IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

ROBOTIC INSTRUMENT SORTING MECHANISM

[1] Shreni Verma, [2]Neha Pillai, [3]Uttam Kumar

[1,2]Ajeenka D Y Patil, Bk -Charoli, Near Lohegaon - 411015

Abstract: Today, small-scale industries and large-scale industries are confronted with frequent disruptions, such as time shortages and labor force, which lead to in efficient production. The right result for the above problem can be achieved by using robotics. In addition, image processing methods can be useful for accurate results. This paper gives information regarding one of the applications for sorting the objects with the help of robotic flapper. This sorting method is fast and does not require continuous monitoring, which increases the growth of the industry[1]. Therefore, it leads to better production and better sales. Robotic sorting mechanism is one of the costless, useful and fastest systems in Industrial applications to reduce manual working time and provides less human mistake when manual system is undertaken. The design is quite flexible and easy to operate as the software can be changed according to specific requirements of the user. This makes the proposed system to be an economical, low maintenance solution for industrial applications.

Index terms: - Sorting Mechanism, Robotics Flapper, Image Processing, GUI, Nut

I. INTRODUCTION

In the 21st century, robots are becoming increasingly important in reducing human error in everyday tasks because of their ability to perform very challenging tasks. The automotive industry works entirely with robots that perform tasks on time without errors[2]. The proposed system is an integrated system of robotic flapper that increases the speed of sorting mechanism, provides an accurate sorting process, reduces the work and sorting process, and improves object productivity. The system consists of a robotic flapper, a DC motor, a webcam and a conveyor belt. The webcam clicks on the image of the object and sends it to system. MATLAB converts the image to a grayscale image and then to a black and white image, which helps in detecting the edge of the object [3]. This image is compared to system data consisting of specific images of the object. The Arduino then reads this from the data on its access ports. The microcontroller transmits its decision to the programmed station. Because Arduino is used as the heart of the system, it makes installation accessible, efficient, and easy to use. The cost of the project can be determined based on current and future estimates.

II. OBJECTIVES

- To use robotic flapper instead of robotic arm as robotic arm has many limitations.
- To save time and increase the sorting speed[1].
- To make a human mistake free system[4].
- In a biomedical field objects like needles, forceps ,syringe etc. has to be sanitized and untouched ,these systems will be the best solution for sorting of these kind of objects .

III. COMPONENTS

1. HARDWARE: -
   - Arduino UNO (Arduino, Italy)
   - Webcam
   - Servo Motor (10rpm, 12volts)
   - Robotic Flapper
   - Conveyor Belt
2. SOFTWARE: -
   - MATLAB software
   - Arduino software
   - Creo Software.

IV. 3D DESIGN

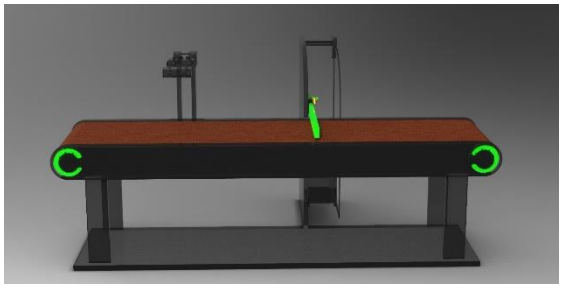

Fig.1 3D Model Design

The above Fig.1. 3D model is designed in Creo parametric software.

V. BLOCK DIAGRAM

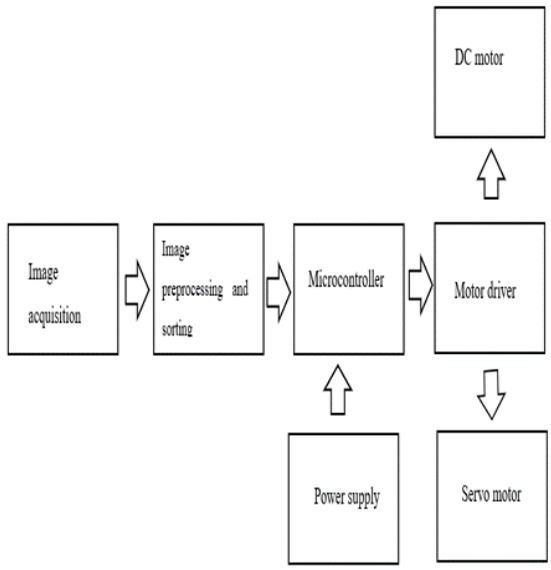

Fig.2 Block diagram

VI. EXPLANATION OF BLOCK DIAGRAM

1. Image acquisition

To start with once the thing on the conveyor is noticed by the camera, image is took by the camera and is guided to the MATLAB workspace. The contribution image found from the webcam cannot be straight given for dispensation. Pre-processing is complete on the image such as thresholding[2]. Then only thing image is changed in binary arrangement. This final threshold image of thing is now prepared for processing[5].

2. Image pre-processing

The camera used in this case will be overhead, it will take the snapshot of the object for colour sensing purpose[3]. The image taken by the camera will be treated by image dispensation by MATLAB.

