Eleyon
SOUTH ASIAN JOURNAL OF ENGINEERING AND TECHNOLOGY

AN UNMANNED HORN SURFACE QUALITY INSPECTION SYSTEM USING RASPBERRY PI

V.Rajkumar, Dr. Azha Periasamy

Department of Electronics and Instrumentation, Bharathiar University, Coimbatore - 641046 Tamilnadu, India
Department of Electronics and Instrumentation, Bharathiar University, Coimbatore - 641046 Tamilnadu, India

***Corresponding Author**
vrkraj36@gmail.com
Tel :+919500349645

1. ABSTRACT

A horn is a sound making device that can be equipped to motor vehicles. The horn manufacturing consists of many processes such as coil winding, spool assembly, terminal base assembly, diaphragm assembly etc. The main objective of this project is to eliminate the requirement of human resource by unwanted complications in quality section and to simplify the process to improve the quality checking and making it more efficient in horn manufacturing. It involves the design and analysis before the dispatch section to detect any damage occurred after manufacturing of horn. The current process is after production, the horn has dispatched to barrier audit section. In barrier audit section, the horns manufactured are checked randomly. During the random check defective surface of horns will be removed. Any defective surface horn may be missed during the random check. The main aim of this project is to evaluate the quality process in leading horn manufacturing company in India, by designing a new technique to detect any damage in horn surface. In this project image processing is being implemented to detect any damage-crack in horn surface. By implementing the image processing technique using the Raspberry pi, damage-cracks can be easily detected and gives the quality assurance to the manufacturer.

Keywords: Image processing technique, raspberry pi, quality, damage-cracks.

2 INTRODUCTION

A horn is the most essential device in today's traffic world. The automobile operator uses the horns to warn other vehicles approach or presence or to call attend to some hazard. There are many types of horn being manufactured. A horn manufacturing undergoes many processes such as coil winding, spool assembly, terminal base assembly, diaphragm assembly, horn pre-tuning, adhesive applications and quality checking. Most of the horn manufacturing companies undergo the random checking for quality process during the time of dispatch. Some of the damaged horn surface can be missed during the random check. To overcome this disadvantage and give the quality assurance to all the horn manufactured, the image processing technique is to be implemented. During the image processing technique, the horn surfaces are checked and the damaged horn surface can be easily identified. The Project "An Unmanned horn surface quality inspection system using Raspberry pi" gives the quality assurance to the manufacturer and customer. Using the image processing technique in the Raspberry pi, the project is

been carried out. The default images of the positive samples of top view LT (lower tune), HT (higher tune) horn and the bottom view of LT (lower tune), HT (higher tune) horn are stored. When the horn surface is placed under the web camera, the image of the horn surface is been captured by the camera. The comparison algorithm is been carried out. When the input image and default image have same features the horn will be passed. When the two images have different features the horn will not be passed and it is removed by air pressure in particular delay time.This work propose the method for quality assurance in the horn manufacturing company. By this method all the manufactured horn are undergone the quality assurance process so that the damaged horn surface are easily identified.

3 PERFORMANCE ANALYSIS

The algorithms for image processing techniques various steps such as image acquistion, histogram, comparison etc. The most efficient system is designed for quality inspection process using comparison algorithm. Any damage-cracks can be easily identified by this system. The captured images will be compared with the default images. The captured image and the default image is converted into the array matrix format and the comparison process is done. After this process the output will be displayed in the screen. In this project the features of the horn surface can be easily identified. This efficient system is used to give the assurance to the manufacturer. This work is designed to implement in the private horn manufacturing company.

4 EXISTING SYSTEM

In industry after production of horn, they are dispatched to the Barrier audit section. Before dispatching the horns are checked randomly by the supervisor. Some of the damaged horn may be missed in this random check.

5 PROPOSED SYSTEM

In this project, focus on automatically detecting the damaged horn surface by implementing the image processing technique. In Image processing technique, an algorithm is created to detect the damaged horn surface and check the other parameters. By checking parameters and giving the quality assurance to the manufacturer is the aim of this project. Wind tone type horns are used in this project. The four sides of horn are to be checked. The top view of both LT (Lower Tune), HT (Higher Tune) and bottom view of LT (Lower Tune), HT(Higher Tune) are checked.

