

# Laser Welding Assembly Using RFID

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**ABSTRACT:**An integration driven framework for accredit the RFID based identification of parts to perform robotics rally operation in a random process. The RFID infrastructure intuit the newly arriving parts to be rallied and via integration framework. Input to this machine glean by a different PLC controller. The robots are able to confess them and then it perform unified welding operations. The parts to be welded with different characteristics, in particular fickle by both dimensions and materials. E-plan is a software, used to implement the specific object. Technical preplanning and designing can be implemented by using this software. Components connection were designed by using E-plan software. Connection of circuit panels with wiring is done. The working postulate of laser welding assembly were observed with the help of PLC.

**KEYWORDS:**RFID, PLC, Digital Displacement Sensor, Laser welding Robot, Ethernet, E-plan.

## I. INTRODUCTION

In this technology we are using two category of station, one is mechanical station and another one is electrical station. Here we are going to perform the operation in electrical station, this station performs the operation in E-plan, RFID and PLC. The purpose of laser welding assembly is to recycle the vehicle fuel pollution by automation techniques. An automatic machine is designed by E-plan software, the function of this software is to design the components. Input to this system comes through a conveyer driven by a different PLC controller. RFID contains electronically stored information and identifies the object through Electromagnetic fields. Digital displacement sensor which perception the physical consignment of an object. Profinet is an industrial Ethernet used to collect the data and control the equipment. RFID identification contraption, integrated with control logic planning and has been used for inflate the performance of laser welding operation within a robotic cell in a random product mix.

## II. RELATED WORK

Welding introduce many complications and problems which often aren't immediately visible. These problems are not experience in all welding processes and there are plenty of assload muddles. Anyone can bolt two pieces of metal together but even the simplest welding requires skilled graft or automation [6]. However welding clutch a lot of power to perform, which can serve severely limit were it can be performed. Now most employers and industries can fairly afford to arrange for sufficient power for welding like laser welding with the assist robots [6].

Robotic laser welding has a much smaller heat-affected zone, so deformation is minimized regardless of the type of metal being welding. Robotic laser welding is an accurate, clean and flexible option for a wide diversity of welding application. It helps to provide a spacious range of benefits for manufactures including fastest speed and better quality. A laser welding robot can effortlessly motorized this inquiry and manufactures will improved reiteration and higher level welds.

### III. PROPOSED METHOD

In this technique, the advanced version of software is pre-owned to design the components. The components were designed by using E-Plan (Electrical P8) software. Designed components are functionally controlled by programmable logic controller (PLC) [1]. Profinet is a commercial Ethernet, the connection of components were done. Here, the servo motors are pre-owned to assemble the components mechanically and it's controlled by PLC. RFID reader (like barcode, tags, serial number) is used read the assembled components, if it reads the components it will proceed for next step or otherwise it will reject the components. The robot laser welding device is pre-owned to weld the components, which is assembled by servo motors with the assist RFID reader. Finally robot position the laser accordingly, the height checking is checked before and after welding by using Digital displacement sensor[6].

This system automatically performs the operation like pressing of components and laser welding. Rated amount of pressing 1000kg's of pressure can be done.

