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# Monitoring and Assembling of Glove Box Using PLC & HMI

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**ABSTRACT:** In any manufacturing or assembling industry the main aim of it is to maintain good quality in their products. They have to be best of others and in order to achieve it, there will be reliability and accuracy of the assembly process must be ensured. In order to achieve the nil error in the assembly process, a new assembly control approach which combines the technology of PLC & HMI along with barcode technology. Our project will be creating barcode for car glove box while assembling. The main concept of our project is to avoid mistakes while assembling of car glove box; this project ensures that the defective component will not be get pack. The spring of glove box will be sensed and in case of defective or mismatch occurred the assembling process will stop and there will be an indicator and buzzer for indication. And the component will not be able to remove from the fixture until and unless the error is been rectified. So it provides a better way to ensure the error proof of car glove box in dashboard.

### I. INTRODUCTION

Nowadays, most of the industrial process gets automated. With the help of machine human can reduce his work effort by just guiding or controlling the machine. Due to human error the assembling part of any job may be mismatched or disqualified to due missing of any component. This mainly occurs due to the inefficient or in correct work of human or labor. A human can do mistakes but a machine cannot do. So the trustworthy of a machine can be higher than a human. The main aim of automation is to check the correct procedure of assembling process or to error proof.

In case of any product get misassembled at manufacturing station, due to improper notice or human error the error can be rectified or correct there itself, the job gets packed and sent to other industry of further development. The main problem is that when come to notice in other station or other industry where the job gets complete use which may situated from far away from a manufacturing industry.

Due to small mistake or misassembled made by an human, total job gets disqualified ad sent back to manufacturing industry due to fault or to reassembled, so the transportation cost and time get wasted due to some small mistakes made by human. So in order to over comet this drawbacks, we opposed an error check controlled over the car glove box while assembling it. The main aim of our project is to avoid errors while assembling using come atomized control machined. So we use PLC. HMI & BARCODE TECHNOLOGY for complete error check.

#### A. SCOPE

The scope of this project is to avoid errors while assembling any components, this can be made possible by used of sensor or other control machined. Periodic human errors or repeating human error is mismatched assembled and not to notice them, so these problems are over comes in this project. The main aim is to avoid error and this project provides an error proof automaton in mass filed of industrialization. It will have bright future because of using barcode technology.

The monitoring operations are controlled using Programmable Logic Controllers (PLC'S). The flexibility, economic, efficient and simplicity makes it more usable. By programming the ladder logic program using CX-ONE software in PLC and HMI, therefore we control the entire system.



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## B.EXISTING SYSTEM

It consists of traditional method of assembling technique. The main disaffects of the existing system was there will be mismatching of products due to human error or not being concentrated in work. So there will be problem arising while the product get assembled and thus create lot of problems like wastage in time and money. So in order to avoid of this existing system disadvantages we proposed a system by monitoring and assembling of glove box using barcode technologies.

## C.PROPOSED SYSTEM

This proposed system consists of PLC, HMI & BARCODE TECHNOLOGY. In order to ensure the component of a job gets completely assemble; sensors are used whether the components are completely gets fixed or not. Depending upon the object sense different types of sensor will be used such as inductive and capacitive sensor. After getting output signal from the sensors the PLC starts executing its program when all the basic requirements of the job gets fulfilled then the plc will send confirmation signals to barcode printer and the printer will print the required barcode with serial running number. With the help of HMI an operator can preselect what type of components is going to be used and so the PLC will start executing the required program that was already saved in it. Communication between PLC & HMI as well as BARCODE PRINTER is done thought RS 232 serial communication cables.

## II.BLOCK DIAGRAM

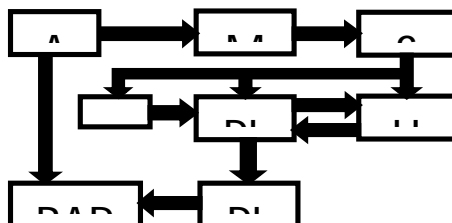


FIG.1 BLOCK DIAGRAM

When the AC supply is on, process will take place and the input is given to the MCB(Miniature circuit breaker), which means for protection and then to SMPS (switched Mode Power Supply) which convert it to DC supply; and the DC supply is given to sensors, PLC & HMI, all input sensors will sense the spring part of glove box and gives as input to PLC.

As per the program saved in PLC, the PLC programmer will process the sensor output as per the encoded program and generates the output which given as input to the barcode printer in the form of ASCII code. The respective barcode is getting printed with all encoded and necessary details required. Only when the confirmation obtained from the scanner the complete assembly of glove box takes place and the barcode printed glove box will take into packing section.

Thus for the every component there will be creating a unique running number barcode for peculiar identification. We can also encode necessary details required in barcode. When the job is get ok then the confirmation from plc is sent into barcode printer then the printer will print the respective barcode.



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## III. HARDWARE DESCRIPTION

### A. PLC – Programmable Logic Controller

A electronic apparatus which uses a programming memory and digitally operating for implementing specific functions such as logic, sequencing, timing, counting and arithmetic to control through digital or analog modules, various types of machines or process uses the internal storage of instructions

POWER SUPPLY- Provides the voltage needed to run the primary PLC components

I/O MODULES -Provides signal conversion and isolation between the internal logic-level signals inside the PLC and the field's high level signal.

