (VS), which is a critical mechanical autonomy application. Visual servoing is a system for controlling a robot's movement utilizing criticism data sent from a sensor. In Vision Sensor, it is hard to track the moving item if information on material distance are not available [2].

There are two distinct kinds of visual servo control: position-based visual servo control (PBVS) and picture based visual servo control (IBVS). The reference contributions for PBVS are the 3D-relative position and the direction between the material and the robot end-effector (i.e., robot's hand) in Cartesian space. In picture based visual servo control, the reference input is the 2D material's position that is acquired from the camera's picture plane. The IBVS approach comes up short where a precise estimation of the material's separation and movement isn't accessible, particularly in unique situations [3]. Where a camera is utilized in the PBVS technique, a little estimation mistake would spread and altogether influence the servoing exactness [3].

To ascertain material measurement for a moving article, the material should first be followed by a camera. Demonstration based following methods require past learning of the material's shapes for the coordinating procedure so as to discover the material in the scene and apply the correct geometrical models of the material. These methods, nonetheless, have two inadequacies: i) a material that isn't in the database can't be perceived by these models; and ii) actualizing these models is entangled and, in some cases, incomprehensible [4].

Appearance-based techniques track a material utilizing the 2D state of the associated area. This following methodology depends on data that is given by the whole area's pixels. Movement, shading, and surface are a few cases of the data. Generally speaking, appearance-based strategies are not hearty with complex distortion [5].

Highlight based techniques track the particular highlights of a material, for example, focuses and edges, have been created in numerous applications. A few preferences of highlight-based strategies are their simplicity and stability for following the materials, however these techniques are not helpful in RTOS. Different weaknesses of highlight-based methods are their high cost and the long time required when countless happen in one material.

2. MOTIVATION

Existing structure were using batch quality analysis or manual based analysis, which had its own limitations such as steady upkeep, transportation and dedicated personnel which costs more to an organization, which is a major drawback. Every manufactured item must be quality checked before final process and its difficult task when it comes to measuring the dimension of manufactured material and tedious process.

So, in order to overcome this, a robotic arm to check the quality of manufactured items in production line has been designed, and thus reducing the error which was more during manual process, and also reduces the time taken to verify the items after manufacturing. This will also increase the throughput of production.

2.1 Objectives

- Detect and track the coveted material

In this venture, material identification is portrayed as distinguishing the presence of any material in the field of view that can be conceivably analyzing the material movement, material following is one of the framework's basic parts. In reality, a material can move openly in a 3D space with 6 degrees of flexibility (DOF). Because of the multifaceted nature of the issue, the problem was divided into two categories: material point (nearest purpose of the protest the camera) following, which is identified with the question's development in the xy-plane; and estimation of the material direction, which is the material's development about the Z-heading.

- Calculate a protest's measurement (e.g., length and width)

To discover a material's measurement, the major and minor axis of the circle (blob examination) is redressed utilizing direction, even and vertical blunder revisions. Note that it can be a legitimate supposition that the presence of a material does not change radically, paying little heed to the light condition and impediment. This

undertaking is mostly worried about examining and exploring the two vision-based frameworks keeping in mind the end goal to build up an exact, quick, and effective algorithm to measure object-to-camera distance.

