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Energy Conservation and Industrial Safety

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Abstract- **In thermal power plant it's difficult to maintain the steam drum level continuously so to maintain the level motor has to run continuesly,if motor is run the power will be utilizing to maintain the drum level so motor to be run in auto mode based on the level its planned to execute the project for consumption of power by maintaining the drum level in real application will be maintained through pid[1] block using the plc[2] logic, for demonstration we are making use of small DC motor pump along with dc motor driver. In every industry silo bunker are used to store the raw material such as coal conveyed from the conveyor, silo is in cone shape bunker at bottom of it. Here for cleaning the wet sticky material which is struck on the walls and opening, workers are getting into it so, here care to be taken that no conveyor should not operate until the persons under Working by any means. so here we are going to demonstrate that using motion sensor and motor control unit going to turn off the motor according the motion detection and show that how the chances of risk can have avoided. The radioactive source such as x-rays and laser [3] are harmful to human beings and no one should exposed to it and nearby it, but for the measurement of quality of the steel strip this source are necessary, we here demonstrating that laser source will turn OFF when a worker is come in contact with source. This can be implement in real time application by using suitable motion detector and plc logic, for demonstration purpose we using pir[4]sensor and laser source**

Key words: [1] pid: proportional integral controller, [2] plc: programing logic controller, [3] laser: light amplification by simulated emission of radiation, [4] pir: passive infrared sensor.

1. INTRODUCTION

In our project we have two modules, namely energy conservation and industrial protection; these two play major role in any production industry where the management is concern about, now a day along with production. In thermal power plant it's difficult to maintain the steam drum level continuously so to maintain the level motor has to run continuesly, if motor is run the power will be utilizing to maintain the drum level so motor to be run in auto mode based on the level its planned to execute the project for consumption of power by maintaining the drum level in real application will be maintained through pid block using the plc logic.

Boiler is generates a steam by water
Steam will be fed to turbine for generation of power
It's tedious task to maintain the drum level
Drum level will be monitor by using
1. Controlling feed water flow
2. Monitoring the speed of Boiler feed pump motor
3. Controlling the process parameters

While monitoring the speed of Boiler feed pump motor, motor to be run continuously for full speed to maintain the drum level so planned to control the speed of motor according to drum level (as per process parameters value) so that reducing the motor power consumption. The second module of project is designed for the industrial safety.

Safety is the state of being "safe", the condition of being protected from harm or other non-desirable outcomes. Safety Can also refer to the control the recognized hazards in order to achieve an acceptable level of risk. For safety concerned this project has two modules, first one is known as "prevent the person from material falling hazard in silo" The silo maintenance, silo is a huge cone shape bunker used to store the raw material like coal, iron ore, here the persons are get in the silo for maintenance and cleaning purpose, whenever they are get into silo care should be taken that the material loading conveyor should not be operate by any means and here planned to install the PIR sensor for detection of persons. When someone enters in to the silo the PIR rays detects the motion detection and alarm will get generated, cutoff the power for the conveyor motor, until they came out from that location to avoid falling of material, on the workers. The second module is designed to avoid the persons from the radioactive source; the radioactive sources like X-rays, LASER are used to measure the quality of steel located at the end of every production line this rays are very harmful for human beings, here we are planned to switch off the radioactive source automatically. This will take place immediately after, if someone entered near radioactive affected area. The motion detection done by the pir sensor and source will turn off in auto.

II. PROPOSED METHOD

The first objective of the project is energy conservation, energy saving is also the main concern of management in order to save the energy consumption, this project is also providing energy saving technique for the to maintain the stem drum level, in present situation pump is driven by

induction motor which is operated whole day with full load speed, instead of running the motor at full load RPM, we planned to run the motor at specified speed based on the water level, for demonstration purpose we are implementing the PWM controller technique for the DC motor pump. In the proposed model the level of water in steam drum is feedback taken from the contact type level sensor and it's switched by means of relay by transistor. The feedback then forward to the ZCD, it triggers the motor at different pwm in an order to control the motor speed based on the input of level sensor.

