Product Inspection using COGNEX Industrial Camera

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Abstract- *In modern times everything has became automated. Increased automation has led to increase in production and quality. Everything is becoming mechanized. As all tasks are performed by machines human intervention is very less and the quality of product is increased. Also automation has made life easier and more luxurious. But in present era inspection of product is done by human beings. These products are inspected based on their sizes, weight, printing etc. Due to the human inspection quality is varied as every person will have a different perception. Hence quality is affected also production is less and time consuming. To overcome this we should make use of automation which will maintain the quality, increase production and reduce the time required. Our system deals with this where we will design a system in which the product will be inspected based on parameters like presence absence, OCR, Barcode and Colour inspection.*

Keywords- Cognex camera, power supply, plc, sensor and conveyor

I. INTRODUCTION

IN Industries, automation is needed to increase the quality and productivity of product. Now a days, automation used in every manufacturing processes. Automation in industries is one of the important part to increase the efficiency and to reduced the unnecessary errors.

In this project, we are going to inspect some parameters of products such as presence absence, OCR, barcode, colour inspection. Image processing is required to do colour inspection. Using image processing it is possible to extract various features of image. Overall using automation and image processing, most of the errors caused due to human beings or any other can be reduced increasingly. Also the availability of humans is main problem faced by industries. So our project introduced a process in which there is less number of humans and all the project work done by using image processing.

Our project includes a conveyor belt on which product is move continuously. After that sensor is placed which give trigger to camera which will take the image of product. Here we are going to use industrial camera which will capture the image very clearly. Once the image is captured, it is processed by camera itself. The camera is initially programmed using PC[4]. After detection product is further operated by PLC. And we use hooter to indicate the OK/NOK signals. If the image of products consists of date, prize, correct barcode sticker without any scratch then the PLC gives PASS signal i.e. OK signal and if image is faulty then PLC gives NOK signal. As PLC is interfacing with hooter, so when the PLC gives NOK signal hooter will provide the alarm. Hooter will blow red lamp for NOK signal whereas green lamp for OK signal. As sensor detect faulty product, automatically conveyor stop moving.

Here we does PLC programming using ladder diagram in TIA portal software. And for image processing we are going to use Insight Explorer software of version 5.2.1.

II. BLOCK DIAGRAM

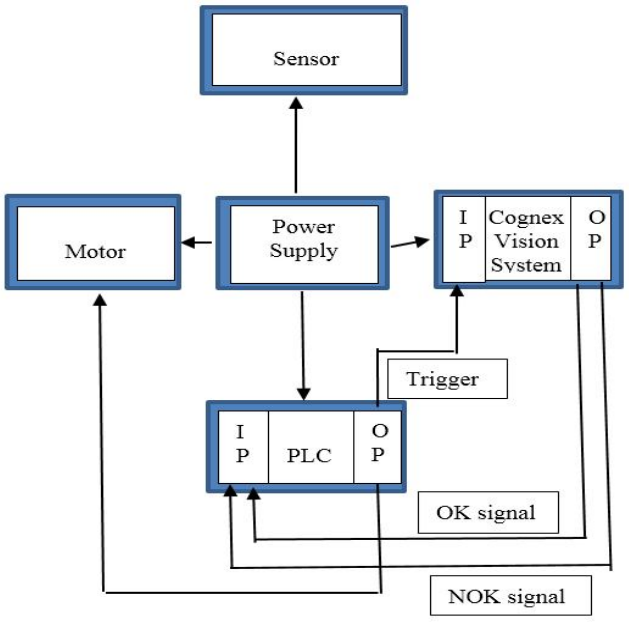

Figure 1.

1. CAMERA

Cognex vision camera system provides the widest range of application solution with greater reliability and repeatability than any other system supplier. Cognex also has

a global network of vision experts with the knowledge to assist you wherever and whenever needed. With Cognex machine vision systems in place, you can perform 100% inspection, ensure brand quality and instantly improve your production processes.

It performs tasks that are difficult or impossible for people to do reliably and consistently. Our systems help to automate and error-proof production, minimizing defects and reducing costs.

2D and 3D vision systems address the following applications:

1. Inspection: Inspect for assembly errors, surface defects, damaged parts and missing features. Identify the orientation, shape and position of objects and features.
2. Presence/Absence: Detect the presence or absence of simple features and objects to give basic pass/fail results.
3. OCR/OCV: Read and verify alphanumeric characters marked directly on parts and printed on labels.
4. Code reading: Read 1-D barcodes and 2-D matrix codes as part of an overall inspection.

Figure 2.

Table 1. Vision system specification:

Specification	**In-sight 7402/7412/7432**
Program memory	512MB non-volatile flash memory
Image processing memory	256MB SDRAM
Maximum resolution	1280*1024
Bit depth	256 gray levels
Power Consumption	24VDC, 2.0 amp
Frames per second	60 full frames per second
Electronic shutter speed	16microsec to 950milisec

2. PLC S7-1200

The S7-1200 controller provides the flexibility and power to control a wide variety of devices in support of your automation needs. The compact design, flexible configuration and powerful instruction set combine to make the S7-1200 a perfect solution for controlling a wide variety of application.

