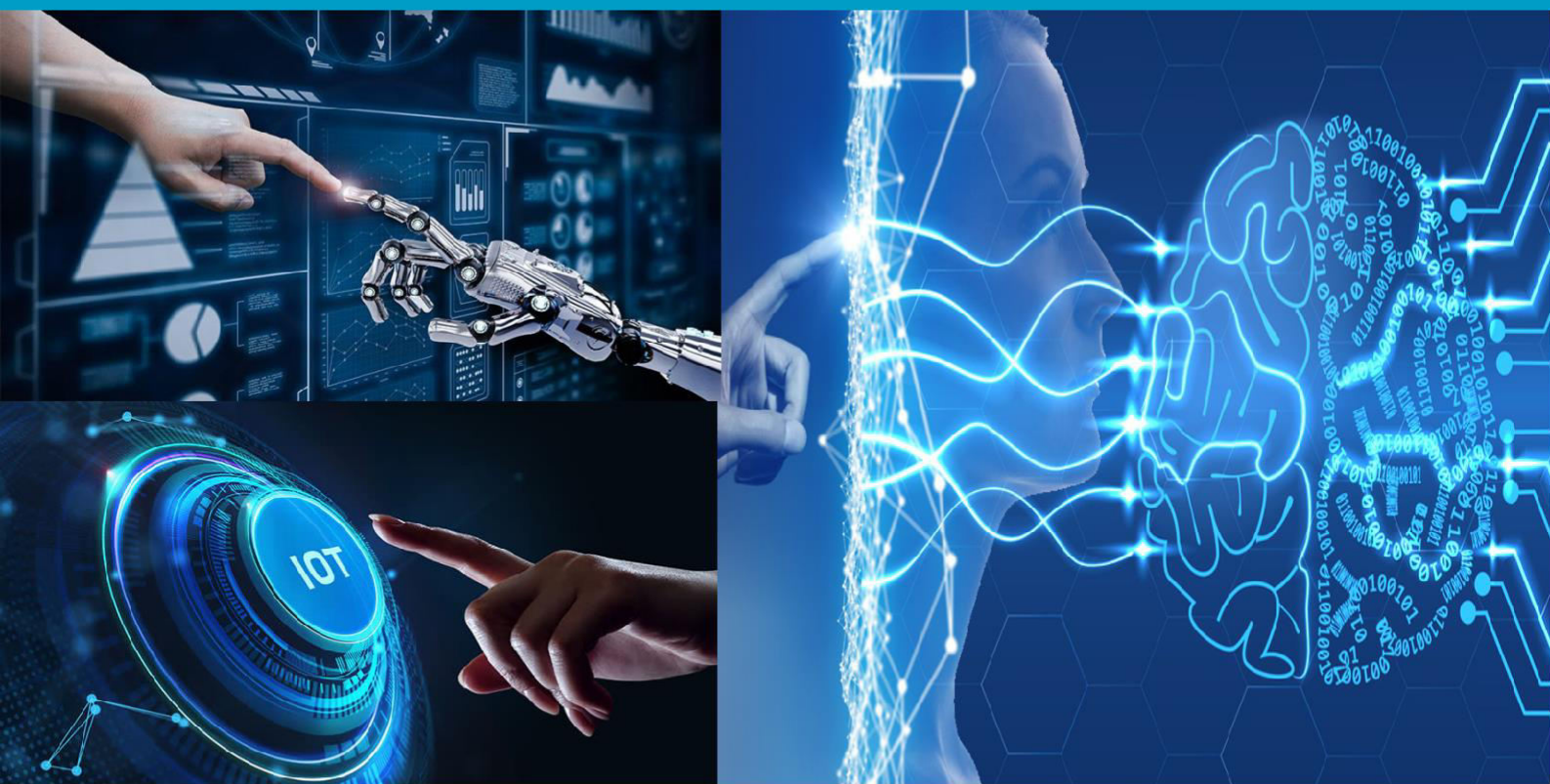




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Optimizing Conveyor System Reliability in Single Line Mining Operation

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ABSTRACT: The hundreds of machinery-related accidents occurring every year in the industry, incidents involving stationary machinery at surface continue to be among the most frequent in our country. National Institute for Occupational Safety and Health (NIOSH) researchers are developing an intelligent conveyor machine guard monitoring and proximity detection system designed to mitigate machine entanglement and maintenance-related injuries and fatalities prevalent in the mining industry. The proposed design to develop a continuous monitoring system consisting of metal sensor and magnetic switch sensors connected with the compact controller also wirelessly transmitting information about a belt conveyor's machine guard's status to the control room. The data transfer was wireless with IoT communication system and displayed on an IoT based cloud interface. The prototype model develops and installs a proof-of-concept wireless IoT solution to monitor machinery and conveyors during operation and maintenance time of work. The primary goals of the system were to provide real-time monitoring of access points and facilitate the planning and execution of safety procedures.

KEYWORDS: limit Switch, Magnetic Sensors, Motion Detection, and Buzzer.

