

Poor Quality Rejector System For Conveyors

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Abstract- *The main intention of this project is to elaborate and simplify how different products manufactured in a factory can be put on a single conveyer for its proper distribution and data logging in a random sequence. To upgrade this process, images captured by the webcam can be processed with image processing techniques using software like MATLAB. This image processing technique and colour detection techniques are applied for the taken image and the appropriate output is obtained in this project.*

The goal is to develop a conveyor belt which will play a vital role in small scale as well as large scale industries for and logging the data, consequently reducing the cost of labor and multiple conveyors. The system leverages a conveyor belt with 2 motors, a mechanism to sort the products and a Webcam in proximity of the apparatus. The webcam is mounted in parallel to the assembly line focused on the products on the conveyors in order to have known the product and its sequence. The apparatus sends image processed readings and measurements over wires to a microcontroller for further processing. Code running on the microcontroller in conjunction with a code in MATLAB generates an output on the appropriate pins configured by user by a program, which controls the speed and direction of the conveyor belt. This quality in MATLAB image processing toolbox and Arduino has made it possible. This research thus implements an industrial assembly line with methodology in image processing.

I. INTRODUCTION

Conveyor system is one part of material handling equipment that transports material from one place to another. Further the conveyor system can also be used for the acceptance and rejection of material or product. Conveyors are used in almost all industries where materials are to be moved. Automated conveyor systems are proved to be very useful as cost labor wages and customer demand is increasing at a great rate. This paper is based on the project which uses fully automated material handling system.

II. LITERATURE REVIEW

- Vishnu R. Kale, V. A. Kulkarni, “Object sorting system using robotic arm”, Vol. 2, Issue 7, July 2013

In this paper a Fully functional sorter machine can be implemented by using a structure of parallel and independent channels in order to increase the overall throughput which results with a forecasted performance. The project can work successfully and separates different objects using sensors. The sensor handling systems which drive the pick and place robot to pick up the object and place it into its designated place can work if accurately designed. There are two main steps in sensing part, objects detection and recognition. The system can successfully perform handling station task, namely pick and place mechanism with help of sensor. Thus a cost effective Mechatronics system can be designed using the simplest concepts and efficient result can be observed.

- J. D. Gavade, P. K. Kharat, S. K. Laga “ Cost Effective Approach for Object Sorting”, International Journal of Computer Applications (0975 – 8887) Volume 52– No.16, August 2012

In this paper, An object sorting system for domestic/industrial control has developed using the concepts of Image Processing, Robotics Mechanism and parallel communication without help of DSP processor. The model developed is user friendly. Hence for fast manipulation the algorithm implemented in the MATLAB is suitable for our sorting problem. Result of sorting the object may not work for 100 percent but it is working for nearly 90 to 94% in case of our algorithm. It can be improved by increasing the accuracy and it depends on atmospheric factors.

- Prof. D. B. Rane¹, Gunjal Sagar S.², Nikam Devendra V.³, Shaikh Jameer U.⁴, “Automation of Object Sorting Using an Industrial Roboarm and MATLAB Based Image Processing”, International Journal of Emerging Technology and Advanced Engineering Website: www.ijetae.com (ISSN 2250-2459, ISO 9001:2008 Certified Journal, Volume 5, Issue 2, February 2015)

In this paper, the sorting machine sorts the objects depending upon the colours of the objects successfully with the help of the roboarm and MATLAB program in image processing. The USB webcam serves as an eye of the system which captures the real time image of the objects. The roboarm picks the faulty quality object and places it at predefined place, while good quality object continues its motion on conveyor belt and finally drops into object carrier

system. In this LCD displays the object count with the status about the quality of the object. The servomotors used in the roboarm plays the vital role as control movement of the roboarm wholly depends control signal given to servo motor. Hence to operate the system accurately the synchronization between IR sensors, dc motors of the conveyor belt and roboarm is very essential.

- 1Vishnu r. Kale, 2V. A. Kulkarni, " automation of object sorting system using pick & place robotic arm & image processing", Proceedings of 3rd IRAJ International Conference, 5th January 2014, Mumbai, India. ISBN: 978-93-82702-51-1.

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III.METHODOLOGY

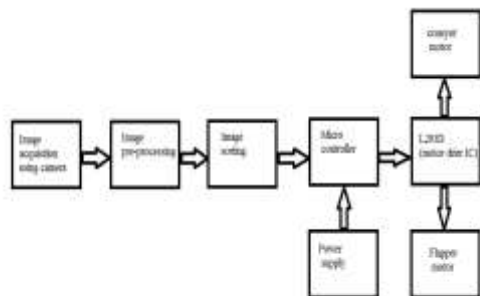


Fig.no.3.1- Methodology block diagram.

