DETECTION & COUNTING OF HOLES OF A GAS BURNER USING LAB-VIEW

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ABSTRACT

Gas burners are very important component of domestic and industrial applications. They are mainly used in gaseous fuel based cooking and heating appliances such as (liquefied petroleum gas) LPG stoves. So, being the product used on mass scale in almost every household, hotels / restaurants and many industrial manufacturing units, its fabrication requires state-of-the-art automatic drilling mechanism, so that burners can be produced efficiently in large volumes at effective costs. These burners have different sizes and shapes. The patterns of holes drilled on them are also different for various categories of burners. These holes need to be drilled precisely at certain angles and their number also varies with the inter hole spacing between two adjacent holes for different type, shape and size of burners. Thus the number and patterns of the holes is the critical part of the gas stove and burner fabrication process as it defines the fuel efficiency. This paper gives a mathematical tool for the estimation of number of holes present in gas burner of quality improvement of product manufactured by companies.

INTRODUCTION

Manual inspection of burners takes a lot of time and also the precision errors are bound to occur. Moreover, the prime objective of the drilling process also requires that the holes must be drilled at precise angles which are not so accurately met with the manual drilling operation. So this paper proposes a computer based cost effective and reliable solution for automatic burner drilling and inspection mechanism. By using this techniques, there is a reduction in human errors, it requires lesser man power, time consumption will be lesser & chance of error will be also be reduce. This technique basically divided in to three parts.

1. Acquire an Image
2. Color Plane Extraction
3. Image Masking
4. Threshold Level
5. Binary Image Inversion
6. Detection of Holes & Its Marking

A. ACQUIRE AN IMAGE AND COLON PLANE

The input image can be taken from any source i.e. the image can be captured with the help of camera (or digital camera), or an image clicked through the webcam or the image downloaded through internet. The color components of an 8-bit RGB image are integers in the range [0, 255] rather than floating-point values in the range [0, 1]. RGB is an m-by-n-by-3 image array whose three planes contain the red, green, and blue components for the image. The input image can be read with the help of Acquiring an Image while selecting process Image. It reads a gray scale or color image from the file specified by its path. If the file contains a gray scale image, A is a two-dimensional (M-by-N) array. If the file contains a color image, A is a three-dimensional (M-by-N-by-3) array. The class of the returned array depends on the data type used by the file format.

Figure 1Original Image

B. IMAGE MASKING

In the image mask the mask is done by setting ROI of processed image. In this the Image Mask can be created by the selecting the acquired image and the set ROI with the help of extracted masked region.We are comparing the different enhancement techniques in terms of MSE & PSNR. MSE & PSNR of each technique are shown via Bar chart and Table. The fig-8 shows the flow chart for calculation of PSNR & MSE.

C. THRESHOLDING

The thresholding find the Amax.and Amin. Value using centroid if we implement Amax.and Amin.& if Amax.and Amin. =0 then it is perfect circle but this image hole are not a perfect circle so set a threshold value and compare the hole.

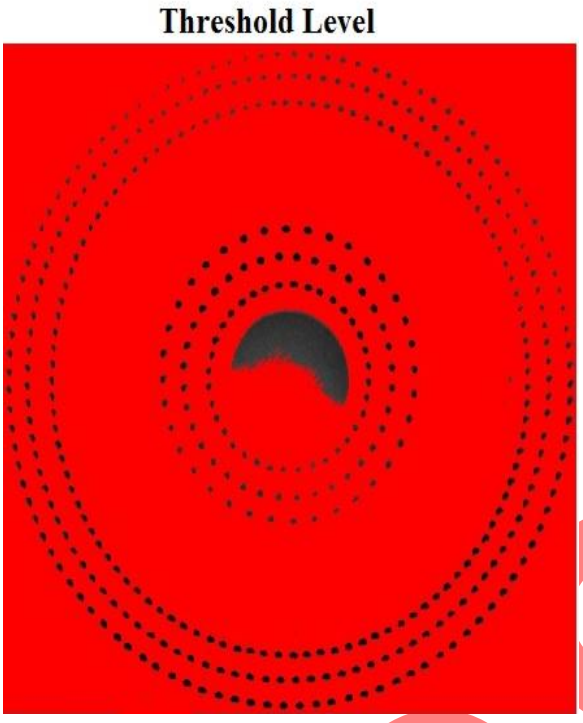

Figure 3 Image after applying threshold Level to the acquired Image

D. BINARY IMAGE INVERSION

In this technique invert the pixel and the white pixel are converted into black pixel and black pixel into white pixel. The white pixel has greater intensity than the black pixel. The maximum value of intensity is 255.