3. METHODOLOGY

3.1 BLOCK DIAGRAM AND HARDWARE

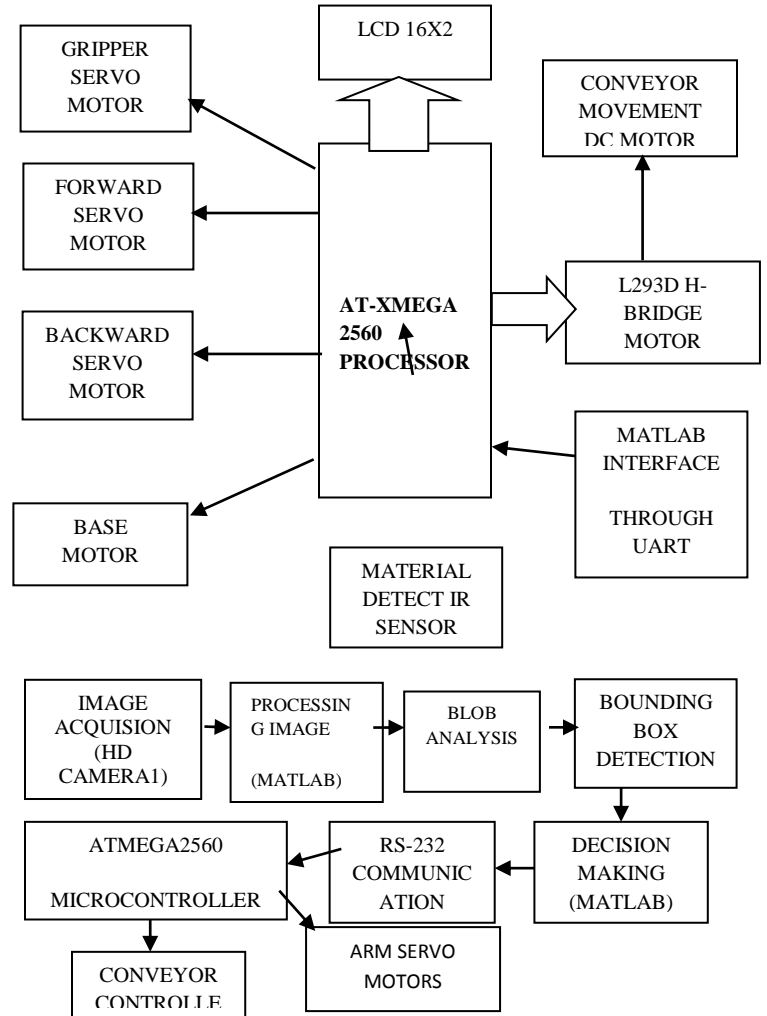


Figure 3.1 block diagram of complete system

The whole system of making a tracker to track a prescribed color which is divided into four blocks: image acquisition, processing of image, decision-making and motion control. Image acquisition can be achieved by using an hd-camera or a digital video camera. This device will capture the image and send it to the camera processor for further processing in the computer. Its main function is to convert the light energy received into electrical signals.

Image processing involves conversion of RGB color images into grayscale images, setting of threshold levels, saturation of the features into binary images and setting of cut-off values to remove noise in the binary image. Decision-making is done through the software program and motion control through either software or constant monitoring by the operator from the keyboard.

Input image phase it is used to acquire color 640X480 images. For background subtraction-based method can identify moving objects with a moving camera. A moving object tracking is done by taking snap when background subtraction is performed and using the obtained color probability distribution information to track for target. This method assumes that the color of the tracked object never changes

Pixel coordinates. Generally, pixel coordination method is most convenient method for expressing location. Here, the image is treated as a grid of discrete elements, ordered from top to bottom and left to right. That is, the first component 'r' (the row) increases downward, while the second component 'c' (the column) increases to the right. For example, the data for the pixel in the third row, second column is stored in the matrix element (3, 2). When the syntax for a function uses 'r' and 'c,' it refers to the pixel coordinate system And Matlab matrix subscripting to access the values of individual pixels can be used.

Detection of the Object. The object identification calculation incorporates four noteworthy stages: removing outlines, extricating shading segments, RGB to grey scale transformation, clamor disposal, removal of little objects and subtracting the back ground. It includes detachment of moving frontal area objects from static foundation. As the objects moves, a few areas on video outlines that vary fundamentally from for foundation can be thought to be closer view (moving objects). Number of research in moving object recognition has been finished with numerous calculations proposed. In the proposed calculation depends on shading highlight recognizable proof for discovery and following of object.

4. SOFTWARE TOOL AND FLOWCHART

4.1 MATLAB Tool

MATLAB (network research center) is a numerical registering condition and fourth era programming dialect. Created by Math Works, MATLAB permits plotting of data and information, execution of calculations. MATLAB is an elite dialect for specialized processing. It coordinates calculation, programming and representation in an easy to

understand condition where issues and arrangements are communicated in a simple scientific documentation.

MATLAB and the Image Processing Toolbox give an extensive variety of cutting edge picture handling capacities and intelligent devices for improving and breaking down computerized pictures. The intuitive apparatuses enabled us to perform spatial picture changes, morphological activities, for example, edge identification and clamor expulsion, district of-enthusiasm handling, separating. Making designs objects semi-straightforward is a helpful method in 3-D representation which outfits more data about spatial connections of various structures. The toolbox capacities executed in the open MATLAB dialect has likewise been utilized to build up the altered calculations.