I.INTRODUCTION

The main advantage of conveyor belts safety that system usually uses is that system can avoid material spillage to a considerable extent. This is noticeable when powdered materials like sand, cement, cement concrete, coal, etc. are transferred with their help. Other applications in food processing units, bottling plants, and wood log processing companies also make the study on economization of conveyor belt transfer as an important one. System is presenting a study of the development of a control method to control the movement and the stop of a continuously running conveyor belt safety. Different types of conveyor belt safety systems implemented in the industries. Simple electronics devices are used in this study. A control strategy is for sensing the motion and presence of conveyor guard. Conveyor safety systems have become an inevitable part in an automated industry or firm. Conveyor safety systems find their majority applications in manufacturing industries, transportation sector, workshops, warehouses and many other similar firms, where transportation of bulk quantities is necessary.

A belt conveyor guard safety system is one of the conveyor systems implemented today. Belt conveyor safety is the most used powered conveyors since they are highly versatile and less expensive. Conveyor belt, guard, pulleys and electric motors constitute the important parts of a conveyor system. Belt conveyor safety systems are necessary in industries which carry out the activities like coal processing, transportation of agricultural products, chemical segregation, powdering applications etc. Throughout the usage, conveyor belt systems have always been a part of the modernizing cycle to fulfil the endlessly growing interest in the 3 higher rate of transporting goods. The transporting rate is influenced by factors such as the level of automatization and reliability of the system. With the introduction of computerized technologies and programming languages during the third industrial revolution, conveyor belt systems were able to keep up with the demand. The introduced technologies were able to automate the transportation process and drastically decrease human involvement in the process

II.EXISTING SYSTEM

The system, which was developed on Level V Object, provides the user with a list of conveyor solutions for their material handling needs along with a list of suppliers for the suggested conveyor devices. Conveyor types are selected on the basis of a suitability score, which is a measure of the fulfilment of the material handling requirements by the characteristics of the conveyor. The computation of the score is performed through the Weighted Evaluation Method, and the Expected Value Criterion for decision making under risk. The prototype system was successfully validated through two industrial case studies. An existing linear viscoelastic model consisting of a three parameter Maxwell model combined with a Winkler foundation that is used to determine the rolling friction due to hysteresis in a conventional conveyor with a flat belt. Adaptations are introduced to incorporate a curved belt surface and to analyze the relationship between traction and slip. Attention is also paid to matching the model parameters to the viscoelastic properties of an actual rubber sample and subsequently the usefulness of more complex Maxwell models regarding rolling friction and traction is investigated.

III.PROPOSED SYSTEM

Conveyor guard safety is basically very wide attached in a loop to two or more turning rotors driven by motors. The loop is the actual conveyor belt, and is generally made of two or more layers of rubber, one layer to give shape and structure to the belt and one to allow it to transport its load safely. This conveyor loop is generally attached to two wheels, called rotors, which are spun by motors. The conveyor belt has enough friction between it and the rotor that it sticks to this rotor. Since safety is everyone's responsibility, it is essential to protect people while keeping production imperatives in mind. Heavy and corroded steel or plastic guards panels, although safe, may lead to operational problems and even certain hazards that could cause injuries. The proposed safety net solution will keep your staff safe, while facilitating maintenance. In this project we measure the safety protection by using the sensors, microcontrollers and notification alert. The figure 2 show the block diagram of proposed conveyor safety guard system.

BLOCK DIAGRAM OF PROPOSED SYSTEM

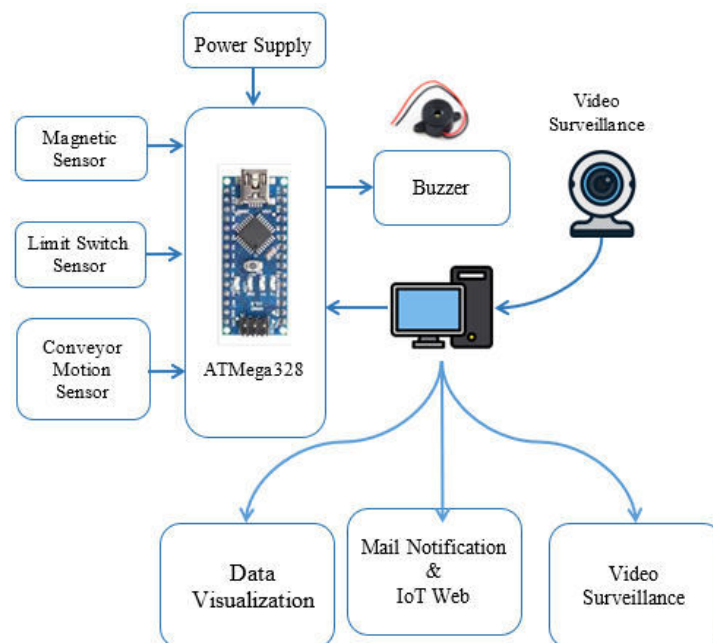


Figure.1. Block Diagram of Proposed System

The System is design by using Arduino, Motion Sensor, IR Sensor and its interface wires. Dynamic model of the conveyor system on longitudinal motion is established by finite elemental method and output data is visualize so that accurate design techniques may be used to Stability and Safety Security of the conveyor belt during emergency and safety control. Conveyor belts are basically very wide belts attached in a loop to two or more turning rotors driven by motors. The loop is the actual conveyor belt, and is generally made of two or more layers of sensor, one layer to give

shape and structure to the belt and another sensor layer to allow it to transport its load safely and operative person safely.

