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Research Article

Monitoring and Control of Component Transfer and Packing through Conveyors Using PLC, SCADA and Mobile Application

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ABSTRACT
The main objective of the project is to monitor and control the components that are being carried over the belt conveyers using PLC, SCADA and Android Mobile Application. The conveyer is controlled through the PLC programming for its control processes. SCADA and MOBILE APPLICATION are used to monitor the completed component that is passed through the conveyer at any specified time. Power reduction and energy utilization is minimized using 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 (Data Logging Process). The whole process can be controlled using the Android mobile application in which the conveyer is controlled wireless in a Particular region of the Industry. The controllable range of the conveyor using the mobile application can also be extended to a wide range (apart from the industry premises) using multiple LAN connections. Where older automated conveyor systems would use in PLC and SCADA.

INTRODUCTION

The PLC is a microcontroller based device with input/output circuitry that monitors the status of field connected sensor (inputs) and controls the attached (output) actuators (motor -starters, Solenoids, Speed drives, Valves etc.) according to a user created logic program stored in the memory. early PLCs used a form of instruction list programming, based on a stack-based logic solver. The functionality of the PLC has evolved over the years to include sequential relay control, motion control, process, distributed control systems and networking

PLC ARCHITECTURE

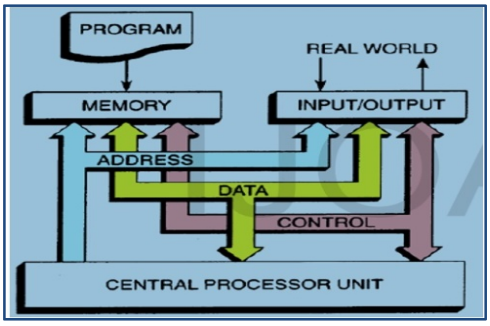


Fig 1 Architecture of PLC

The PLC architecture consists of the microcontroller, Memory IC and necessary circuit to store and retrieve information from the memory. The Job of CPU is to monitor status or state of input device, scan and solve the logic of a user program and control ON or OFF state of output device.

Relay

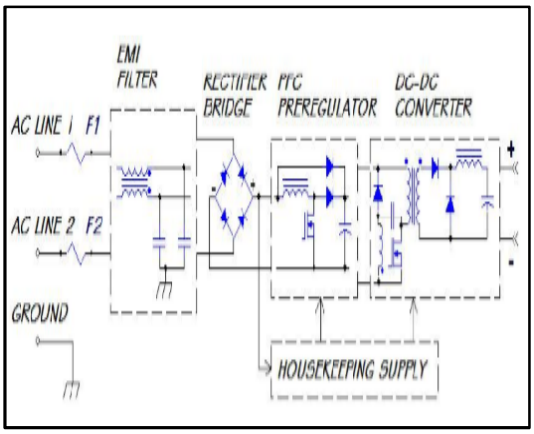
The most common changeover function relays are produced to switch a single feed line (usually positive - position 30) between two active functions in a circuit, the relay is switched manually via a toggle/push switch or remotely through the circuit. A simple 'single line changeover switch' is achieved by switching a single line input from terminal position 30, at rest in the normally closed terminal position 87a (indicated by the 'thick set' black lines on the diagrams below), to the 87 position. When the coil is energised the line switches from terminal 87a to terminal 87, remaining in the second function until the power to the energised coil (via 85 and 86, which can be swapped in some applications) is switched off, returning the circuit to the normally closed (NC - 87a) position. A typical explanation of this function is to associate it with a headlight dipped beam, when momentary switching to full beam and then back to the dipped position (with both output positions 'by design' being active). In practice it would be correct to say that changeover relays have been used (sometimes by vehicle manufacturers) to achieve a normally open or normally closed make and break action, by leaving a line out position undesignated.

Scada

SCADA (SUPERVISORY CONTROL AND DATA ACQUISITION) is a system operating with coded signals over communication channels so as to provide control of remote equipment (using typically one communication channel per remote station). [6]The control system may be combined with a data acquisition system by adding the use of coded signals over communication channels to acquire information about the status of the remote equipment for display or for recording functions. It is a type of industrial control system (ICS). Industrial control systems are computer-based systems that monitor and control industrial processes that exist in the physical world.

Smps

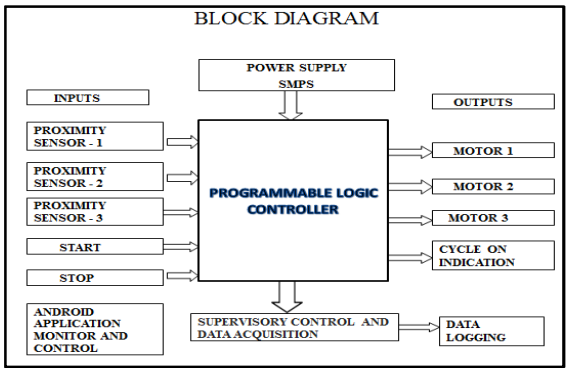
A switching regulator does the regulation in the switch mode power supply. A series switching element switches the current supply to a smoothing capacitor turn ON and OFF. The voltage on the smoothing capacitor controls the time when the series element is switched. The constant



switching of the capacitor keeps the voltage at the necessary level.

Fig 2 Circuit diagram of SMPS

Proposed System



Data Logging

Data logging is the collection and recording of information and data from around your production process. Data is usually collected automatically, but there may also be the need for manual input points where staff can input data or add relevant comments to explain the reason for downtime, faults, or change of operator. Within any production line there are large quantities of data that can be logged Logging data provides you with the necessary information to make educated and informed decisions in relation to improving the production process and efficiency. It enables user to pick up on areas of the production line or staff that are bottlenecks within the process. Having collected the relevant data, user can then implement changes to eliminate the bottlenecks as

well as having the option to set staff bonuses based on throughput and production speed.

Integrating The System

Conveyor1 runs only when sensor1 detects the object on conveyor 1. Once the object is shifted from conveyor 1 to conveyor'2' the corresponding sensor which is sensor2 detects the object on coveyor2 and enables the connveyor2 is driven by the motor. If the sensor does not objects are detect by either of the sensor 1 & 2. The conveyors 1 &2 are in rest position. Once the object from the conveyor 2 is shifted to the third conveyor the corresponding sensor '3' is connected to a counter, so once the counter count is set to the assigned count the third conveyor runs. The whole process is controlled using 'Delta Smart Viewer' mobile application. The mobile phone is interlinked with the PLC using the Ethernet cable. From the Ethernet cable the generated signal is communicated with a modem (Wi-Fi Module). Using the Wi-Fi the mobile phone is connected to the modem which is in interlink with the PLC, therefore using the mobile phone the process can be controlled and operated.

Thus the process can be controlled and operated using both SCADA and MOBILE APPLICATION (Delta Smart Viewer)

Conclusion

PLCs are well-adapted to a range of automation tasks. These are typically useful in industrial processes in manufacturing where the cost of developing and maintaining the automation system is high relative to the total cost of the automation.

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