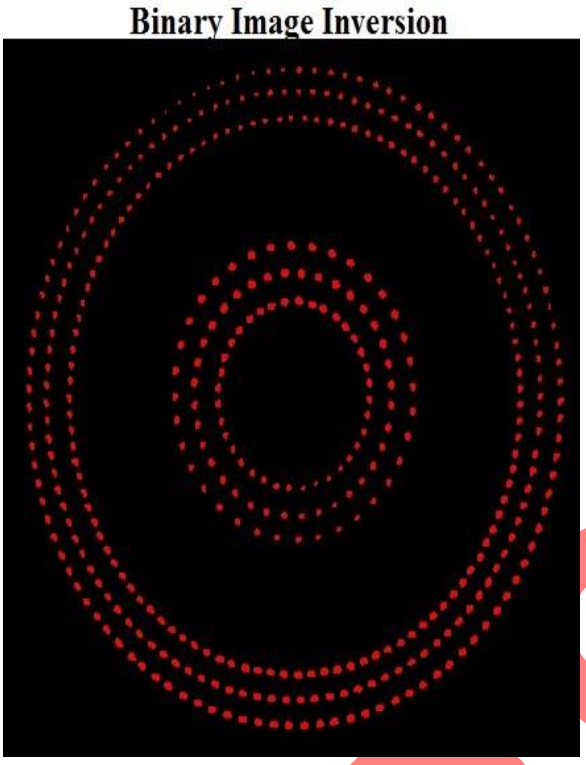

Figure 4 Image after Binary Inversion

E.DETECTION OF HOLES & MARKING

After the thresholding& binary image inversion technique the edge detection is done and it will fine the $A_{max}$and A_{min} values using centroid if we implement A_{max} and A_{min} & if $A_{max}$and A_{min}=0 then it is perfect circle but the holes of image are not a perfect circle so set a threshold value and compare the hole. If hole is found then mark the holes & increase the count.Figure 5 shows the image with marking of holes &these holes are estimated .Numbers of holes in image as shown in figure 5 is 432 which is actual count.This is the result of the image which is captured from 90 degree angle.

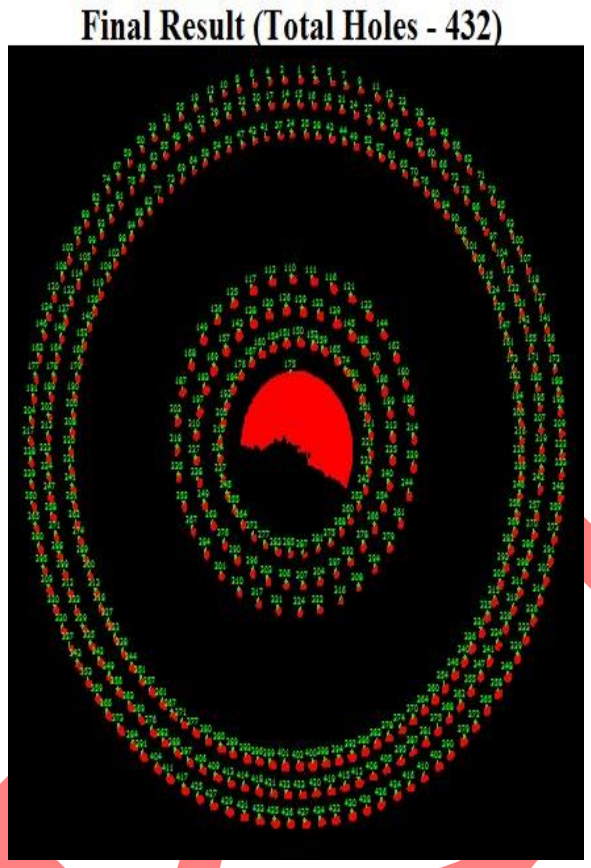

Figure 5 Estimation of burner holes at image captured from 90 degree angle.

Fig 5 show the figure after performing all levels in Labview and resulted in particle analysis.The estimation of burner holes of image captured at 75 degree. Number of counted holes is 271 which is not the actual count. Actual numbers of holes in gas burner is 432 the result at this angle is not perfect. For capturing the image at different angle, keep the image fixed and move the camera at different angle.

CONCLUSION

In this project designed a system for automatic counting of holes of a burner. The manufacturing process involves the automatic drilling which makes automatic holes at regular gaps in the burner shaped iron using Lab view Software. Automatic drill is connected with a Computer. This is a most efficient technique for drilling with 80% successful results. After drilling, the drilled burner goes to quality control department for manual counting of holes to verify the standard no. of holes chosen by HPC i.e. 432. If due to some reasons the hole counting do not match with standards then the sample rejected and the burner with the exact counting passes to the dispatch department for further dispatch. But manual counting has certain limitations such as the chances of error increases to maximum level which affects the productivity rate of the product and it is a

time consuming process also and also requires more man power. To remove these limitations the image processing is used. In this project solve this problem & automatic counting of holes are possible using image processing in labview. By using this technique automatic counting of holes are made possible.In this technique the image is captured by a camera & acquire in Labview then image is enhanced by using different image enhancement techniques after this thresholding is applied on enhanced image after the thresholding the binary image inversion is applied to invert the image in binary form where edge detection is done in particle analysis of the project & holes are marked and counted. Without enhancement applied on input image the holes are not properly counted because all holes at the surface of burner are not properly visible so enhancement technique is applied on input image.

RECOMMENDATION

Here recommend that image should be captured at 90 degree angle for proper counting of holes because at 90 degree this system gives actual output. So a mechnisium is required which help in captured the image at 90 degree angle. As the result show that when the images is captured at below 90 degree angle then this system cannot count exact number of holes. In this case the estimated holes are not equal to actual as the angle of capturedof image is decreases or increases from 90 degree the difference between estimated holes & actual holes increases.

FUTURE SCOPE

As the result shows that when the image is captured at below 90 degree angles then this system cannot count exact number of holes .In this case the estimated holes are not equal to actual.So at 90 degree angle of image captured this system give actual output. So at 90 degree there is no difference between actual & estimated holes. This limitation of the system is that it does not work below 90 degree & and above 90 degree. In future if there change in this system using any enhancement technique then this system can give exact result. This system can be changes into real time system by interface a high quality camera with mat lab.

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