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APPLICATION OF IMAGE PROCESSING FOR DEVELOPMENT OF AUTOMATED SHAPE SEPARATION SYSTEM

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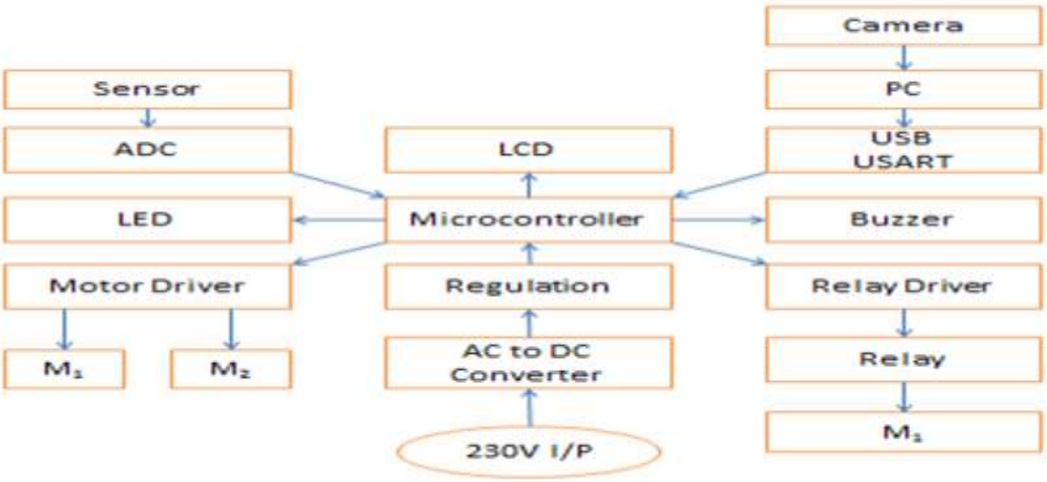
Abstract— Efficiency and Effectiveness of industrial work mostly depend on Labour work, manufacturing time, fixed cost and variable cost. The main aim of this paper is to decrease Labour work as well as cost. So high efficiency can be obtained. The two key aspects of this paper are:-
1) Automated System: - In industry the labour work required for segmenting object of different shapes (such as triangular, square, round etc.) one by one which are moving on conveyer belt. So it increases labour cost and work time. So, the goal of this paper is to design a system which automatically sense shape of object and separates them automatically so work efficiency can be improved.
2) Machine Vision: - In industries if manufacturers producing different shapes of objects then machine requirement for producing each shaped object is different. This paper is also deals with production of every shaped machine in just single machine and separating them after production. Thus this research is helpful for Industrial Economization.

Keywords— MATLAB, Image processing, Shape separation, Automated System

Introduction:- An Automated inspection system is continuously conveyed in the manufacturing process. The systems mention in this paper offers computing of shapes, Image processing, analyzing image in MATLAB, software computing and determining that which shape of object it is. Since, Humans are also able to find shape with prior knowledge. Human judgment is influenced by expectations and prior knowledge. However, it is tedious, laborious, costly and inherently unreliable due to its subjective nature. Therefore, traditional visual quality inspection of shape performed by human inspectors has the energy to be replaced by software computation and making system totally reliable as well as flexible. These systems employ image processing techniques and can quantitatively analyze sizes, shapes, and the color and textural properties of products. Accurate automated shape separation and segmentation can reduce human workloads and labor costs. Machine vision has been used to detect the part and take the image of the part which compares it with the standard dimensions given to it through programming language The research work carried out in this paper is very helpful in Automatic Inspection, Process control and Robot Guidance I \n industrial application. The system block diagram and stepping action for making this system is follows as. The step includes

1) Acquisition of Image: - Typically using camera analysis of different shapes such as Rectangular, square, circular etc is to be carried out through MATLAB image processing and the data obtained for each shape is stored in a storing device such as microcontroller.
2) After storing each data, when conveyer belt is in running mode, sensor (camera) senses shape of objects and data is given to microcontroller from other input port.
3) Now Microcontroller compares data which stored in step 1 and step 2. if any comparison matches then object of that particular shape will be separated by some pushing device(for ex. CD drive) on conveyer belt and segmentation takes place.
4) if comparison doesn't match then pusher will not operate and hence belt continues to rotate. separation will not be carried out. the control system will blow buzzer which will give indication to user that the shape of object is invalid. so, corrupted shape can't be segmented. This is great advantage that corrupted shape will not come in manufacturing process.