IV. CONVEYOR

The conveyor motor receives power and signal from the central supply through rectifier and control circuit. The control circuit consisting of a potentiometer will allow the user to manually control the speed of conveyor belt by the regulatory knob.

Polyester is used as a belt material. A conveyor belt consists of two or more pulleys, with a continuous loop of material - the conveyor belt - that rotates about them.

As shown in our block diagram our system proposes an hitech vision system for sorting bottles without cap or labels from conveyor line. Here we use hi speed cameras which captures continuous images of bottles and this images are been processed using Matlab real time. As soon as the bottle without cap or label is detected the controlling signals are send from Pc to controller to control the flapper in two different direction using predefined angle of rotation.

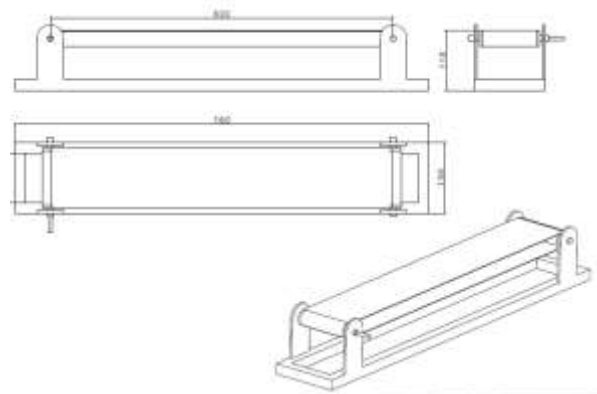


Fig.no. 4.1- Design of conveyor.

V.OVERVIEW

5.1.IMAGE ACQUISITION

To start with when the object on the conveyor is detected by the camera, image is captured by the camera and is sent to the MATLAB workspace. The input image obtained from the webcam cannot be directly given for processing. Pre-processing is done on the image such as thresholding. Then only object image is converted in binary format. This final threshold image of object is now ready for processing.

5.2.CAMERA

The camera used in this case will be overhead camera, it will take the snapshot of the object for colour sensing purpose. The image captured by the camera will be processed by image processing using Matlab.

5.3.IMAGE PROCESSING

The objects are sorted on the basis of color and predetermined shape. To identify the color, firstly the image is converted into gray format and then thresholding is done. After thresholding color components are extracted and the image is converted into black and white format which is called as binary format Find region properties & bounding box and the color are identified.

5.4. SORTING MECHANISM

The sorting mechanism consists of a linear actuator, servo motors and a conveyer assembly. After identifying the color with predetermined size, command will be sent to direct the linear actuator through COM port of the computer via the development board. Conveyer assembly is in OFF state for this period. According to the size and color the servo motors with help of linear actuator places the objects in their specified place.

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Fig.no. 5.4.1- Conveyer belt.



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Fig.no. 5.4.2- Conveyer belt.



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Fig.no. 5.6.2- Microcontroller (back profile).

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VI.ESTIMATED COST OF PROJECT

Sr.no.	Item	Price
1	MICROCONTROLLER	500/-
2	PRINTED CIRCUIT BOARD (PCP)	1300/-
3	POWER SUPPLY COMPONENTS	200/-

4	L293D => MOTOR DRIVING IC	270/-
5	WED CAM	4200/-
6	DC MOTOR	1280/-
7	CONVEYOR	5600/-
8	CONVEYOR BELT	300/-
9	BEARING	160/- EACH
10	PL23003 => SEREIS COMMUNICATIVE MODEL	660/-

Table.no. 6.1- Cost table.

VII. RESULTS

The conveyor system designed will only be efficient when it achieves higher degree of accuracy and its output is very close to the expected result. The initialization delay of the microcontroller in the beginning is expected and can be tolerated up to 4 seconds. The Conveyor system is designed in an efficient way and expecting to work normally with provided power supply. The Matlab code has the option to modify the industrial and product parameters and can be recalibrated.

VIII. CONCLUSION

The Code is generated using MATLAB image processing in conjunction with Arduino. The whole process is documented in the theory sections. There are no more limits but your imagination. One can begin to explore the more advanced functionality that the MATLAB-Arduino platform offers to understand as one progress further and further.

It was a valuable experience in making the project design, implementation, and testing of a system that involved digital components. More time was available for the circuit design and implementation, which was able to go through several designs before an acceptable one was reached. Ultimately the system accomplished its primary goal of motor speed control in a clear way.

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