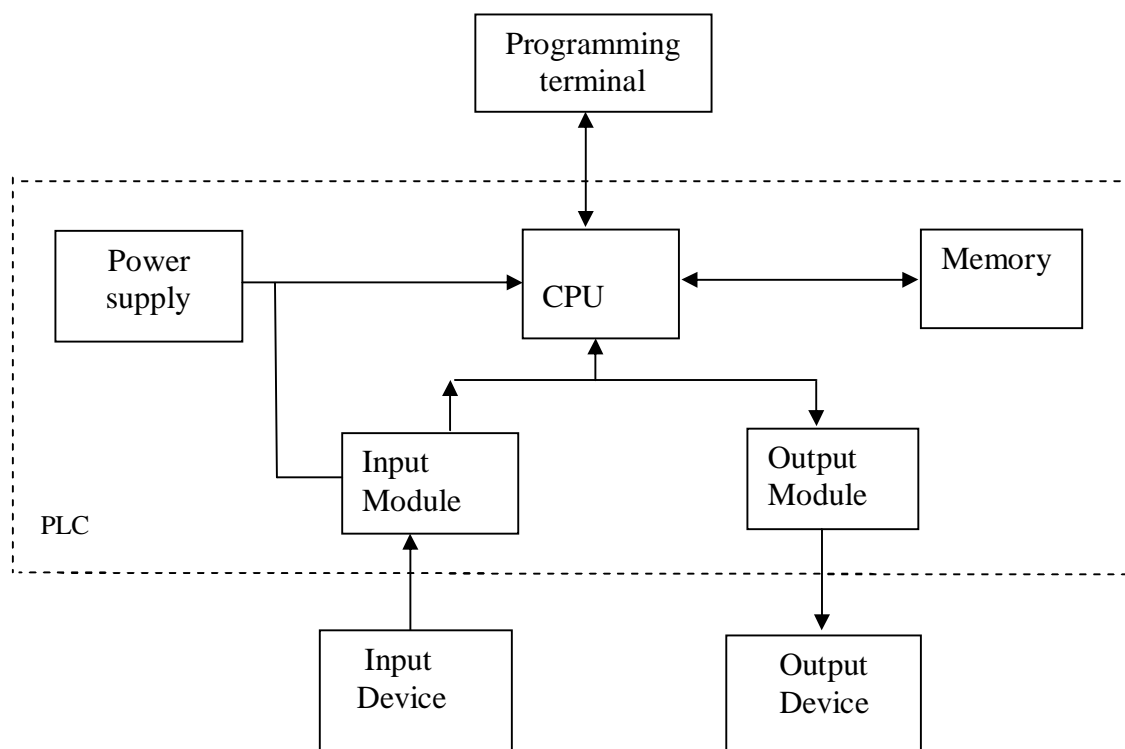


FIG 1: PLC STURCTURE

#### IV. WORKING PRINCIPLE

##### A. E-PLAN

E-plan is a software which is pre-owned to design the outlook of the gadget and the working operation. E-plan offers illimitable prospect for project forethought (method of operation), documentation and management of self-regulating projects. The automatic production of detailed reports based on wiring illustration is unsegregated part of a comprehensive substantiation system. It provides ensuing phase of the predict such as construction, assembly commissioning and service with the data mandatory.

##### B. PLC

Programmable Logic Controller is a digital computer pre-owned for the cybernation of electro controllable processes in racket. PLC consists of a microprocessor which is schedule using the leverlanguage. The program is scrawl on a computer and it is downloaded to the PLC via cable [2]. During the change of transmit control panels to PLC, the hard wired relay argumentation was barter for the program fed by the user. The hardware portion of a PLC systems are CPU, memory, Input/Output, power supply unit, and programming device [1]

- The device must be programmable and re-programmable.
- It must be delineate to operate in an industrial abode.
- It must acquire 120-V ac signals from standard buttons and switches.
- Its output must be delineate to switch and continuously operate loads.



*Fig 2: PLC control panel*

##### C. PROFINET

Profinet is also called as “Switched Ethernet”, it is direct access to diagnostic information via standard web browser. Profinet type of cables are suitable for industrial fieldbus systems with the intercontinentally acquire TCP/IP protocol. The cable afford Low smoke halogen sheathing, which makes them befitting for use in public buildings to reduce the risk to intuitive equipment in event of fire [3]. These cables are frequently pre-owned to operate technology such as transport and conveyors, and machine tool manufacturing. Profinet is a fast automation, fast and reliable testing and perform all task even before a CPU has been integrated into the network [4].

