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Monitoring and Controlling of Components in a Conveyor using PLC and SCADA

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***Abstract*:- The main objective of the project is to Monitor and Control the Components that is being carried over the Belt Conveyers using PLC, SCADA. The conveyor is operated by DC motor. The components in the conveyor are detected by using sensors. The Conveyer is controlled through the PLC Programming for its Control process, monitoring of how many Completed Components passed through the conveyer at a specified time along with Power reduction using Energy Efficient PLC Programming. The entire process is Monitored and Controlled remotely using SCADA. The Report generation for the Conveyer process is programmed in SCADA like Conveyer Cycle time, Conveyer Idle Time and these data can be automatically saved in the Excel Data format.**

Keywords:- PLC, SCADA, Conveyor control, Monitoring and Control.

I. INTRODUCTION

PLC

A programmable logic controller (PLC) or programmable controller is an industrial digital computer which has been ruggedized and adapted for the control of manufacturing processes, such as assembly lines, or robotic devices, or any activity that requires high reliability control and ease of programming and process fault diagnosis.

PLCs can range from small modular devices with tens of inputs and outputs (I/O), in a housing integral with the processor, to large rack-mounted modular devices with a count of thousands of I/O, and which are often networked to other PLC and SCADA systems. They can be designed for multiple arrangements of digital and analog I/O, extended temperature ranges, immunity to electrical noise, and resistance to vibration and impact. Programs to control machine operation are typically stored in battery-backed-up or non-volatile memory.

SCADA

Supervisory Control and Data Acquisition (SCADA) is a control system architecture that uses computers, networked data communications and graphical user interfaces for high-level process supervisory management, but uses other peripheral devices such as programmable logic controller (PLC) and discrete PID controllers to interface with the process plant or machinery. The use of SCADA has been also considered for management and operations of project driven process in construction. The operator interfaces that enable monitoring and the issuing of process commands, such as controller set point changes, are handled through the SCADA computer system. However, the real-time control logic or controller calculations are performed by networked modules that connect to the field sensors and actuators.

SENSOR

In the broadest definition, a sensor is a device, module, or subsystem whose purpose is to detect events or changes in its environment and send the information to other electronics, frequently a computer processor. A sensor is always used with other electronics. Sensors are used in everyday objects such as touch-sensitive elevator buttons (tactile sensor) and lamps which dim or brighten by touching the base, besides innumerable applications of which most people are never aware. Moreover, analog sensors such as potentiometers and force-sensing resistors are still widely used.

MOTOR

An electric motor is an electrical machine that converts electrical energy into mechanical energy. Most electric motors operate through the interaction between the motor's magnetic field and winding currents to generate force in the form of rotation. Electric motors can be powered by direct current (DC) sources, such as from batteries, motor vehicles or rectifiers, or by alternating current (AC) sources, such as a power grid, inverters or electrical generators. An electric generator is mechanically identical to an electric motor, but operates in the reverse direction, accepting mechanical energy (such as from flowing water) and converting this mechanical energy into electrical energy.

II. PROBLEM DEFINITION

Controlling and monitoring of systems are prone to error due to the involvement of humans in the data collection and processing using complicated mathematical expressions. That is what we required in this system, that collects raw data, process, and monitor it. In industries important thing is to increase the production without spending more cost for the labour and also external problems are also possible due to the carelessness of the workers. These problems are solved by using PLC and SCADA. The automation is the only way to help the industry from errors and increase its productivity. By automating the controlling and monitoring of industrial process, it made simple and cost effective.

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III. LITERATURE REVIEW

In this chapter, the discussions are more about the previous researched that have been done. In the never ending effort of the humanity to simplify their work.

"PLC and its Applications in Automation Plants"

in 2017 IJEDR Volume 5, Issue 3 ISSN: 2321-9939 by Akhil Dixit et al. In this paper they carried out basic task of filling up of water bottles using Programmable Logic Controllers (PLC). In this paper, they given information about the basic parts of PLC such as CPU, Memory, Input devices, Output devices, Programming unit, Power supply. They used the PLC for performing the filling operation because they are flexible, easy to program and space efficient. In this project they have placed bottles on the conveyor belt one at a time and then they get filled. The entire system can be controlled using PLC and SCADA was used for visual representation of the bottling plant. They concluded that the purpose of their project is to create a PLC based automatic bottle filling plant based on given description..

