

An Efficient Energy Saving System For Industry

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ABSTRACT- In industries where motor is connected by conveyor belt the light & fan are continuously on while operator is not there at work and it causes a huge energy loss while we considering as a whole industry. In this project by using IR sensors we can save the energy and we can control motor automatically by using PLC.

This project presents the control of elevator system using PLC. The system is programmed to drive a dc motor for forward and backward motoring mode with sensors at each floor, emergency STOP switch for maintenance purpose or to prevent any accident inside the lift & door switch for safety purpose. The system is also programmed to conserve energy by automatically switch off lights and fans of cabin when motor is in rest state for a specified duration of time. The software used in this elevator system. This system can be used for learning the control strategies involved in elevator systems for educational purpose.

KEYWORDS- PLC, Conveyor Belt, Light, Fan, IR Sensor, Geared motor.

1. INTRODUCTION-

Energy monitoring System is an energy efficiency technique based on the standard management axiom stating that “you cannot manage what you cannot measure”. Energy monitoring techniques provide energy managers with feedback on operating practices, results from energy management projects, and direction on the level of energy use that is expected in a definite period. Importantly, they also provide early warning of unpredicted excess consumption caused by equipment malfunctions, operator error, lack of effective maintenance and the like. The Energy monitoring System lies in determining the relationships of energy consumptions to related causes and the aim is to help business managers identify and explain excessive energy.

Become aware of instances when energy consumption is surprisingly higher or lower than would usually have been the case, Envision energy consumption trends (daily, weekly, seasonal, operational, Identifying future energy use and costs while planning changes in the business, Identify specific areas of wasted energy, Observe how it changes to relevant driving factors impact energy efficiency, Develop performance targets for EM programs, Manage energy consumption, rather than accept it as a permanent cost, The ultimate aim is to reduce energy costs through improved energy efficiency and energy management control. Another benefits generally include increased resource efficiency, improved production budgeting and reduction in greenhouse gas (GHG) emissions.

2. ENERGY STRUCTURE EVALUATION-

Energy monitoring system (EMS) is one of the emerging technologies that enable an industrial organization to collect real-time information on the energy use through assessing, monitoring, and visualizing energy consumption. This concept not only monitors energy consumption but also helps in making data driven decisions and enhances enterprise-level operation and financial decision. Monitoring information of energy use established for energy management and explains deviations from an established pattern. Its primary aim is to maintain said pattern, by providing all the necessary data on energy consumption, certain driving factors, as identified during preliminary investigation (production, weather, etc.) As shown in the figure 1, direct consumption, auxiliary consumption, and common consumption are independent parts of overall energy consumption. Reduction of any of these three types of consumption would reduce overall energy consumption.

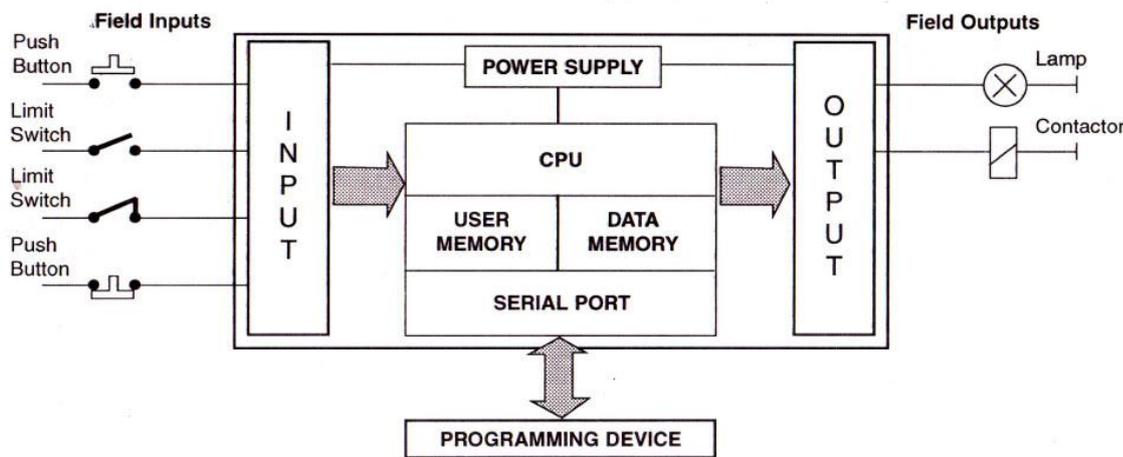
3. PLC-

Input modules, a Central Processing Unit (CPU), and output modules. The PLC accepts inputs from switches and sensors that measures or senses from the system. An input module accepts a variety of digital or analog signals from various field devices (sensors) and converts them into a logic signal that can be used by the CPU. The Central Processing Unit (CPU) evaluates, makes decisions and executes these signals based on a program instructions or logic sequence. Output module converts control instructions from the CPU into a digital or analog signal that can be used to control various field devices such as a machine or process

FEATURES OF PLC-

The main difference from other computers is that PLCs are armored for severe conditions (such as dust, moisture, heat, cold) and have the facility for extensive input/output (I/O) arrangements. These connect the PLC to sensors and actuators. PLCs read limit switches, analog process variables (such as temperature and pressure), and the positions of complex positioning systems. Some use machine vision. On the actuator side, PLCs operate electric motors, pneumatic or hydraulic cylinders, magnetic relays,