6 METHODOLOGY

6.1 FLOW DIAGRAM

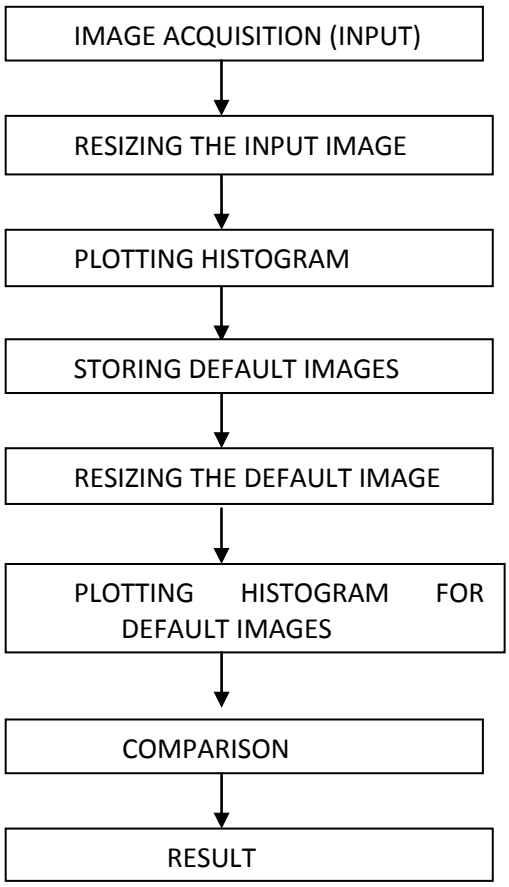


Fig.1 Flow Diagram of Proposed Method and explanation of working process of the proposed method.

6.2 PROPOSED METHOD

Step-1. The input images are been captured by the web camera.

Step-2. The captured image can be in any size so, that input image is resized to the particular size.

Step-3. The histogram for the input image is plotted. To show the number of pixels in an image at each intensity value in the image.

Step-4. The default images of the positive samples of top view of LT (Lower Tune) , HT(Higher Tune) and the bottom view of LT (Lower Tune) , HT(Higher Tune) are stored.

Step-5. The default images can be of any size so the four images are resized to the particular size. So that the default image and captured image are converted into same size.

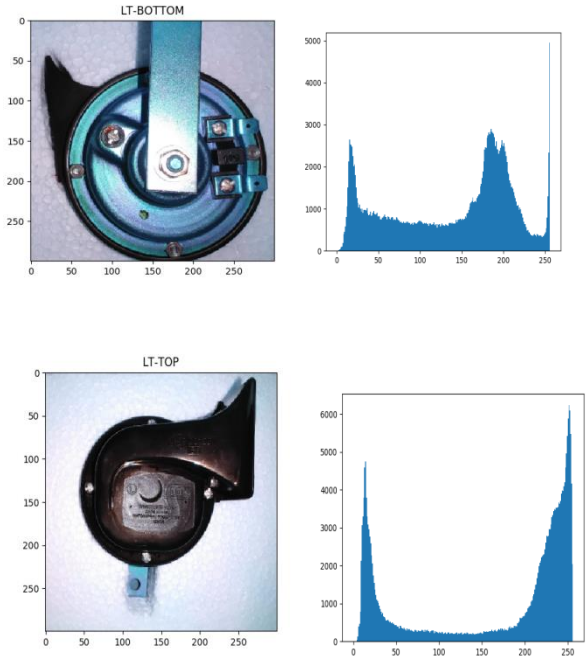
Step-6. The histogram has plotted for the default images.

Step-7. Comparison of the default image and captured image is done.

Step-8. If the compared images have same features then the horn will be passed to the dispatch and displayed as “Quality is good”. If the compared images have different features, the horn will not be passed to dispatch, it will be passed to not clear section by the source of air pressure in particular delay time and displayed as “Quality is not good

7. RESULTS AND CONCLUSION

In this research project paper, web camera is used for capturing the images. The captured image and the resultant images are shown in the following figures.