The CPU combines a microprocessor, an integrated power supply, input and output circuits, built in PROFINET, high speed motion control I/O, and on-board analog inputs in a compact housing to create a powerful controller. After you download your program, the CPU contains the logic required to monitor and control the device in your application. The CPU monitors the input and changes the output according to the logic of your user program, which can include Boolean logic, counting, timing, complex math operations, and communications with other intelligent devices.

The CPU provides a PROFINET port for communication over a PROFINET network. Additional modules re available for communicating over PROFIBUS, GPRS, RS485 or RS232 networks.

3. SICK SENSOR GTB6-P1211

SICK has a wide range of photoelectric, electromagnetic and ultrasonic sensors available to solve demanding industrial applications. SICK also offers a complete line of rotary and linear encoders.

Figure 3.

Table 2. Features:

Sensor/detection principle	Photoelectric proximity sensor, Background suppression
Dimensions (W*H*D)	12mm*31.5mm*21mm
Housing designs(light emission)	Rectangular
Sensing range max.	5mm-250mm
Sensing range	35mm-140mm

Type of light	Visible red light
Light source	Pinpoint LED
Light spot size (distance)	6mm (100mm)
Wave length	650nm
Adjustment	Mechanical spindle, 5 turns
Supply voltage	10 V DC-30 V DC
Ripple	10%
Power consumption	<=30mA
Output current I(max)	<=100mA
Response Time	<625microsec
Weight	60 g
Switching frequency	1000Hz
Connection type	Cable, 3-wire, 2m
Enclosure rating	IP 67
Operating temperature	-25*c -55*c

III. FLOWCHART

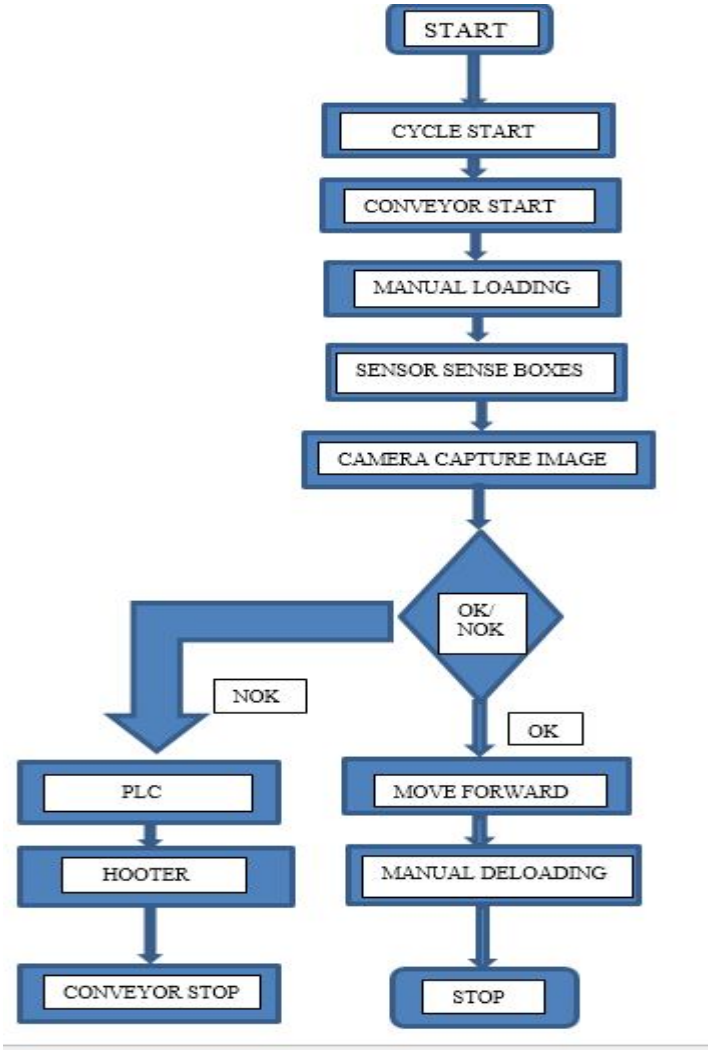

Figure 4.

IV. RESULTS

For the above system, the result must be displayed on the PC using Insight Explorer software. We connect camera online to the PC using Ethernet cable and power cable. As the conveyor start moving, product with good quality of printing gave results as shown in fig 5.

If anything is absent in the finished product, it will shows the result as shown in fig 6. and in fig 7.

Figure 5. OK product

Figure 6. NOK product, print missing

Figure 7. NOK product

V. CONCLUSION

The main aim of this project to develop compact , easy, accurate object inspection using real time camera based vision system . These system is very reliable and useful in industries. It reduces human error and improve efficiency and speed. Using PLC we can give data inputs according to change in products whenever it is required. It is highly feasible according to economic point of view.

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