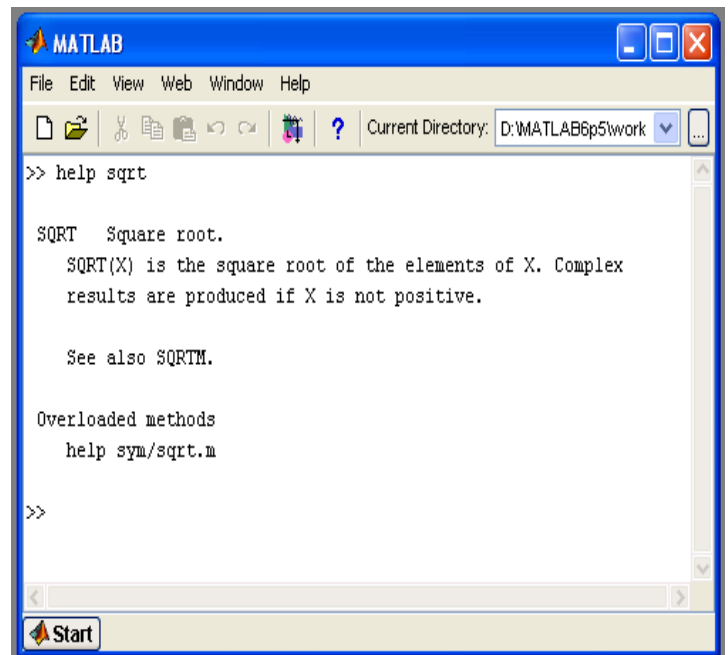
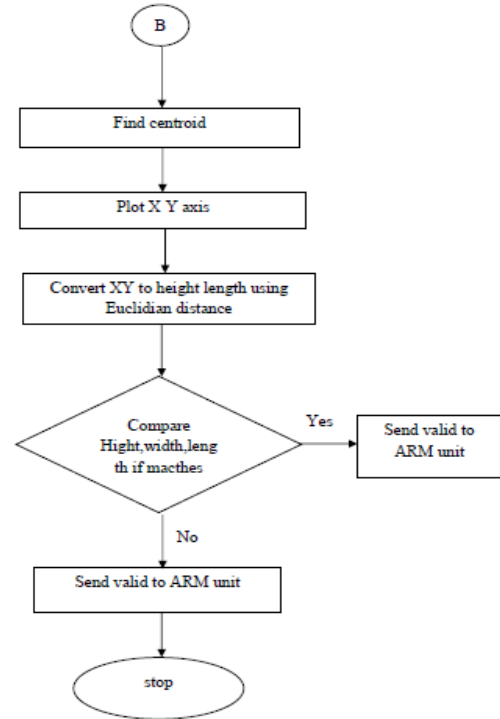
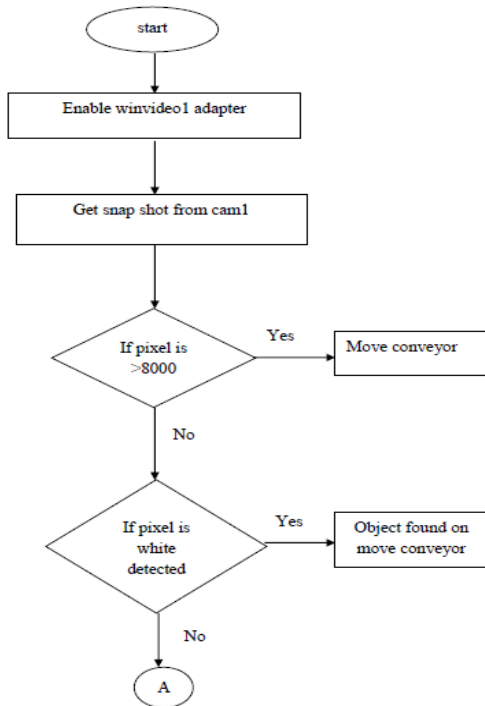