PROCESSOR-Provides intelligence to command and govern the activities of the entire PLC systems.

PROGRAMMING DEVICE - control of process equipment or driven machine. The desired program that will determine the sequence of operation and

Every PLC system needs at least these three modules:

- CPU Module
- Power Supply Module
- One or more I/O Module

### OMRON PLC *CPIE-N-20-D-R-A*

This model is most applicable for most of industrial purpose. Because of it cost efficient, flexibility, efficient.

The E-type Basic CPU Units provide cost performance and easy application with only basic functionality.

■The N and NA-types Application CPU Units support Programmable Terminal connection, position control, and inverter connection.

Major Components of a Common PLC:

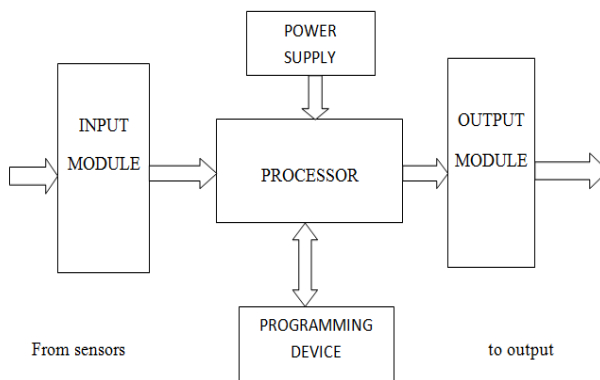


FIG.2 Major Components of a PLC



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What Is a Programmable Controller?

A programmable controller (PLC) has a controls devices and microprocessor through programs done by the customer or user. Based on the system program a plc get or receive input signals from the input devices and produces respective output.

OMRON PLC

It is a huge company which has high quality and standards inexpensive controllers. Today manufacturers round the world are excellent devices, and altogether similar. Good specific application and specific information about a PLC controller being used. Adjective “micro” itself implies the tiny models from the viewpoint of a number of attached lines or possible options. Still, this PLC controller is ideal for the purposes, and that is to introduce a PLC controller philosophy to its readers.

Plc is microcontroller system having memory space and execute program in a sequential manner. It always different from other software from the assembler. This software execute in ladder logic. It had many number of inputs and outputs port, expandable I/O ports. The controller can be mounted in a panel along with other parts of the kit.

## ***B.Zebra GT820 Desktop Printer***

It is the most advanced desktop printer, provides professional quality, reliability and high performance as well as competitive price. Both thermal and thermal transfer model are available. They are easy to load designs to improve operational efficiencies, ideal for a wide range of environment. They are more flexible and wide range of applications and fast print speed helps you to get job done quicker.

Printer Specifications

Resolution 203dpi/ 8dots per mm

Memory- 8MB Flash, 8MB SDRAM (standard)

Print Width 4.09”/ 104mm

Print Length 39”/ 990mm

Print Speed 5”/ 127mm per second

## ***C. HMI (HUMAN MACHINE INTERFACE)***

Human Machine Interface is the user interface in a manufacturing or process control system. It visualization is of graphics-based for an industrial control and monitoring system. Initially HMI was called as "MMI" (man machine interface).

The DOP-B-3S211 series provides various types and different sizes of touch panel HMIs with multiple dimensions and colors, and also offers fast and convenient control functions to meet the diverse application requirements demanded of industrial automation machines. In case of errors, an alarm alerts user's audio message in real time.No need to connect to a PC. The data saved in an SD card / USB disk can be encrypted and the number of copies can be limited to protect the programs from unauthorized user.

## **IV. WORKING & DESCRIPTION**

This simple control mechanism works when cycle start bush button gets starts, then the component presence sensors will detect the presence of the component. Mainly diffused sensor will be used to sense the component presence. It is done to check the confirmation whether the component is present or not. When the confirmation or output is received from the component presence sensor or diffused sensor it get turned as input signal for the fixture to on,. Thus the fixture for this job is mainly of nylon mould rubber clam which help to keep the component in a stable and fixed position for further assembling process and to check this errors proof mechanism. As per the aim of out project, that to produce nil error while assembling, so we program the plc as the job will not be taken out from the fixture until it gets confirmed that the component gets assembled completely and perfectly. In case of emergency or under circumstance,



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the job will be taken out either by using key or by entering password in HMI both this security will be provided in the hands of supervisor so under any other circumstance the job will not be able to be taken out by worker or labor thus the job will we release automation only when the component spring is get presence and the matched barcode is been get printer and stick it on the glove box. Only when the scanner scans the barcode the fixture set to resent condition and the job get released, thus complete error check mechanism is of higher level thus job cannot be placed with any errors.

Then the PLC waits for the output of inductive sensor. When the inductive sensor sense the component if produces output when the component rightly present at its place or it will not produce output. So at same time timer gets started for giving a time delay for the sensor to work. If the sensor does not gives output all over the time delay that means that the error or component missing in the assembling part. So the program will automatically send signal to buzzer and an indicator in order to intimate that the error had occurred.