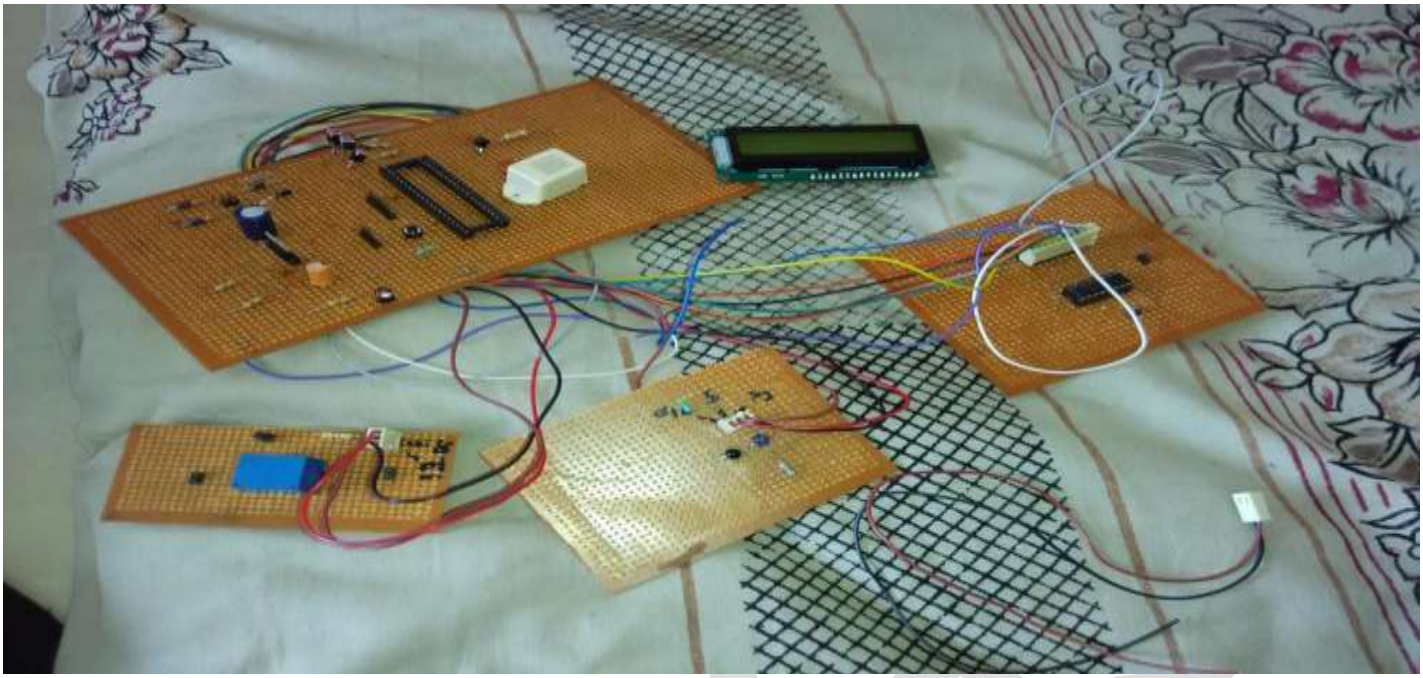
DESCRIPTION:-

1) Image Processing for shape separation: -
Fundamental steps in image processing:
1. Image acquisition: This is the first step of image processing. In this a digital image is acquired
2. Image preprocessing: In the second step image is improved in a way that increases the chances for success of the other processes.
3. Image segmentation: It partitions an input image into its constituent parts or objects.
4. Image representation: It converts the input data to a form suitable for computer processing.
5. Image description: In this step features are extracted that result in some quantitative information of interest or features that are basic for differentiating one class of objects from another.
6. Image recognition: It assigns a label to an object based on the information provided by its descriptors.
7. Image interpretation: A meaning is assigned to an ensemble of recognized objects in this step.

2) Different Power electronics Block to construct system:

- Power supply block
- Micro controller Block
- PC implementation Block
- Sensor
- Motor driver Block (for conveyer belt mechanism)
- Relay driver block

The image consists of different blocks which we prepared during research



Shape Detection

The shape detection algorithm performs checking/detection of some simple geometrical shapes for provided set of points (edge points of a blob). During the check the algorithms goes through the list of all provided points and checks how accurately they fit into assumed shape. During image processing, especially for blob analysis, it is often required to check some objects shape and depending on it might perform further processing for a particular object shape. For example, some applications may finding only circles from all the detected objects, or quadrilaterals, rectangles, etc.Aforge.net describes some basic techniques, which allows detecting such simpler shapes like circles, triangles and quadrilaterals (plus their subtypes, like rectangle, rhombus, triangle, etc.).
The shape checking algorithm allows some deviation of points from the shape with given parameters. In a nutshell, it is permitted that specified set of points may form a little bit distorted shape, which might still be recognized. The allowed range of distortion can be controlled by two properties (Min–Acceptable–Distortion and Relative– Distortion–Limit), which allow higher distortion level for bigger shapes and smaller amount of distortion for smaller shapes. In order to check specified set of points, the algorithm calculates mean distance between specified set of points and edge of the given shape. If the mean distance is equal to or less than maximum
Permitted distance, then a shape is recognized. For simple shape detection ,we have taken the assistance fromAForge.net Framework. We have used simples hope Class under the framework during implementing the application. Simple shape class finds the blob points of the objects and preserves these points within an array named blob–array. During implementation we have invoked separate methods for rectangular/square and circular objects.

Rectangular or Square Shaped Objects
The blob points are used to find four corner points for Rectangular or Square shaped object. The centre point of the object is calculated from these corner points. As the expected dimension of the object is known and fixed for a batch, there is provision to provide expected length and width of the object as input values .We have kept provision that calculated value (actual) may deteriorate +/-10% with respect to given input parameter values. That means if the actual object deteriorates
Maximum 10% with respect to given dimensions, the algorithm will be able to report the object as valid within the acceptable limit. The deterioration percentage can be tuned to more or less if anybody wants.

Circular Shaped Objects
The idea of circle detection algorithm is based on the assumption, that all circle's edge points have the same distance to its center, which equals to circle's radius. It may happen that circles may have some distortion of their shape, so some edge pixels may be closer or further to circle's center. The blob points have been considered to find the radius and centre for the circular object. The algorithm distortion is too big, than most probably the object has other than circle shape. Finding circular object is easier compare to square or

rectangular object due to homogeneity of circular objects. The algorithm is able to process doughnut (one type of baked product) image which is having common centre but different radius (outer and inner circle). Thus it is able to calculate the thickness.

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CONCLUSION:-

In this paper, the shape separation is being developed. This system is advantageous for industrial economization. Different types of geometries can be used for image processing. This system is more advantageous for small scale industries. Different types of models or objects can be used as a work piece for separation

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