ISSN(Online): 2319-8753
ISSN (Print): 2347-6710

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly Peer Reviewed Journal)

Vol. 5, Issue 1, Januray 2016

Automation in Autoconer Section of the Spinning Mill

Sundareshan M[1], Dinesh Kumar M[2] Vinoth S[3], Vivekanandhan P[4],Mugesh S[5],Subramani T[6], Sundar Ganesh C S[7]

U.G. Student, Department of Robotics and Automation Engineering, PSG College of Technology, Coimbatore, India[1,2,3,4,5]

Assistant Professor, Department of Robotics and Automation Engineering, PSG College of Technology, Coimbatore, India [6,7]

ABSTRACT: The main objective of the paper is to automate the process of separation of the spinning pumps from the autoconer section of the spinning mill. This process is currently done manually which is being automated. For the separation of the spinning pumps in the conveyor, image processing technique is used. A VGA camera is used to get the colour information of the spinning pumps. Based on the gray levels taken from the image, the processor sends the required signal to solenoid valve thereby separating the spinning pumps by blowing it towards the trays collecting the pumps. The alignments of the pumps were achieved by modifying the time cycle of the Autoconer section.

KEYWORDS: Autoconer section, Spinning pump, Automation, Image Identification, Open CV Software.

I. INTRODUCTION

Automation is achieved by various means such mechanical, hydraulic, pneumatic, electrical, electronics and computers. Complicated systems, such as modern factories, airplanes and ships typically use all these combined techniques. The biggest benefit of automation is that it saves labor however it is also used to save energy and materials and to improve quality, accuracy and precision. The primary aim of the project is to design, develop and implement automation in the Autoconer section of the spinning mill. Currently in Autoconer section, spinning pumps are separated according to the colors manually, which is time and cost consuming. In order to manage time and human labor, the Autoconer section can be automated. The color image of the spinning pumps which are coming from the Autoconer section through conveyor belts are captured using a web camera. The captured images are processed by Raspberry pi b+ processor. Based on the gray levels, the processor sends the required signal to solenoid valve thereby separating the spinning pumps by blowing it to the corresponding trays.

II. RELATED WORK

Image processing in today's world grabs massive attentions as it leads to possibilities of broaden application in many fields of high technology. The real challenge is how to improve existing sorting system in the modular processing system which consists of four integrated stations of identification, processing, selection and sorting with a new image processing feature. Existing sorting method uses a set of inductive, capacitive and optical sensors which do differentiate object colour. This method presents a mechatronics colour sorting system solution with the application of image processing. Image processing procedure senses the objects in an image captured in real-time by a webcam and is classified using a decisional algorithm and selected in real time [1]. This information is processed by image procesing for pick-and-place mechanism. This project uses an automated material handling system which is widely used in industries.[2]. Image processing in today's world grabs massive attentions as it leads to possibilities of broaden application in many fields of high technology [3]. A model of automated inspection system is presented in this conceptual paper. Image processing is used for inspection of part. It is assumed that the part after going through many previous operations comes to inspection system where the weight of the part as well as geometry made on that part is

ISSN(Online): 2319-8753
ISSN (Print): 2347-6710

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly Peer Reviewed Journal)

Vol. 5, Issue 1, Januray 2016

detected and later decided whether it is to be accepted or rejected with the help of image processing technique. Using MATLAB software a program is developed and pattern or geometry is detected. [4]

This paperpresents a similar but simplified system which will sort the objects according to different parameters such as color and size using simple image processing technique. The system is trained initially with a set of images defined as the reference images. Then while execution, real time images are compared with the reference image parameters and respective output is then fed to the placing system through parallel port of the computer. [5].The images acquired usingcamera are processed using support vector machine to classifypencils based on color, and a counting algorithm isincorporated to find the specific number of each coloredpencils. Results on testing showed the successful achievementof set objectives.[6]

III. AUTOCONER SECTION

The Autoconer is a basic unit used for separating the threads from processed cotton. The threads are differentiated based on the thicknesses which are separated from the Autoconer. The Autoconer is generally integrated with the PLC. The PLC is used for monitoring and alarm tagging which helps in providing total control over the system. Autoconer section consists of two turrets each having 6 slots, each providing different thickness as shown in fig.1.The Autoconer used in our project was integrated with PLC, installed from Oerlikon known as Oerlikon Schlafhorst Autoconer x5. Each Autoconer has separate sensor for identifying the unwound pumps and automatically ejects the pumps once the thread is unwound completely from the pump.
The whole autoconer section consists of blower fixed over a hanging rail above the section. The blower helps in removing scattered and unwanted cotton and threads and preventing the system from getting damage and keeping the autoconer section clean.

