

Coal Crushing and Conveyer System

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Abstract: The COAL CRUSHING AND CONVEYER SYSTEM will include the design and construction of a microcontroller based coal crushing and conveyer system with DTMF and GSM protocol. As the title itself suggests the proper use of this project is in any mining and cement industries. The project consists of a conveyer belt which helps us in getting the coal directly from the mining area towards the industry, as we all know mining areas are far from industrial plants. Thus here conveyer belt became a source to connect a link between mining area to the industrial plant. Here we are using two conveyer belts, one which delivers coal to another conveyer belt where it is filtered and filled in the container at an appropriate level, here LCD is used to display the no. of containers filled. Object detector is used to indicate object. PIR (Passive Infrared Rays) is an indicator to detect the presence of a person around the system and a motor drive circuit.

Keywords: coal crushing and conveyer system with DTMF and GSM protocol, Object detector, PI.

1. INTRODUCTION

The paper will include the design and construction of a microcontroller based coal crushing and conveyer system with DTMF (DUAL TONE MULTIPLE FREQUENCY) and GSM (GLOBAL SYSTEM MONITORING) protocol. The project consists of a conveyer belt which helps us in getting the coal directly from the mining area towards the industry. We have also used another conveyer belt for the crushed coal collection. This coal is transported up to the coal storage bunkers through conveyer belts. Coal is then transported to the Crush house by conveyer belts where it is crushed to small pieces and light dust is separated.

Crusher is used to reduce the size of a solid mix of raw materials so that pieces of different composition can be differentiated. Various types of crusher are available for crushing like jaw crusher, gyratory crusher, cone crusher, Impact crusher, Double roll crusher, pulverizers, ring granulators etc. The crushed coal is transported from crusher to thermal power plant through conveyer belt and is used in boiler. The type of conveyors used for transferring the coal are listed below (1) Belt conveyor (2) Screw conveyor (3) Bucket conveyor (4) Grab Bucket Conveyor (5) Skip Hoists (6) Flight Conveyors.

PIR (Passive Infrared Rays) is an indicator to detect the presence of a person and if any person is detected then by using controller the system stops working so that the chance of accident is reduced. If there is any problem in crusher or motor and if it's working is not proper then through the object sensor we can get the message by GSM that system is not working properly. In both the cases of above then indication is given by blowing buzzer.

In case if we are not able to go to that place then by using DTMF we can stop the system so that we can save power to waste. We have also used the sound controlling so by giving the instruction in audio system it works according to that.

In addition we have also used the object counter which counts the number of containers so we can know the amount of the coal crushed so the system will work automatically and man work can be reduced.

2. OBJECTIVE AND SCOPE

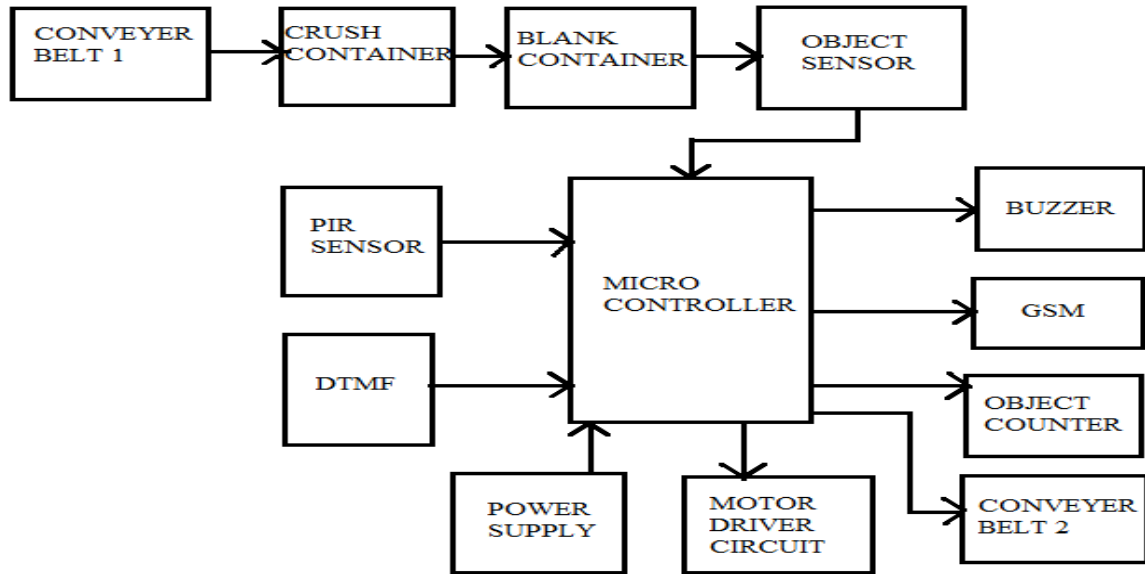
OBJECTIVE:

The main objective of our project is that we are using protocols such as DTMF and GSM which would help us to convey a message and a call, which help us to save power system. Besides that we are using PIR sensor to avoid accidents and buzzer to indicate that problem has occurred in the system.