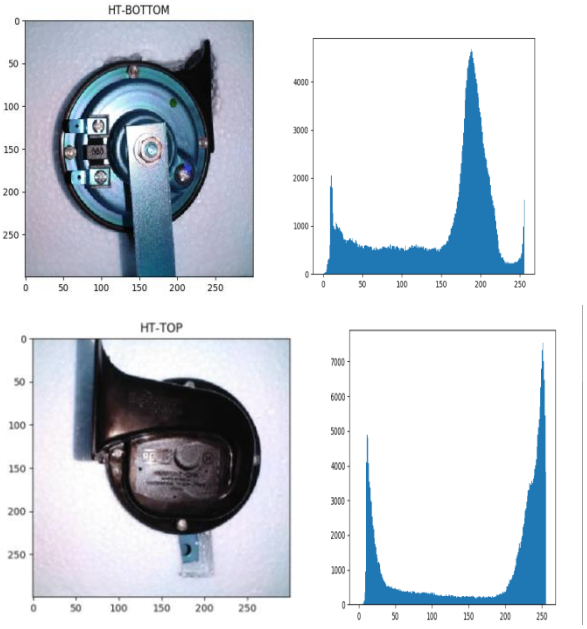
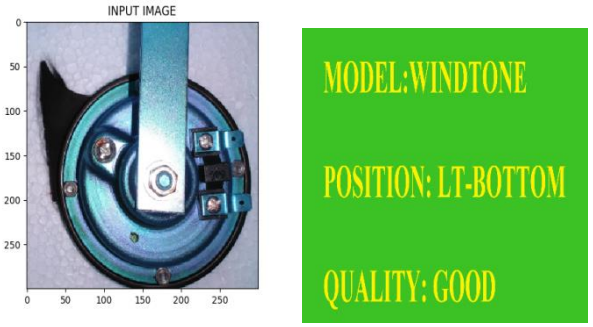


Fig.2 shows the default images of of top view of LT (Lower Tune), HT (Higher Tune) and the bottom view of LT (Lower Tune), HT (Higher Tune) and its histogram.



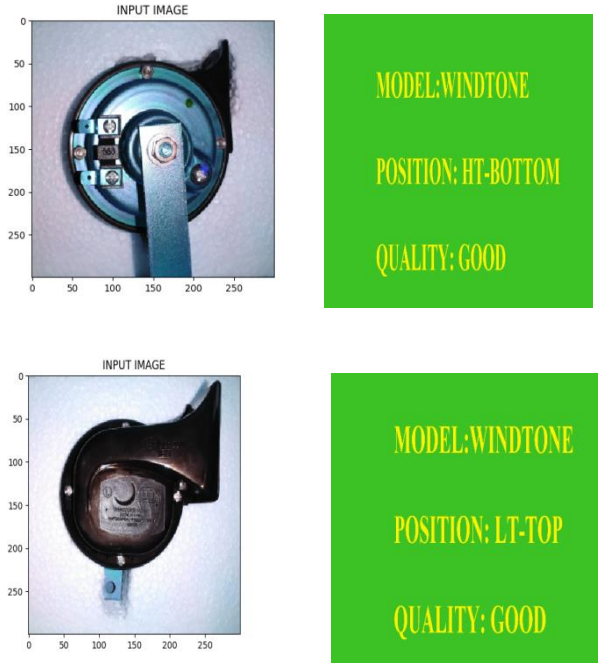


Fig.3 The input images captured by the camera and its respected output.