If the sensor gives output and the plc programmer automatically send signal to the barcode printers in the form of ASCII code that we already saved in the memory of plc. And after some time delay the before process gets rest and start to operant the same program for the next component sense when the cycle start push button is on. The cycle gets on repeating. The numbers of job worked are get counted as well as the number of ok job and number of not ok job also counted separately.

The HMI interfaced is used for operated the plc in either in manual or automatic control. The instruction already saved or set in HMI helps to complete process in case of any emergency. The high level security password set in HMI help to keep safe the job proceed data and the in case of mistakes occurred the not ok job will not be get able to removed from the fixture. So that only an ok job is get removed from the fixture and send to assembling section.

## V. PROGRAMME AND SIMULATION OUTPUT

### A. PLC PROGRAMMING SAMPLE:

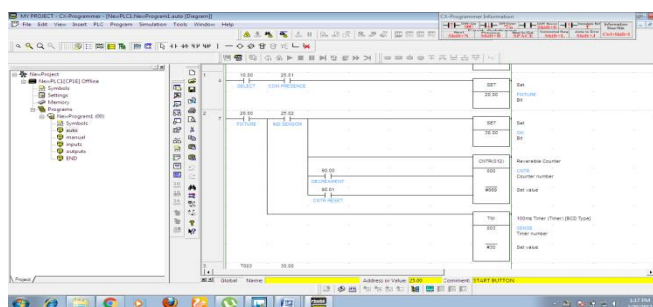


FIG 3. SAMPLE PROGRAMM

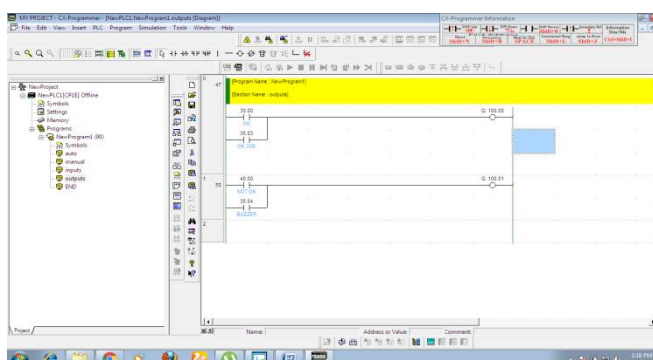


FIG.4 PROGRAMMIN OUTPUT

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## B. HMI(Human Machine Interface)

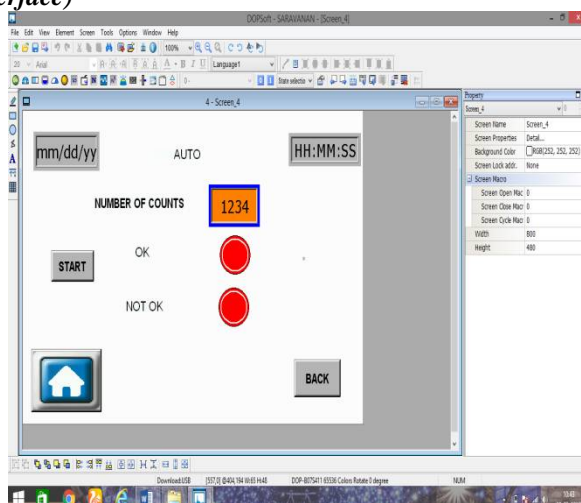


FIG. 5 HMI DESIGN

## C. BARCODE DESIGN

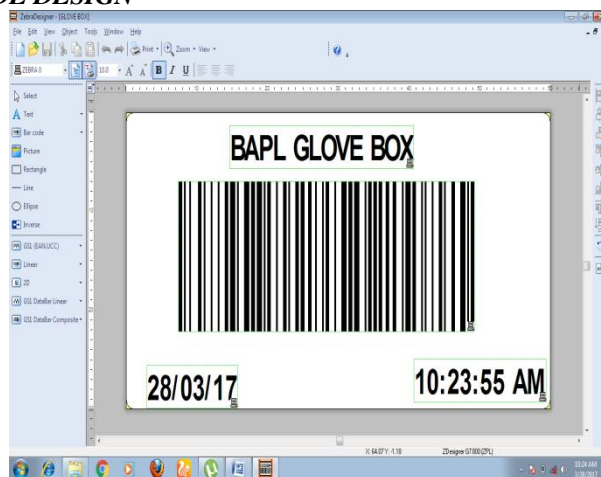


FIG. 6 BARCODE DESIGN

## VI. CONCLUSION AND REFERENCE

By observing the above proposed system and implementing those error proof check; we have come up with the idea of executing a barcode automation based system with the help of ladder logic implemented using PLC and HMI by transmitting ASCII code. Thus this project will give a complete error check for the car glove box and the printed barcode will ensure the components are well assembled.

Therefore, the technology is very suitable to be applied in the flexible assembly lines, either manual or automatic, which has many kinds of products and has a high requirement of quality monitoring.





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