SCOPE:

Design, Engineering, Manufacture, Supply, Delivery to site, Erection and Commissioning including Fire Protection System, Dust Control System, all Electrical, Instrumentation, Civil and Structural work and Modification work as needed.

3. BLOCK DIAGRAM



The **block diagram** show the design and construction of a microcontroller based coal crushing and conveyer system with DTMF and GSM protocol. As the title it suggests the proper use of this in any mining, cement industries, thermal power plant. The paper consist of a conveyer belt which help us in getting the coal directly from the mining area towards the industry, as we all know mining areas are far from industrial plant .Thus here conveyer belt became a source to connect a link between mining area to the industrial plant. Here we are using two conveyer belt, one which delivers coal to another conveyer belt where it is filtered and filled in the container at a appropriate level, here LCD is used to display the no. of containers filled. Object detector is used to indicate object PIR (Passive Infrared Rays) is an indicator to detect the presence of a person around the system and a motor drive circuit.

4. COMPONENTS

PIR SENSOR:

The objective of this project is to use inexpensive PIR sensor to detect if a human has moved. To build this project I use a PIC18F25K20 microcontroller to detect if the sensor had change state and it will emit a sound from the speaker or piezo, the MCU also detect the voltage of the battery in the startup, the algorithm it is very simple it use a interrupt on change to detect the change on the PIR sensor.

PIR sensors allow you to sense motion, almost always used to detect whether a human has moved in or out of the sensors range. They are small, inexpensive, low-power, easy to use and don't wear out. For that reason they are commonly found in appliances and gadgets used in homes or businesses.

PIRs are basically made of a pyro electric sensor, which can detect levels of infrared radiation. Everything emits some low level radiation, and the hotter something is, the more radiation is emitted. The sensor in a motion detector is actually split in two halves. The reason for that is that we are looking to detect motion (change) not average IR levels. The two halves are wired up so that they cancel each other out. If one half sees more or less IR radiation than the other, the output will swing high or low. When used as part of a burglar alarm, the electronics in the PIR typically control a small relay. This relay completes the circuit across a pair of electrical contacts connected to a detection input zone of the burglar alarm control panel. The system is usually designed such that if no motion is being detected, the relay contact is closed a 'normally closed' (NC) relay. If motion is detected, the relay opens, triggering the alarm.



BUZZER:

A buzzer elements piezo bender is an audio signaling device. They are known to be found in many devices that contain typical buzzers or beeps. These types of products include alarm devices, timers, mouse clicks, keystrokes, household appliances, etc. Buzzer elements piezo benders may also be used to detect vibrations. They are very reliable because of the few moving parts they contain and have the ability to produce either a single or multi-frequency output. Reliability is dependent upon operating requirements.



MICRO CONTROLLER:

In our project we are using Arduino micro controller.

It is controlling the components such as sensor, counter, buzzer, conveyer belt.



ARDUINO:

Arduino is a single-board microcontroller, intended to make building interactive objects or environments more accessible. The hardware consists of an open-source hardware board designed around an 8-bit Atmel AVR microcontroller, or a 32-bit Atmel ARM. Current models feature a USB interface, 6 analog input pins, as well as 14 digital I/O pins that accommodate various extension boards.



CRUSHER:

Crusher is used to reduce the size of a solid mix of raw materials so that pieces of different composition can be differentiated. Various types of crusher available for crushing like jaw crusher, gyratory crusher, cone crusher, Impact crusher, Double roll crusher, pulverizers, ring granulators etc.

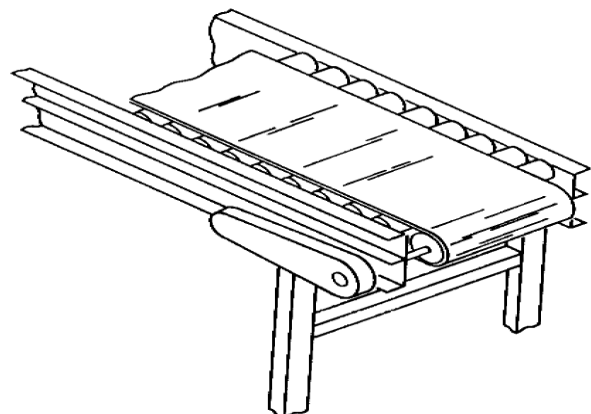


CONVEYOR:

This coal is transported up to the coal storage bunkers through conveyor belts. Coal is then transported to the Crush house by conveyor belts where it is crushed to small pieces and light dust is separated. The crushed coal is transported from crusher to thermal power plant through conveyor belt and is used in boiler. The following types conveyors used for transferring the coal are listed below (1) Belt conveyor (2) Screw conveyor (3) Bucket conveyor (4) Grab Bucket Conveyor (5) Skip Hoists (6) Flight Conveyor belt

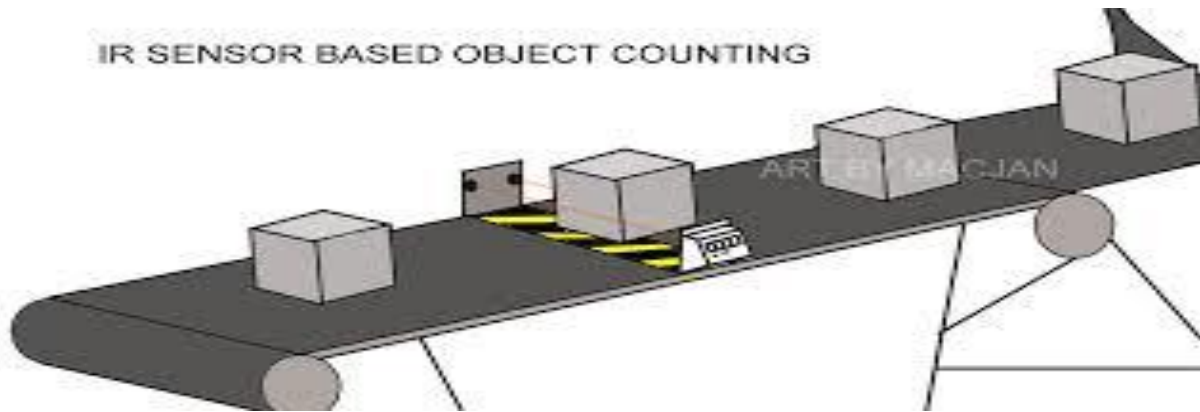
Conveyors are very suitable means of transporting large quantities of coal over large distances. Belt Conveyors consists of endless belt made of rubber, canvas or balata running over a pair of end drums or pulleys and supported by series of rollers (known as idlers) provided at regular intervals. The return idlers which support the empty belt are plain rollers and are space wide apart.

The initial cost of this coal carrying system is not high and power consumption is also low compared with another conveyors. The belt conveyors are successfully used on inclination up to 20° to the horizontal. The load carrying capacity of the belt conveyors may vary from 50 to 100 tonnes/hr and it can be easily transferred through 400 meters. It is not suitable for short distances and greater heights. It cannot be able to carry the coal at greater heights and inclination is limited to 20°.



OBJECT COUNTER:

Counter as the name suggest it counts the object. Object detector is used to indicate object. PIR (Passive Infrared Rays) is an indicator to detect the presence of a person around the system and a motor drive circuit. There are two pairs of sensors: one pair of sensors consists of transmitter and receiver, which are kept exactly opposite to each other across the edges of the belt. The transmitting part emits modulated IR light which is received at the receiver end and is then fed to the microcontroller of the 8051 family. When an object passes through the sensors, then the microcontroller gets an interrupt signal (from IR sensors), then an alarm is generated by the device.



5. MERITS, DEMERITS AND APPLICATION

MERITS:

- Reduce man power
- Efficiency increases
- Accident cases are reduces
- Produce more product in less time
- Simplified design and analysis
- Easy installation
- Cost effectiveness
- The dynamic behavior of system can be accurately calculated and predicted
- Conveyor system can safely move materials from one spot to another
- Instance automation Safe practice Flexibility

DEMERITS:

- Noise is more
- Maintenance is required
- Possibility of environment pollution
- If material is sticky then system can be difficult to operate
- Power consumption for operate system is more
- Particles may enter in environment which cause dusty atmosphere

APPLICATION:

- The project is used in Mining industries.
- Such as coal mining, gold mining, bauxite mining.

- It can also be used in Cement industry.
- Preparation of coal for gasification and liquefaction
- For prepare coal which is used in fired boiler In thermal power plant
- Conveyor system is used for moving materials from one location to another

6. FUTURE SCOPE

We can modify the system by operating the conveyer belt through GSM, which will move the conveyer belt forward and backward.

We can monitor the system through CCTV camera through which we can keep an eye on the operation that is going on.

7. CONCLUSION

By implementation of this project efficiency is increased. When the system stops working due to some error, the instructor gets information about that through GSM so that wastage of power is stop. The accident cases also reduce.

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