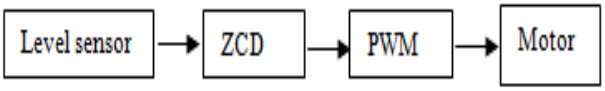

Fig1. Energy saving model for steam drum

The contact type level sensor is fixed at 3 different level of steam drum namely at 25%,50% ,75% and finally at 100%, The feedback is fed to PWM circuit through the ZCD,The model is designed such that at 25% of water level motor made to run at full rpm, at 50% of water level motor runs at 50% of its rated speed , at 75% of water level motor is made run at 25% of its rated speed, finally at 100% of level motor will be made to turn off. The second main objective this project is industrial safety, here we are implementing the two modules,

1. Prevent the person from material falling hazard in silo

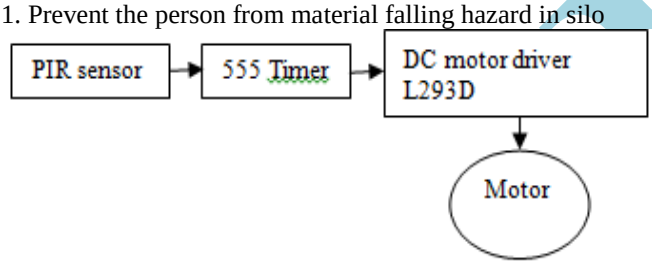

Fig2. Person protection from material falling hazard

Here the pir sensor is located at the bottom of silo in an order detect the motion of the worker, when pir output is high it trigger the 555 timer and output of the timer fed to the dc motor driver L293D where it stop the motor which is coupled to run the conveyor along with alarm will be generated.

2. Prevent the worker away from the radioactive source

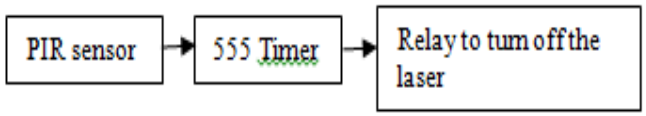

Fig3. Protect the person away from radioactive source

The pir as motion detection and when pir output is high its trigger the timer circuit to turn off the laser source by the relay driver circuit it consist of set of transistor operated as switch.

III. SYSTEM OVERVIEW

Figure.1 Energy saving model for drum level

For the water level dectection we are using contact type level detector which is gives the feedback of water level to zcd in an order to control the pwm their by controlling the Dc motor speed based on the level input.

Figure.2 Person protection from material falling hazard

The major components of this model is pir and motor driver circuit. The pir detects the motion of the worker inside the silo and give the output to 555 timer as astable multivibrator,the output of timer fed to the DC motor driver L293D to cutoff the motor power in an order to stop the conveyor

Fig3. Protect the person away from radioactive source

This circuit also contains the pir sensor for the motion detection, which output is fed to the relay circuit to turn off the radioactive source through timer

IV. SYSTEM SPECIFICATIONS.

L293D Motor driver

L293D is a typical Motor driver which allows DC motor to drive on both directions. Two DC motors can be simultaneously controlled in both directions using the L293D which is a 16-pin IC. Its working concept is based on H-bridge. H-bridge is a circuit that allows the voltage to be flown in both the direction.

NE555 IC

The 555 timer IC is an integrated circuit (chip) used in a variety of timer, pulse generation, and oscillator applications. The 555 can be used to provide time delays, as an oscillator, and as a flip-flop element. Derivatives provide two (556) or four (558) timing circuits in one package.

V. CONCLUSION

Energy saving is the main concern of management in order to save the energy consumption, this project is providing energy saving technique for the condenser pump in boiler In present scenario safety is an essential for every employee and the management also for the company reputation; here we take some example of hazardous location like silo maintenance and radioactive source where workers are directly involved, by implementing this in real time application for providing the safe environment with best safety practices.

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