EEP-211

Automated Visual Inspection System For Quality Assurance

(Report)

Students:

Sumit Singla (2004EE50415)

Udit Garg (2004EE10349)

Nikhil Shrivastav (2004EE50411)

Sudhanshu Mittal (2004EE0345)

Coordinator:

Prof. A. K.Pathak

(Dept. of electrical engg.)

Objective:

To design a system that can automatically inspect for missing tablets in medicine strips on the production line.

Equipments Used:

1. Web Cam

2. Conveyor Belt

3. Lighting Tube

4. Wooden Box

5. Computer system

Utility of product:

Every product of a Company requires a minimum quality assurance before being sent to the market. If the production is large it is not possible to inspect each and every product manually, and hence arises the need for an automatic system that does the job.

In the case of pharmaceutical Industry, companies manufacturing medicine strips need to ensure that all the medicine strips passing on the production line be fully filled and the defective samples be identified and removed. Our product is basically aimed at solving this problem in an economical and efficient way.

Our Approach to the project:

Step1: Complete analysis of the specified problem.

Step2: Identifying the equipments needed and their specifications required to accomplish the project.

Step3: Searching and collecting the equipments needed.

Step4: Assembling and synchronizing all the things together to make the final project.

Concept:

Automated Visual Inspection:

Automated Visual Inspection (AVI) is a mechanized form of quality control normally achieved using one or more cameras connected to a computer system. Inspection is carried out to prevent unsatisfactory products from reaching the customer.

The project utilizes the concepts of AVI for quality assurance. The medicine strips pass on a moving conveyor belt being driven by synchronous motor and go under a black box containing a web cam that acquires an image of the strip. Then using image processing tools, it is checked for any missing tablets and an error signal is produced in the form of a sound in case of any defects. The movement of the conveyor belt has been synchronized such that the camera clicks at the instant the strip is completely in the frame then it waits for the other strip to arrive while the previous image is being processed.

The whole system is highly automated with the user just having to initially adjust the first strip in the frame of the camera before starting the system.

Image acquisition and processing:

The coding for the image acquisition and processing has been done using C++ codes, and including the opencv libraries.

Image Acquisition: The image acquisition using the web cam has been controlled using a C++ code that activates the camera to take images only after specific intervals of time, in order to synchronize it with the moving conveyor belt.

Some of the important commands used for this are:

1. cvCapturefromCam (-1): Initiates the camera to take the image.

2. cvQueryFrame (capture): Grabs a frame from camera or AVI and returns the pointer to grabbed image.

3. cvWaitkey (delay): Gives the delay in the capturing of next frame; useful for synchronization.

Image Processing: Image processing codes make use of the fact that the yellow coloured pixels have RGB values within a particular range. Whenever the image of a strip with a missing tablet is taken, the yellow colour of the slot, on which medicine strips are placed on the belt, becomes apparent in place of proper tablet and during image processing, if the number of yellow colored pixels exceeds a particular threshold, an error signal in the form of a sound from the CPU of the computer is generated, thereby signifying a faulty strip.

Some of the important functions used for this part are:-

1. iplGetPixel8U (IplImage* img, int X, int Y, uchar* color): Gives the RGB values at (X,Y) pixel on the screen

2. error(IplImage* image1): Checks the passed image(image1) for any missing tablet

Note: The Image processing techniques used here will work for any medicine tablet except the case of yellow coloured tablets, in which case only the yellow coloured slots will have to be altered with.

Major Advantages of the product:

- Alternative to expensive sensor based systems
- Highly Accurate
- Easy to implement (simple structure) and maintain
- Fully Automatic
- Highly useful when the number of samples to be tested is large.
- Versatile: Can be used for a variety of products (like PCBs)
- Use of open source system and libraries
- Designing of a simple and cheap conveyor
- Portable and lightweight system

Cost of project:

Sl. no.	Equipment	Cost (in Rs.)
1.	Web Cam	1700
2.	Conveyor Belt System	1100
3.	Lighting & wiring	100
4.	Wooden Box	500
5.	Miscellaneous	500
	Total cost	3900