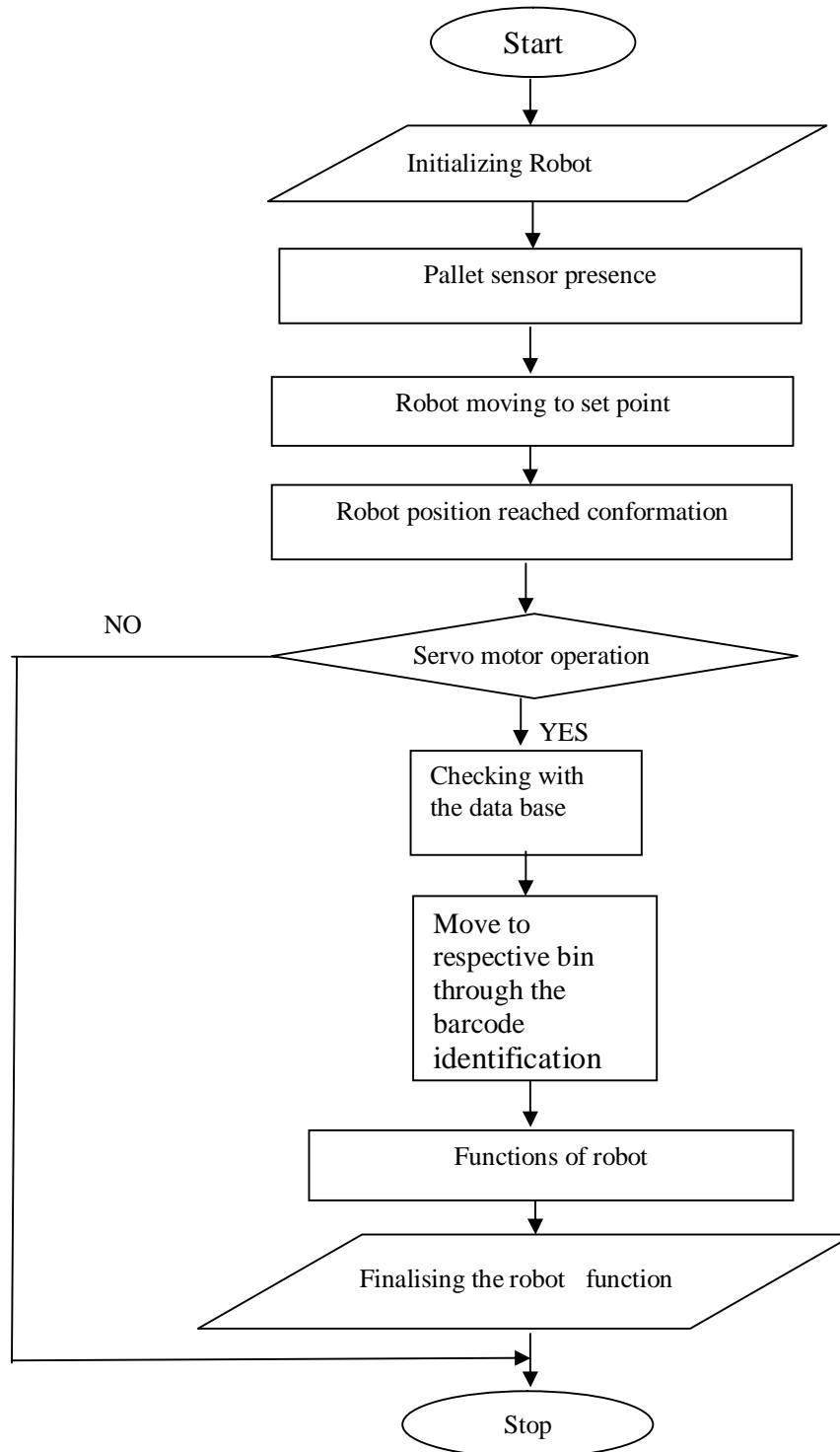


Fig 3: Flowchart of Profinet function

Every module within PROFINET network has three addresses:

- MAC address → modified if the device is replaced.
- IP address → form of network addressing which may be dynamically designated.
- Device name → stable address a device name is used.

#### D. SERVO MOTORS

Servo motor is unusual type of motor which it automatically handle up to undeniable limit for a given order with the assist of digital error-sensing report to correct the fabrication. The primary task of servo contraction is to maintain the output is set-up at the desired value in the occupancy of trouble.