***Image Processing*:** The substances are sorted on the foundation of colour and prearranged form. To classify the colour, first the image is rehabilitated into grey format and then thresholding is complete[6]. After thresholding colour components are removed and the image is rehabilitated into black and white arrangement which is called as second format Find area properties & leaping box and the color are identified.

3. Image Sorting

The arranging mechanism contains of a linear actuator, servo motors and a conveyer meeting[6]. After classifying the colour with prearranged size, knowledge will be sent to straight the linear actuator finished COM port of the processer via the growth board[7]. Conveyor assembly is in OFF state for this retro. Rendering to the size and colour the servo motors with assistance of linear actuator seats the substances in their stated place.

4. Microcontroller

The ATmega328 is a low-power CMOS 8-bit microcontroller founded on the AVR improved RISC building. By executing powerful orders in a single timepiece cycle, the Atmega 328 attains throughputs future 1 MIPS per MHz letting the system designed to enhance power ingesting versus processing speed.

5. Conveyor Belt

The conveyor motor obtains power and sign from the dominant supply finished rectifier and switch circuit. The switch circuit containing of a potentiometer will let the operator to physically control the haste of conveyor belt by the controlling knob. Polyester is used as a belt physical. A conveyor belt contains of two or additional pulleys, with an incessant loop of physical – the conveyor belt that alternates about them. Here we use hi speed cameras which captures continuous images of bottles and this images are been processed using MATLAB real-time.

6. Motor driver

The motor driver is been used to give the instruction to the dc and servo motor[6]. It is capable of running 2 motors at the same time. It can control speed and direction both. Motor voltage is 36v and current is 600mA .1.2 A is peak motor current. Supply Voltage is 4.5V to 7V Transition time: 300ns (at 5Vand 24V). If the system heats up above certain level thermal shutdown is available.

7. MATLAB

MATLAB is a high-performance verbal for technical calculating. It mixes computation, imagining, and software design environment. Also, MATLAB is a modern software design linguistic environment: it has urbane data structures, covers built-in excision and debugging gears, and ropes object-oriented programming

VII. WORKING

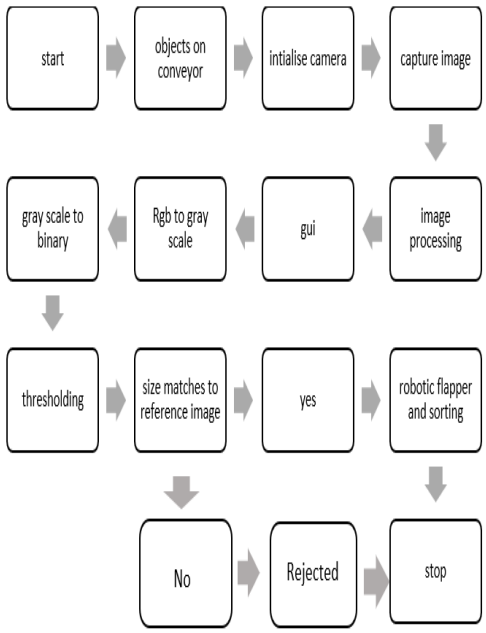

Fig.3 Working

1. OBJECT PLACEMENT

It is the first step of the system. The object that are supposed to be sorted are been placed on the moving belt.i.e, Conveyor Belt. Objects like nut, screws, metallic bolts, etc. can be used. As these objects have different size and shape are been placed on the conveyor belt[8]. These objects are been placed at a particular distance (. i.e., approx.2-5mm.) Once the objects are placed the conveyor belt starts moving.

2. IMAGE CAPTURING

It is the second step of the system. Once the placement of the objects is done on the conveyor belt. Conveyor belt starts moving. The camera placed above the belt will take an image. This image is further sent to the system with MATLAB software.

3. IMAGE PROCESSING

In this part the image that is captured is compared to the systems data. During image processing many algorithms are used on the image. The terms used are:

a) RGB- Gray scale: -

The 3D colour image array is converted to RGB image. (RGB image is basically an image formed by 3 primary colours i.e., Red, Green and Blue.) Once the RGB image is formed it is then converted to a Gray scale image. (Gray scale image contains about 256 shades of grey.)

b) Gray scale – Binary: -

The Gray scale image is then converted to binary image[5]. (Binary image is an image that consists of black and white pixels.). Thresholding is done during this process to reduce noise in the image.

c) Edge Detection: -

After reduction of the noise edge detection is been done. And after the edge detection the image formed is then compared to the reference image[9][8]. If the image is matched to the reference image, then it is further processed and if it does not match then it is been placed in rejected container.