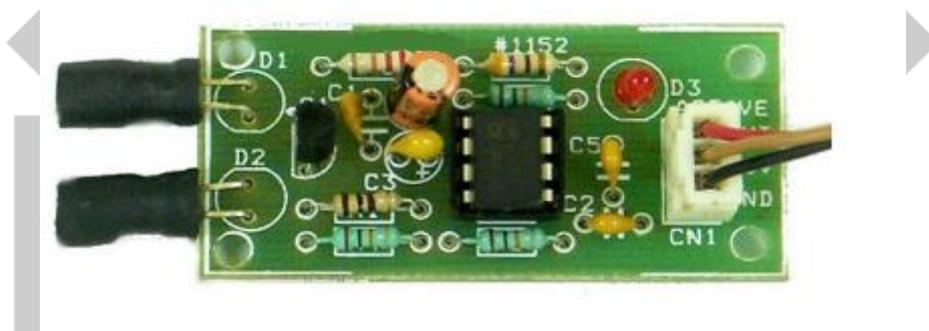
solenoids, or analog outputs. The input/output arrangements may be built into a simple PLC, or the PLC may have external I/O modules attached to a computer network that plugs into the PLC.



PROGRAMMING IN PLC-

Early PLCs, up to the mid-1980s, were programmed using proprietary programming panels or special-purpose programming terminals, which often had dedicated function keys representing the various logical elements of PLC programs. Programs were stored on cassette tape cartridges. Facilities for printing and documentation were very minimal due to lack of memory capacity. The very oldest PLCs used non-volatile magnetic core memory.

4. IR SENSOR-



Proximity Sensor are used to detect objects and obstacles in front of sensor. Sensor keeps transmitting modulated infrared light and when any object comes near, it is detected by the sensor by monitoring the reflected light from the object. It can be used in robots for obstacle avoidance, for automatic doors, for parking aid devices or for security alarm systems, or contact less tachometer by measuring RPM of rotation objects like fan blades, Digital low output on detecting objects in front.

Features-

Modulated IR transmitter, Ambient light protected IR receiver, 3 pin easy interface connectors, Bus powered module, Indicator LED, Up to 20cm range for white object, Can differentiate between dark and light colours, Active Low on object detection.

Applications-

Proximity Sensor, Obstacle Detector Sensor, Line Follower Sensor

5. DC GEARED MOTOR-



Geared DC motors can be defined as an extension of DC motor which already had its Insight details demystified here. A geared DC Motor has a gear assembly attached to the motor. The speed of motor is counted in terms of rotations of the shaft per minute and is termed as RPM. The gear assembly helps in increasing the torque and reducing the speed. Using the correct combination of gears in a gear motor, its speed can be reduced to any desirable figure. This concept where gears reduce the speed of the vehicle but increase its torque is known as gear reduction. This Insight will explore all the minor and major details that make the gear head and hence the working of geared DC motor.

6. WORKING OF PROJECT-

As we seen nowadays there is increase in per capita consumption of energy and hence energy conservation is important need therefore in our project we are saving energy using PLC. As we seen in industry there is requirement of lot of energy and to make the industry operation efficient we need to save energy effectively. In our project we used infra-red sensor for human detection, conveyor belt is connected to the geared motor and hence after operation of conveyor belt it should be turned off after some interval. In industry there is fan, light are also there and there are two relays used in our project. One is of 5 v which is used for IR sensor and one is of 24 v which is for PLC.

We done operation of relay by connecting contact on the 5 v relay and operation of PLC by connecting it to the 24 v relay. When IR sensor senses the current, relay turns on and 24 v goes to the PLC. We used one another relay board and from this that relay turns on and 12 v output is connected to it for the motor operation and in this way system is controlled by PLC and effective energy saving operation is done.

7. ADVANTAGES-

Replacing human operators in tedious tasks. Replacing humans in tasks that should be done in dangerous environments (i.e. fire, space, volcanoes, nuclear facilities, under the water, etc) Making tasks that are beyond the human capabilities such as handling too heavy loads, too large objects, too hot or too cold substances or the requirement to make things too fast or too slow. Economy improvement. Sometimes and some kinds of automation implies improves in economy of enterprises, society or most of humankind. For example, when an enterprise that has invested in automation technology recovers its investment; when a state or country increases its income due to automation like Germany or Japan in the 20th Century or when the humankind can use the internet which in turn use satellites and other automated engines.

8. DISADVANTAGES-

The main disadvantages of automation are: Technology limits. Current technology is unable to automate all the desired tasks. Unpredictable development costs. The research and development cost of automating a process is difficult to predict accurately beforehand. Since this cost can have a large impact on profitability, it's possible to finish automating a process only to discover that there's no economic advantage in doing so. Initial costs are relatively high. The automation of a new product required a huge initial investment in comparison with the unit cost of the product, although the cost of automation is spread in many product batches. The automation of a plant required a great initial investment too, although this cost is spread in the products to be produced.

9. CONCLUSION-

This project has a wide variety of applications in security access control systems. It enhances the productivity due to auto switching and also increases the speed of operation so no interruption will occur. Our project can replace the conventional systems of security access in the near future due to constant backup operation will streamlined. Our system will help the industries to automate their packaging and all the work related to conveyor without any fault.

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