Servo motor consists of three steps

- Servo slider - used to progress the components in X and Y axis.
- Servo press - used to press the two components of metals.
- Servo rotary - used to rotate the components for laser welding.

#### E. RFID

Radio frequency identification, is a collective term for techniques that use radio waves to spontaneously identify the elements. There are various methods of remembrance, but the most common is to store a serial number that recognize a elements, and feasibly other certitude, on a microchip that is fixed to an antenna (chip and an antenna together called as radio waves)[3]. The antenna enables the chip to transfer the rallied direction to a reader. The reader converts the radio waves return back from the RFID tag into digital direction that can be transferred on to the computer that can forge use of it [4]. The reader sense out electromagnetic waves, tag antenna is attune to collect these waves [5].

#### F. ROBOTIC WELDING

A robot laser welding system consists of a servo-controlled, multi axis mechanical forelimb, with a laser trimming head ascend to the face plate of the robot appendage. The trimming head had focusing optics for the laser light and innate height control contraction [6]. It helps to furnish a wild range of benefits for manufactures including faster speed and better quality.



Fig 4: Robot Laser Welding Device

#### G. DIGITAL DISPLACEMENT SENSOR:

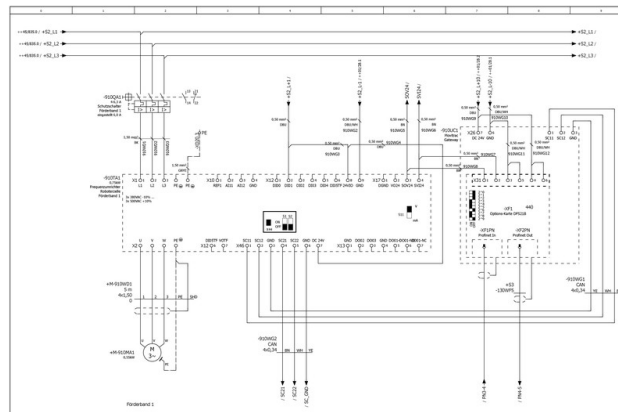
Digital displacement sensor measured physical quantity of an object. Physical quantity output is feasible, only in inclusion to ON/OFF signal output. Sensor comprise of transmitter and receiver. Smaller sensor, parallel beam line sensor, laser micro meter sensor is the types of digital displacement sensor.



Fig 5: Over View of Machine

### V. EXPERIMENTAL RESULT

Thus the work is done by E-Plan software which is pre-owned to design the section. The ingredient are designed by using the symbols which is presented in the software. This software gives the accurate result and the output of the designed components gives the perfect result for further operations. Designed components are observed by mechanically and electrically. Then the components working are electrically observed with the assist by PLC and RFID.



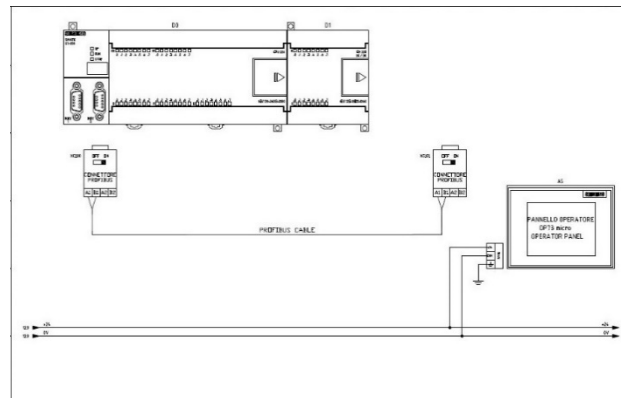


Fig 6: Design of Robot Circuit and PLC circuit.

## VI. CONCLUSION

Nowadays, most of the control system operation in industries used PLC as a controller to control the process. It contains process control, transportation, production lines and so on. Then, RFID is used to read the components. It is found that the above claim and results that the RFID based tracking yields good results in terms of flexibility, expanse, adjustability, hardware and cost of the device.

In this paper, we have mainly studied the concepts of various automation techniques like E-Plan, PLC and RFID. Some of the elements are designed by using E-Plan software. The various concepts with function of PLCs and RFID were studied practically.

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