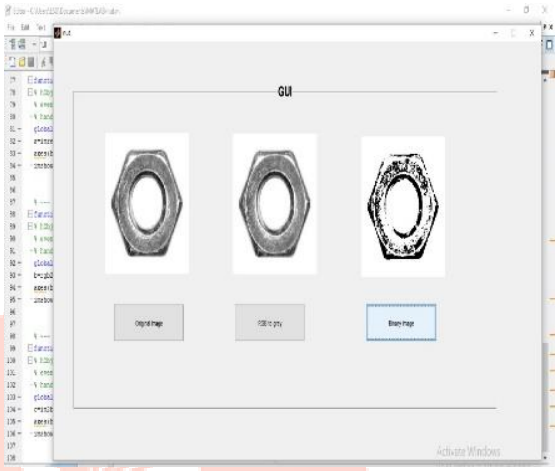

Fig.4 Image processing

4. INSTRUCTION TO THE FLAPPER

The image is been compared with the reference image that is stored in the system. If the image is been matched then the Arduino will give the instruction to the flapper. The flapper will have a torque movement which will help sorting the object.

VIII. APPLICATION

Some of the main applications of the system are

1. **Manufacturing Industry**: - It can be used in small- and large-scale industries. In industries it will help in sorting manufactured components like nuts, skewers, gears, wheels, etc.
2. **Medical field**: - The system can be used in sorting of surgical equipment's like scissors, forceps, etc.
3. **Food and Agriculture**:- The system can be used in sorting fruits, vegetables, grains etc.[1, 10].
4. **Logistic and Packaging industry**:- It can help in sorting packed products to keep in respective containers[1].

IX. RESULT

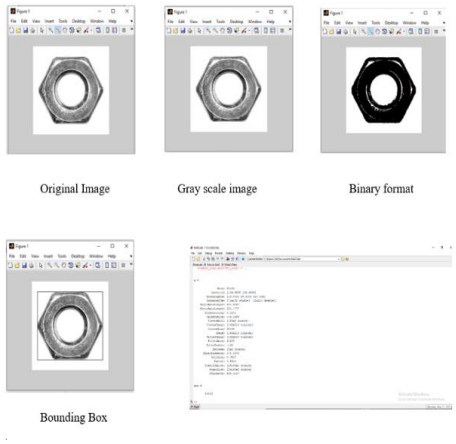

Fig.5 Result

The device sorts the object depending upon their size, shape, color successfully with the help of robotic flapper and MATLAB programing in image processing with different algorithms[3, 8].The webcam helps in capturing the image of the object and it successfully performs the role of an eye of the system. The robotic flapper helps in sorting the object successfully and place the object in its predefined or respective place. The steady movement of the conveyor helps the flapper and the internal system to take its respective time and helps them to sort the object.

CONCLUSION AND FUTURE SCOPE

The following place it in particular container. The image captures proposed system have been analyzed and have been in working state. As the system is able to recognize the object and from a low-cost camera with regular camera intensity is further processed with the help of MATLAB and GUI programming. The system then gives the command to the robotic flapper and it starts its sorting process. Future scope of the system is it can be used in large scale industries with higher commands and better programming. It can also be used Pharmaceuticals industries. The system can be modified according to the need of the customers.

REFERENCES

[1] E. Santolini, B. Pulvirenti, S. Benni, L. Barbaresi, D. Torreggiani, and P. Tassinari, "Numerical study of wind-driven natural ventilation in a greenhouse with screens," *Computers and Electronics in Agriculture*, vol. 149, pp. 41-53, 2018.

[2] P. Vijayalaxmi, R. Putta, G. Shinde, and P. Lohani, "Object detection using image processing for an industrial robot," in *Proceedings of Fifth IRAJ International Conference, 15th September*, 2013.

[3] Y. Jia, G. Yang, and J. Saniie, "Real-time color-based sorting robotic arm system," in *2017 IEEE International Conference on Electro Information Technology (EIT)*, 2017: IEEE, pp. 354-358.

[4] B. Therese and P. Gupta, "Robotic arm with real-time image processing using raspberry pi, Both automated and manually," *International Journal of Advanced Research March*, 2018.

[5] T. Singh, D. Dhaytadak, P. Kadam, and R. Sapkal, "Object sorting by robotic arm using image processing," *International Research Journal of Engineering and Technology (IRJET)*, 2016.

[6] V. R. Kale and V. Kulkarni, "Object sorting system using robotic arm," *International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering*, vol. 2, no. 7, pp. 3400-3407, 2013.

[7] R. V. Soans, G. Pradyumna, and Y. Fukumizu, "Object Sorting using Image Processing," in *2018 3rd IEEE International Conference on Recent Trends in Electronics, Information & Communication Technology (RTEICT)*, 2018: IEEE, pp. 814-818.

[8] M. Dragusu, A. N. Mihalache, and R. Solea, "Practical applications for robotic arms using image processing," in *2012 16th International Conference on System Theory, Control and Computing (ICSTCC)*, 2012: IEEE, pp. 1-6.

[9] M. Dragusu, A. Mihalache, and R. Solea, "Practical applications for robotic arms using image processing System Theory," in *Control and Computing (ICSTCC), 2012 16th International Conference*, 2012.

[10] M. Rokunuzzaman and H. Jayasuriya, "Development of a low cost machine vision system for sorting of tomatoes," *Agricultural Engineering International: CIGR Journal*, vol. 15, no. 1, 2013.