"Low Cost Wireless Control and Monitoring Using PLC and SCADA"

International Journal of Scientific and Research Publications, Volume 3, Issue 9, September 2013 1 ISSN 2250-3153 by Kaushik Bhuiya. In this the illustrated contents are PLC is a controller used to automate the industrial process and monitor itself. Programmable logic controller is used in many industries to control the whole process automatically with less human intervention and to avoid errors. With the rapid growth in technology wireless instrumentation has come into existence to avoid cabling infrastructure and to obtain efficient control. In order to have a wireless control the existing PLCs have to be replaced with wireless PLCs. In this paper we present a novel approach of converting the existing wired plc into wireless plc by configuring XBEE in direct mode using X-CTU software as communication interface between plc and process, the process used here is batch process and controlled through SCADA.

"PLC Based System Using Recent Technology SCADA"

Vol-1 Issue4 2018 IJARIIE-ISSN(O)-2395-4396 by Jaswandi G. Joshi. In this the illustrated contents are It is the system which obtains a real time data of industrial parameters and displays it in various forms. It is an automatic control system usually practiced in number of industries. In the recent past, researchers have tested a wide array of control system in an attempt to find improved methods of monitoring and controlling the specific industrial parameters. The list of PLC manufacturers in global market is also provided in this paper. The most common way to program a PLC is to design the desired control circuit in the form of relay logic ladder diagram and then enter this ladder diagram into programming terminal. They have listed out some other programmable devices such as relay, pushbutton, selector switch, limit switch, proximity switches etc.

"The Role of PLC in Foundry"

at 2017 IJEDR Volume 5, Issue 3 ISSN: 2321-9939 by Pravinkshirsagaret al. In this the illustrated contents are PLC is an intelligent system of modules for replacing relay-based logic. PLCs are often programmed in ladder logic which is the wiring up of relay contacts and coils on screen. Some of relay contacts are tied up with inputs and some are with outputs from real world. The program incorporates timers, counters and arithmetic operations which couldn't with just relays. Along with the PLC, SCADA database is used for graphical view of process monitoring from operator station in the central control room. A SCADA system used to gather data from sensors and instruments and transmit data at a central site for control or monitoring. The collected data is viewed on one or more SCADA host computers.

"Applications of Programmable Logic Controllers (PLCs)"

in July 2016 by Ephrem Ryan Alphonsus, Mohammad Omar Abdullah. In this paper the author have discussed about applications of PLC in our current market. It enlisted PLC hardware, PLC programming, other programmable devices and the PLC applications. PLC is capable of controlling many types of industrial equipment and entire automated system.The list of PLC manufacturers in global market is also provided in this paper. The most common way to program a PLC is to design the desired control circuit in the form of relay logic ladder diagram and then enter this ladder diagram into programming terminal. They have listed out some other programmable devices such as relay, pushbutton, selector switch, limit switch, proximity switches etc.

"Principle of PLC (Programmable Logic Controller) and its Role in Automation"

This International Journal of Engineering Trends and Technology- Volume4 Issue3- 2013 by Avvaru Ravi Kiran et al. This paper discusses topics of PLC and role of PLC in automation engineering. The purpose of PLC is to directly replace electromechanical relays as logic elements. The main difference from other computers is that PLC are armored for severe conditions (such as dust, moisture, heat, cold) and have the facility for extensive input/output arrangement. These connect the PLC to sensors and actuators. PLC is good example of an industrial control system. PLCs are specialized computers which are often used to synchronize the flow of inputs from sensors and events with the flow of output to actuator and events.

IV. PROJECT DESCRIPTION

The components used in design of the project are Delta PLC, Wonderware Intouch SCADA, 3 Conveyor Belt, 3 DC Motor, 3 Proximity Sensor, Switch Mode Power Supply, Relay, Miniature Circuit Breaker, Switch.