Fig.1 Autoconer Section

SPINNING PUMP

The term spinning pump as shown in fig.2 is used in Autoconer section. Spinning pump is a variation of bobbin and it is used for differentiating the thickness of the threads that are used for various purposes. There are 12 colors in each autoconer section that differentiates based on the thickness. Autoconer section consists of two turrets each having 6 slots, each providing different thickness. The PLC which is integrated with autoconer takes care of identifying the color and winding each pump with the required thickness of the thread.

ISSN(Online): 2319-8753
ISSN (Print): 2347-6710

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly Peer Reviewed Journal)

Vol. 5, Issue 1, Januray 2016

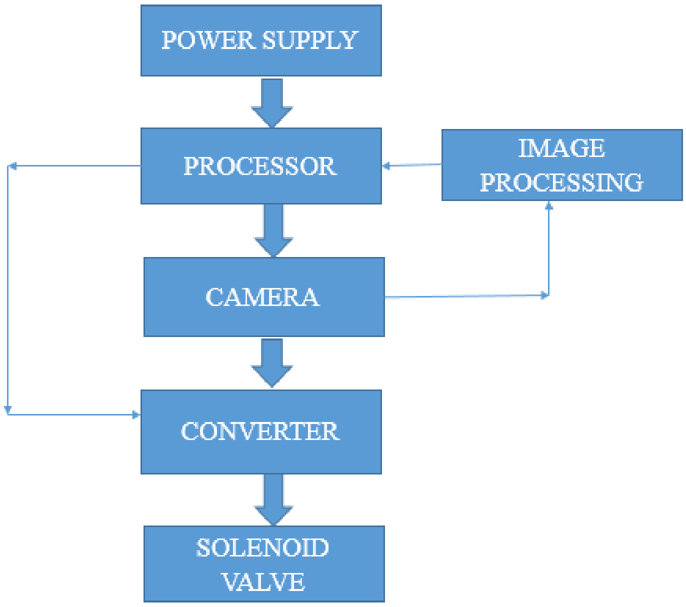
Fig. 2 Spinning pump

The specifications of spinning pump is

- Length-18cm
- Larger end radius-1cm
- Weight-32gm
- Smaller end radius-0.5cm

IV. METHODOLOGY

The below fig.3 shows the operational block diagram of project. The section is given with a primary power supply of 230v. This 230v of power supply is converted into 5v by a converter, given to the processor. The second power division which is required for the solenoid, 24v is converted from 5v by the relay circuit from the processor.



DOI:10.15680/IJIRSET.2015.0501009

ISSN(Online): 2319-8753
ISSN (Print): 2347-6710

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly Peer Reviewed Journal)

Vol. 5, Issue 1, Januray 2016

Fig. 3 Block Diagram

The image is captured by the face to face ROBOK20 webcam and the images are sent to the processor. Raspberry pi B+ processor converts the image to gray scale, thereby identifying the color of the spinning pump. This whole step comes under image processing. Using the signal received from the processor, the relay actuates the solenoid valve via converter. Here a belt conveyor is used to transport the spinning pumps. The speed of the belt conveyor is 500rpm. . A belt conveyor system consists of two or more pulleys, with an endless loop of carrying medium, the conveyor belt that rotates about them. One or both of the pulleys are powered, moving the belt and the material on the belt forward.

When the colour of the spinning pumps is sensed by the camera, it converts to its respective gray level by image processing and transfer the signal to the pneumatic system for further process. The pneumatic system using connectors blow the air on the spinning pump and push it into the box provided. Most image-processing techniques involve treating the image as a two-dimensional signal and applying standard signal-processing techniques to process it.

V. RESULTS

Open CV (Open Source Computer Vision) is a library of programming functions mainly aimed at real-time computer vision, developed by Intel Russia research center in Nizhny Novgorod. The library is cross-platform. It focuses mainly on real-time image processing. If the library finds Intel's integrated performance primitives on the system, it will use these proprietary optimized routines to accelerate itself.