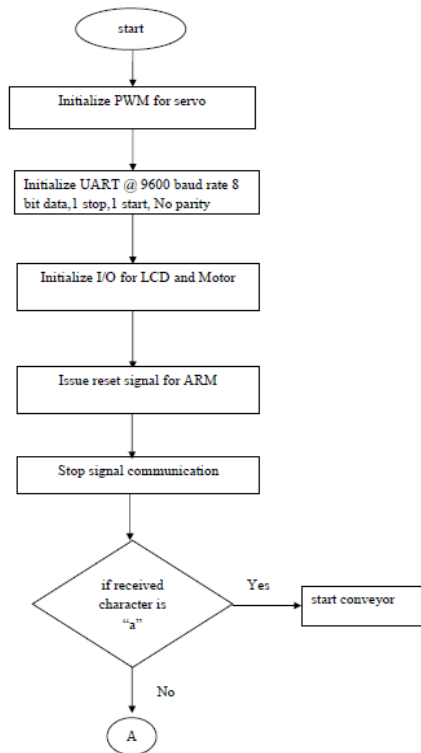
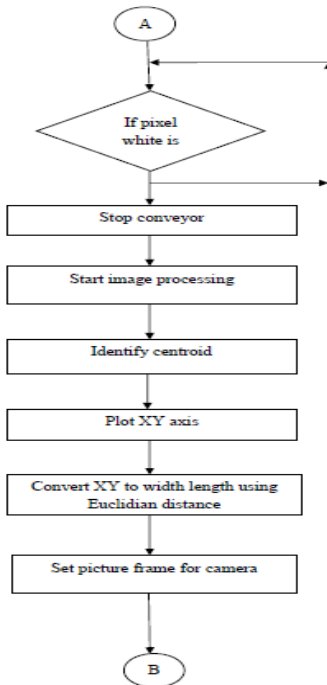
Fig4.1- a screenshot of MATLAB tool

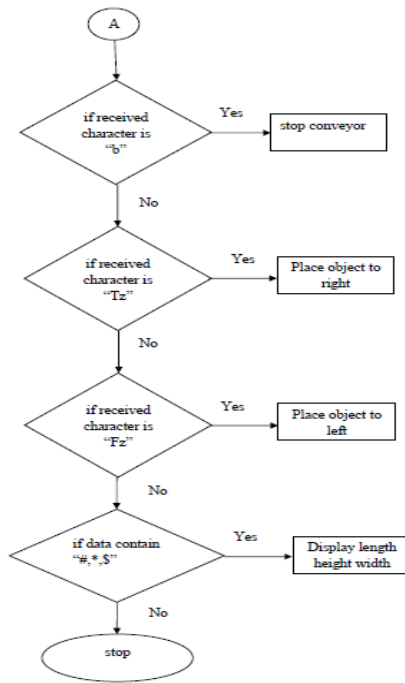
4.3 FLOWCHARTS

FLOWCHART OF IMAGE PROCESSING



FLOWCHART OF SERVO MOTOR





5. CONCLUSION

Endeavors to plan two vision-based object distance estimation calculations utilizing a solitary settled camera and a solitary camera with variable contribute edge were delineated this venture. In the headway of these estimations, basic assumption about the working state of the objects were made; in any case, no confinements were put on the object's size or on orientation. The development for an estimation to process object measurement of any size or geometry was made. In actuality, be that as it may, an immense measure of data is lost when the 3D world is anticipated onto a 2D picture plane. Notwithstanding when numerous perspectives are accessible, profundity data may not generally be recoverable. To conquer this loss of data, confinements, for example, nonlinearity are regularly presented, for example, the non-linearity rectification proposed in this undertaking.

In the proposed approaches, the object measurement estimations utilizing a solitary settled camera with variable pitch edge were gotten by a technique made out of a few picture preparing steps. These means can be abridged as: I) foundation estimation; ii) object following; iii) include extraction; and iv) highlight analysis. Robots need to distinguish the orientation and the distance to the objects keeping in mind the end goal to limit, explore, and high-level planning task should be performed. This work was propelled by presenting cases of the two noteworthy obligations of the object remove estimation: I) finding the separation utilizing the span of the object and the central

length of the camera; and ii) finding the separation of the object of obscure size by coordinating the stature of the camera and the purpose of contact of the object with the ground.

Although the problem of depth perception when using a single camera is of great importance in the mobile robotics community, the depth perception is a basic robotic capability which, when it is solved, immediately allows for higher-level capabilities such as localization, mapping, and path planning.

6. REFERENCES

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