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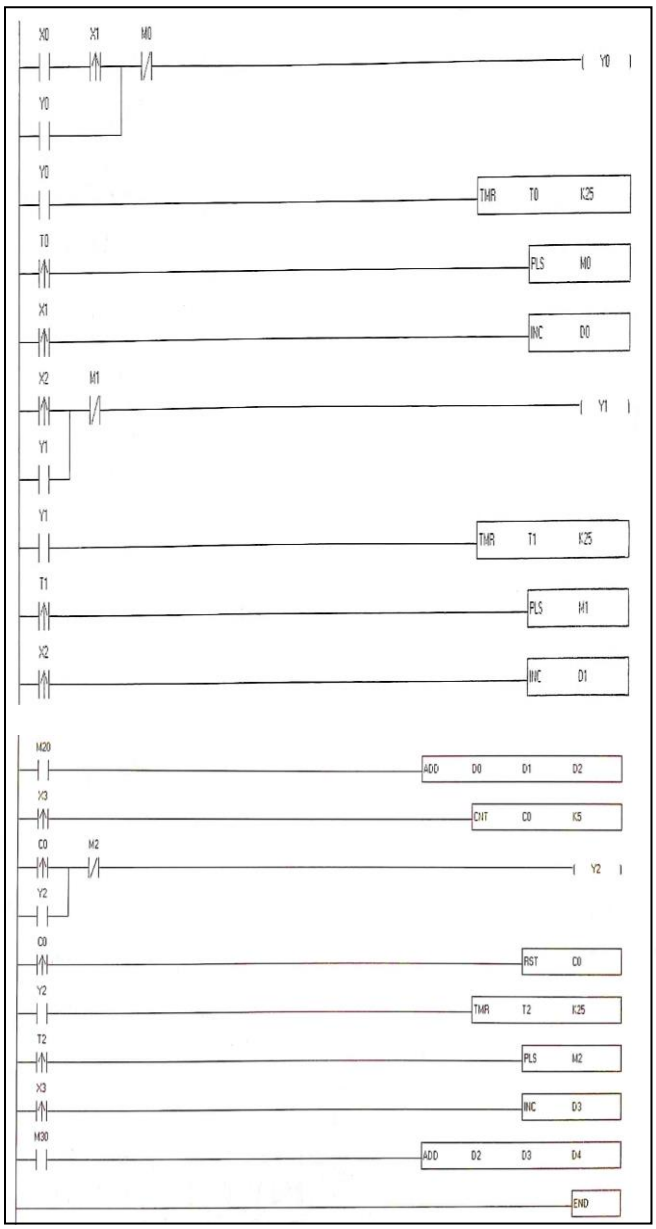
PLC Program



SCADA PROGRAM

ON SHOW

SW = 0;
C1 = 0;
V1 = 0;
V2 = 0;
H1 = 0;
H2 = 0;

WHILE SHOWING

If SW = = 1 AND H1 < = 180 AND V1 = = 0 Then H1 = H1 + 5; END If;
If SW = = 1 AND H1 > = 180 AND V1 < = 100 Then V1 = V1 + 5; END If;
If SW = = 1 AND H1 < = 360 AND V1 > = 100 Then H1 = H1 + 5; END If;
If SW = = 1 AND H1 > = 360 AND V1 < = 200 Then V1 = V1 + 5; END If; If SW = = 1 AND V1 > = 200 Then H2 < = 170 Then H2 = H2 + 5; C1 = C1 + 5; END If;
If SW = = 1 AND H2 > = 170 AND V2 < = 40 Then V2 = V2 + 5; END If;
If SW = = 1 AND V2 > = 40 Then H2 = 0; C1 = 0; V2 = 0; END If;

V. WORKING PRINCIPLE

The project is based on the controlling of components by using PLC. In this there are three conveyors which are controlled by dc motor each conveyor has a proximity sensor. So that the object through the conveyor is observed. The conveyor running is started only when the object is detected in the proximity sensor and the conveyor is offed after certain seconds of the object detected. The process is the same for each conveyor and in the third conveyor the running starts after five objects are collected. The whole process is obtained and controlled using the DELTA PLC. The monitoring is done by using the Wonderware Intouch SCADA system. The Intouch is used for monitoring of the work from anywhere and the ideal and working time of the conveyor is obtained from the data logging sheet.

REFERENCES

[1] Akhil Dixit et al, “PLC and its Applications in Automation Plants” in 2017 IJEDR Volume 5, Issue 3 ISSN: 2321-9939.
[2] Avvaru Ravi Kiran, “Principle of PLC (Programmable Logic Controller) and its Role in Automation”. This International Journal of Engineering Trends and Technology- Volume4 Issue3-2013.
[3] Ephrem Ryan Alphonsus, Mohammad Omar Abdullah, “Applications of Programmable Logic Controllers (PLCs)” in July 2016 vol. 3, 4, pp. 252264.
[4] Jaswandi G. Joshi, “PLC Based System Using Recent Technology SCADA”, Vol-1 Issue-4 2018 IJARIIE-ISSN(O)-2395-4396.
[5] Kaushik Bhuiya, “Low Cost Wireless Control and Monitoring Using PLC and SCADA”. International Journal of Scientific and Research Publications, Volume 3, Issue 9, September 2013 1 ISSN 2250-3153
[6] Pravinkshirsagaret, “The Role of PLC in Foundry” at 2017 IJEDR Volume 5, Issue 3 ISSN: 2321-9939.