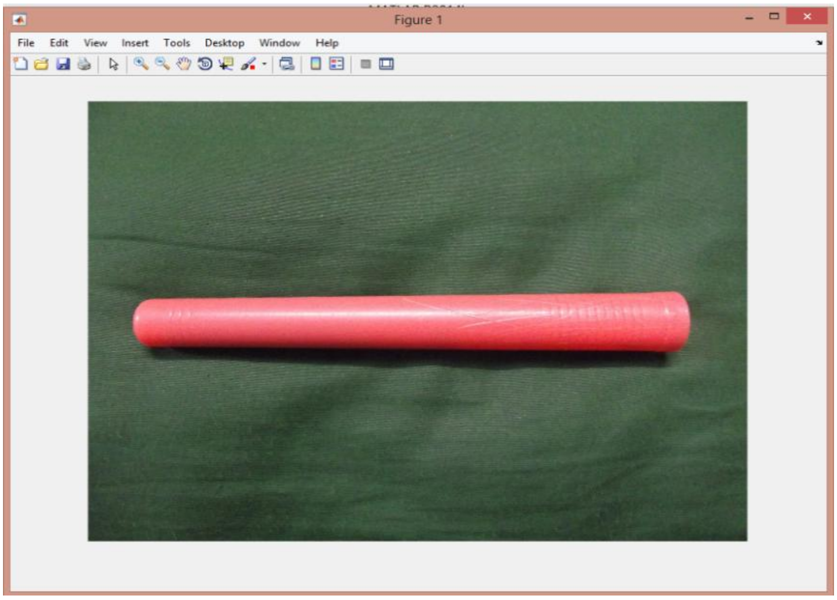


Fig. 4 Image of a spinning pump

a) Steps involved in image processing

1) The image of the spinning pump from the conveyor is captured by the camera as shown in fig.4.The image contain all the intensity of pixels in color.Each pixel has the value of combination of R, Y, B colors. This image is captured ny a high definition camera.

2) The captured image is processed by the raspberry Pi B+ processor for RGB component separation, thereby identifying the pump's gray scale level colour as shown in fig.5.

ISSN(Online): 2319-8753
ISSN (Print): 2347-6710

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly Peer Reviewed Journal)

Vol. 5, Issue 1, Januray 2016

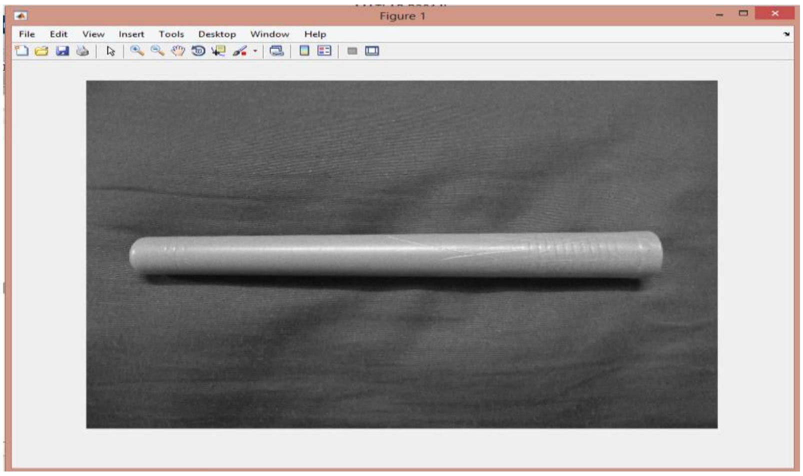


Fig.5 Converted image of a spinning pump by Open CV

The color image is converted into gray level image by the image processing algorithm. This is done effectively by the Open CV software. The histogram is taken from the gray level image.

3) Using the RGB component separated image, the pump's colour is identified as shown in fig.6 and the processor sends the signal to the relay to actuate the solenoid valve.

