

Design and Manufacturing of Gear Error Profile Detector

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Abstract— A sampling method of gathering representative data from a group. For example, a manufacturing might check only 2 or 3 gears from a batch of 100 gears due to which the whole lot gets rejected if any gear in between has error in it. Thus, we need to check each and every gear in the batch but physically this process is time uncontrollable. In our project we are designing and manufacturing a system which will be check-ups each and every gear. We use a conveyer belt for movement of gear, a camera for capturing and checking the gear parameter stored at the back end. If the parameters are matched with the stored parameters then it goes to the accepted lot otherwise with the help of shooting gun it goes to the rejected lot.

Keywords: Automation, Mechanism, detecting, sensor, dimension, Energy Saving.

1. INTRODUCTION

Gear is a widely used mechanical component whose primary use is to transmit power from one shaft to other. These gears are of many types namely spur gear, helical gears, worm gears etc.

Gear drives are used to various kinds of machines like automobiles, metal cutting tools, material handling equipment, rolling mills, marine power plants etc. The friction and other losses in this type of power transmission equipment is relatively very low.

In this work we use a software called "MATLAB" to determine gear parameters. MATLAB is broadly used for scientific & research purposes. The program is easy to understand & when executed it ask the inputs and performs the necessary design calculations and gives necessary output values. As computers are used to perform this task, gear design becomes simple & error free.

In this world of fast paced computation where resources with time and capital are very important. The activities in manufacturing and processing industries are day by day being performed by computers, algorithms and computing agents replacing human or semi-human interference. Here in the industries that require gears, the filtering and classification of gears is very important and is done by human labour, but human labour is limited to its way of working and the time and cost required. Classification can be done with the use of imaging devices, Cameras and scanners with developing an algorithm that describes what to take and reject.

Computer science image processing technology is gradually becoming a part of our daily life. As the key role of technology that presents gear size and measurement and guides to do research and develop

more advanced computer technologies, such as DSP (digital signal processing) technology, and DIP (digital image processing) technology. We will measure the image object features easily by using these technologies. The measurement is essential task to limit the gear at specific size. By using image processing the fundamental work has been carried out to measure following things which are its most important features.

- To calculate outer diameter (Addendum diameter).
- To calculate inner diameter (Dedendum diameter).
- To count the number of teeth in gear image object.
- To calculate tooth height.
- To calculate PCD of gear.
- To calculate module of gear

In this regard we have converted the original gear image object into grayscale, and then grey scale of original gear image goes from steps to count the teeth of the gear. It means by using programming code, we measure the gear teeth in respect of teeth counted through image processing.

The gears are used in machinery and we know that gear broadcasts can be used to alter a machine motion property, although it ensures the modification in the motion through linear and rotary development of gear. It is an old technology and gear broadcast was invented having difficulty.

In light of gear teeth count and to measure the parameter of the gear object difficulty of broadcast. The geometry is used to measure the gear broadcasts for commercial vehicles. Here it presents a technical exposure of gear basics. On the other hand, for appropriate use of gear and design of gear that is necessary to have a minimum know how about the gear. There are different types of gears in market according to need that can be used. It means gears have different profiles. Hence these are in different size and having odd or even number of teeth profile. Hence the gear parameters measurement will be more simple, fast and less time consuming.

2. METHODOLOGY

First, we will design gear profile error detector suitable to our application. We need to design the conveyor belt taking into consideration the applications and operational conditions. Then we will examine the design in ANSYS for static and dynamic conditions. Theoretically we will compare basic operational parameter of designed gear profile error detector. By

using MATLAB software, we will do the programming of the error.