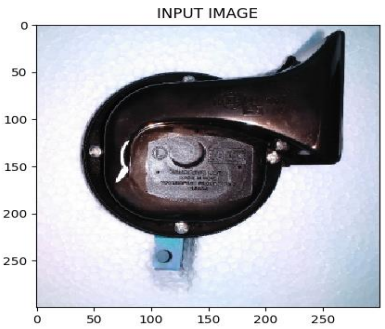


Fig.4 Defective horn input image

Fig .5 Output of defective horn

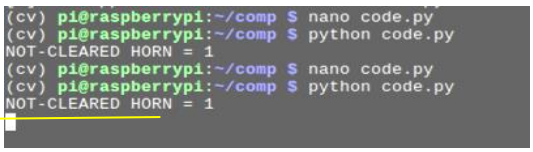


Fig.6 Number of damage horn counting

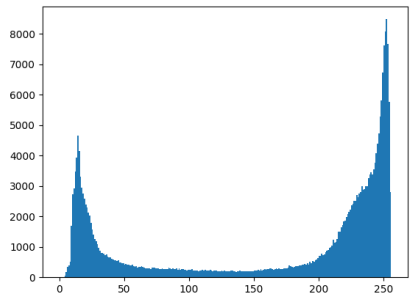


Fig.7 Histogram of defective horn image

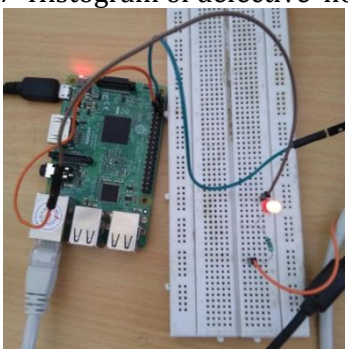


Fig.8 Instead of pressure LED is given

8. REFERENCES

[1] Pydipati, xavier p. Burgos-artizzu, angela ribeiro, maria guijarro, gonzalo pajares; "real-time image processing for crop/weed discrimination in maizefields"; elsevier; 2010.

[2] Behnel S, Bradshaw R, Citro C, Dalcin L, Seljebotn D, Smith K. 2011. Cython: the best of both worlds. Computing in Science and Engineering 13(2):31-39

[3] Bhatt D, Otto S, Depoister B, Fetcho JR. 2004. Cyclic amp-induced repair of zebrafish spinal circuits. Science 305:254-258

[4] Brandl G. 2007. Sphinx Python documentation generator. Available at http://sphinx-doc.org/ (accessed 30 March 2014)

[5] Burt PJ, Adelson EH. 1983a. The Laplacian pyramid as a compact image code. IEEE Transactions on Communications 31(4):532-540

[6] Burt P, Adelson E. 1983b. A multiresolution spline with application to image mosaics. ACM Transactions on Graphics 2(4):217-236

[7] Pedregosa F, Varoquaux G, Gramfort A, Miche l V, Thirion B, Grisel O, Blondel M, Prettenhof er P, Weiss R, Dubourg V+6

more. 2011. Scikit-learn: Machine Learning in Python. *Journal of Machine Learning Research* 12:2825-2830

[8] Rublee E, Rabaud V, Konolige K, Bradski G. 20 11. ORB: an efficient alternative to SIFT or SURF. In: Proceedings of the 2011 international conference on computer vision (ICCV). 2564-2571

[9] Schindelin J, Arganda-Carreras I, Frise E, Kaynig V, Longair M, Pietzs ch T, Preibisch S, Rueden C, Saalfeld S, Schmid B+6 more. 2012. Fiji: an open-source platform for biological-image analysis. *Nature Methods* 9(7):676-682

[10] Schneider CA, Rasband WS, Eliceiri KW. 2012. NIH image to ImageJ: 25 years of image analysis. *Nature Methods* 9(7):671-675

[11] science-fair.org. 2014. Privately sponsored project, project awards 2014. Synopsis Silicon Valley Science and Technology Championship. *Available at http://science-fair.org/database/project_awards.php?schoolname=Privately+Sponsored+Project&school_year=2014* (accessed 30 March 2014)

[12] Thuret S, Moon L, Gage F. 2006. Therapeutic interventions after spinal cord injury.*Nature Reviews Neuroscience* 7:628-643

[13] VanderWalt S, Colbert C, Varoquaux G. 2011. The NumPy array: a structure for efficient numerical computation. *Computing in Science & Engineering* 13(2):22-30