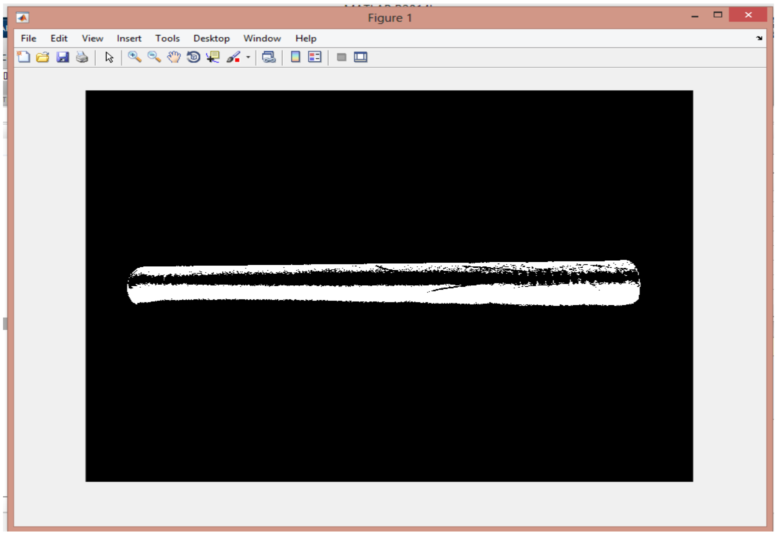


Fig.6 Binary Image level

Using the binary thresholding technique, the grey level image is converted into binary image. The binary image contains two binary bits 1 and 0. From the calculated value, it is identified as a red spinning pump. Similarly this procedure is applied to twelve different type of spinning pumps which is produced in the spinning mill.

IJIRSET

ISSN(Online): 2319-8753
ISSN (Print): 2347-6710

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly Peer Reviewed Journal)

Vol. 5, Issue 1, Januray 2016

VI. CONCLUSION

The concept of automation in the Autoconer section was a major step in developing the separating of spinning pumps. The spinning pumps received from the Autoconer section was identified by the camera and using the Raspberry Pi B+, the required signal for the respective pump's colour was obtained. The solenoid valve's actuation was obtained using the signal received from the processor thereby blowing the pumps towards the respective trays based on the colour. The complete automation was achieved after considering all the required parameters of the spinning mill.

REFERENCES

[1] Rafael C. Gonzalez and Richard E.woods, 'Digital Image Processing', Addition - Wesley Publishing Company, New Jersey 2010.

[2] AbhishekKondhare, Garima Singh,,NehaHiralkar, M.S.Vanjale, "Colour And Shape Based Object Sorting", International Journal Of Scientific Research And Education, Vol.2, pp.553-562, 2014.

[3] Atef. A. Ata, Sohair F. Rezeka, Ahmed El-Shenawy, Mohammed Diab, "Design and Development of 5-DOF Color Sorting Manipulator for Industrial Applications", International Journal of Mechanical, Aerospace, Industrial, Mechatronic and Manufacturing Engineering Vol:7, pp 2457-2464,2013.

[4] Ms. Shubhada.K. Nagrale,Mr. S.T.Bagde "Application of Image Processing For Development of Automated Inspection System", International Journal Of Computational Engineering Research, vol. 3, pp 103-107, 2013.

[5] J. D. Gavade,P. K. Kharat,,S. K. Laga,"Cost Effective Approach for Object Sorting",International Journal of Computer Applications ", Vol52,pp 1-5,2012

[6] Santhosh K V,Bhagya R Navada,"Online Classification and Measurement of Pencils using Image Processing Techniques",International Journal of Computer Applications,Vol 96,pp 25-30,2014.

[7] SanketRege&RajendraMemane, "2d geometric shape and color recognition using digital image processing", International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering Vol. 2, pp. 2479-2487, June 2013

[8] [Somer M. Nacy&Wisam T. Abbood, "Automated Surface Defect Detection using Area Scan Camera", Innovative Systems Design and Engineering Vol.4,pp. 1-10, 2013

[9] H. I-silBozma&H.ulyaYal-cin, "Visual processing and classification of items on a moving conveyor a selective perception approach", Robotics and Computer Integrated Manufacturing,vol.18, pp.125–133,2002.

[10] Seema S. Vanamane&Pravin A. Man ,"Design, Manufacture and Analysis of Belt Conveyor System used for Cooling of Mould",International Journal of Engineering Research and Applications (IJERA) Vol. 2, pp.2162-2167,2012.