3. PROCESS FLOW

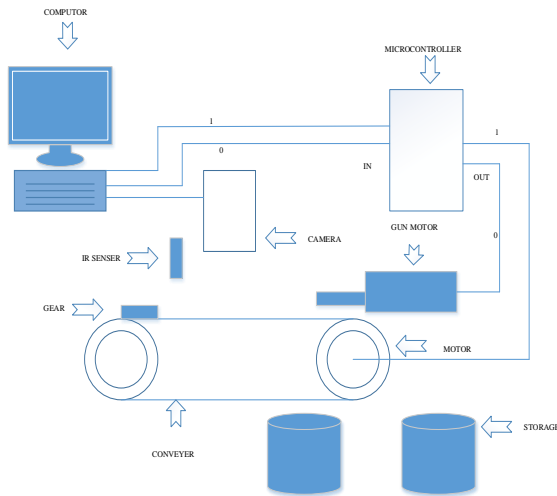


Fig. [1] EXPERIMENTAL SETUP

1. In gear detecting process we have to first identify the gear or object with the help of IR sensor. IR sensor send the input to Arduino circuit, Arduino circuit control the speed of the both motor and create delay to motor.
2. When the IR sensor sense the gear the Arduino circuit create the delay i.e. 2 sec. the delay is calculated with the help of conveyor speed.
3. After gear is came below the camera, camera will capture the image and send it to MATLAB, we developed the MATLAB code by using image processing for automatic operation and checking the each and every gear.
4. MATLAB calculate the gear parameter by using several steps firstly original image is converted to the grey scale image than the calculate the threshold value of the grey scale image after that grey scale image is converted into binary by using threshold value
5. After that binary image is inverted to highlight the region that we interested to calculate. After inverted small object will remove. then we fill the holes in binary image. Finally, all unnecessary part removes only gear parameter like tooth etc.
6. In microcontroller IC we insert the program to run the gun motor and conveyor motor
7. After scanning the all parameter of gear conveyor motor will start if MATLAB send 1 means ok the conveyor motor will continue running and gun motor will not work and when MATLAB send (0) the conveyor motor will stop after 2 sec that we calculated with the help of distance between camera position and gun motor location and speed of conveyor.
8. Operation for controlling of motor will be installed in microcontroller IC if all parameter of gear is not up to the mark the gun motor will through the gear in defective storage
9. This process will continue and check each and every gear by using this method.

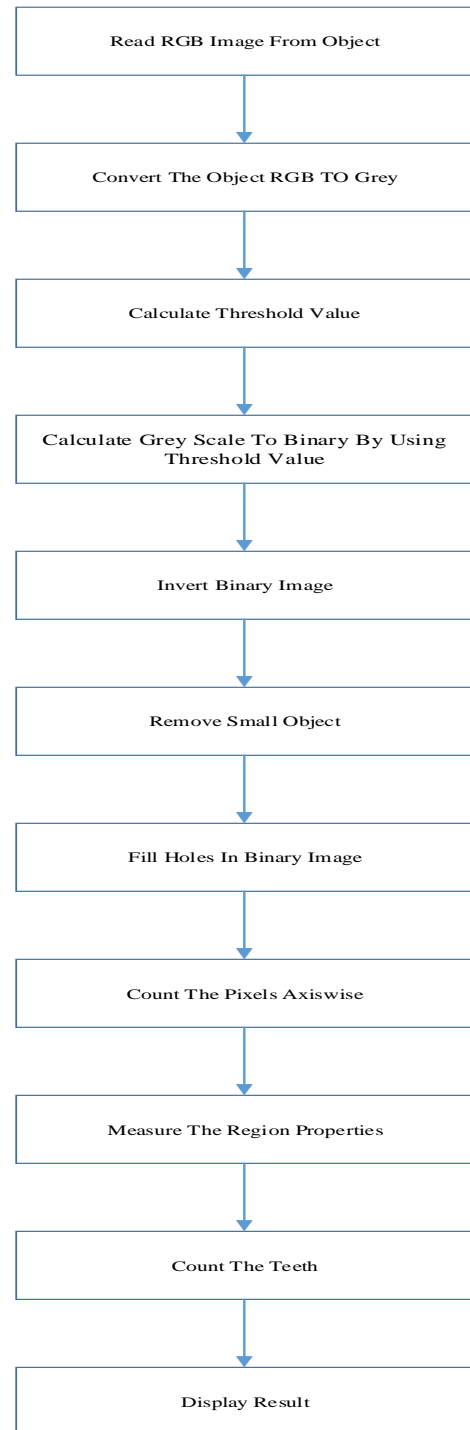


Fig. [2] IMAGE PROCESSING CHART

The methodology is followed to measure the gear image object by using image processing in scientific tool MATLAB. To accomplish this task, we have developed the code by which a gear image object pixel has been measured and teeth have been counted. The flow chart is given above.

4. CONCLUSION

The gear Area calculated and teeth counted by using image processing in the MATLAB tool. Gear objects can be measured with the help of MATLAB tool by using image processing. Digital image processing processes and evaluates images through computer with particular algorithm. We conclude that image processing technology can be effectively useful in manufacturing industries, automobile industries, space, medical and biological study, remote sensing, computerized photography etc.

5. REFERENCES

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