Magnetic Sensor

MC-38 Wired Door Window Sensor Magnetic Switch Home Alarm System can be used as a door or window security system. It produces the signal when moved away from each other which can be fed to the microcontroller to perform the desired action as per requirement.



Figure.2. Magnetic Sensor

Limit Switch:



Figure.3. Limit Switch

In electrical engineering, a limit switch is a switch operated by the motion of a machine part or the presence of an object. A limit switch can be used for controlling machinery as part of a control system, as a safety interlock, or as a counter enumerating objects passing a point. They can determine the presence, passing, positioning, and end of travel of an object. They were first used to define the limit of travel of an object, hence the name "limit switch".

Motion IR Sensor

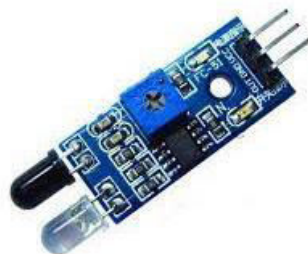


Figure.4. Motion IR Sensor

An infrared sensor (IR sensor) is an electronic sensor that measures infrared (IR) light radiating from objects in its field of view. They are most often used in PIR-based motion detectors. PIR sensors are commonly used in security alarms and automatic lighting applications.

IV.HARDWARE RESULTS

The ultrasonic sensor is used to detect the animal movement in agriculture field shown in the figure 5. After getting that initial input signal, it will be given to the microcontroller for further processing, it will on the APR board, and the sound is being played to divert the animal, at the same time it makes a call to the owner. Therefore, ultrasonic sensor detects the presence of birds in all direction. If the ultrasonic sensor is detected, it sends the signal to the controller. Microcontroller block is used for reading the inputs from ultrasonic sensor shown in the figure 5. Whole process is controlled by microcontroller. The GSM module is used for making call to farmer when movement is detected. It alerts the farmer that some animals or birds try to enter into the farm. This proposed smart crop protection system from animals using Arduino Uno.

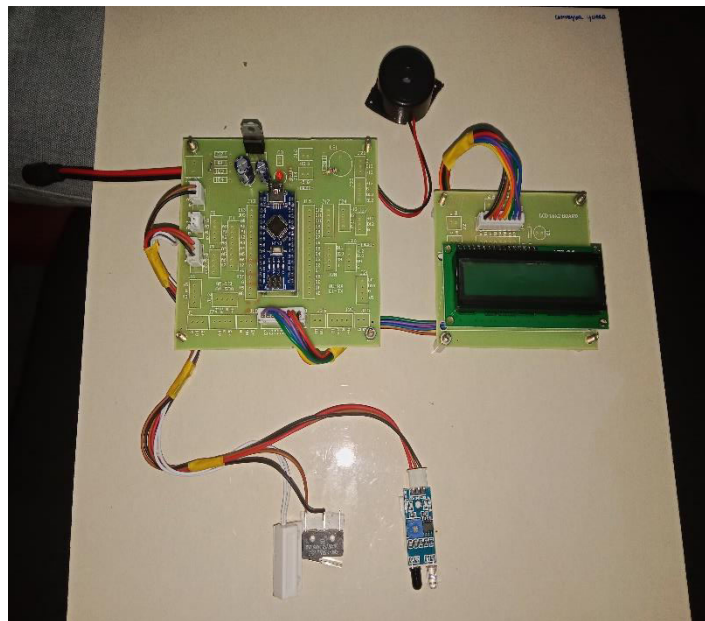


Figure.5.Hardware Results

Once the animal or bird is detected, the speaker will be on and the recorded sound is played for 20 seconds and GSM module makes a call to the farmer shown in the figure 5. Along with the call, repellent system of irritating loud noise like cracker sound is used simultaneously with interval of 4 seconds is used upon the animal. This system works continuously for better effectiveness for protecting the crops from animals.

V.CONCLUSION

The system is designed to identify the safety guard automatically in the conveyor belt is open or closed while the conveyor belt is on or off condition. The Conveyor belt safety guard system is used for industrial area, bottling plants, mining industries, railway stations, airport etc. for various purposes. This system is designed such a way it can detect and also resolve industrial safety in a belt guard without manual efforts and time delay. This system calculates the conveyor movement and guard position of conveyor belt using IR, Magnetic and Limit Switch sensors. If the conveyor belt is having any kind of safety issues will find then automatically the IoT based email notification is send to the admin or supervisor of system, so that they can take corrective actions.

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