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Automatic Conveyor for Industrial Automation

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ABSTRACT: The main aim of this project is to maintain the conveyor automatically by sensing the objects placed in the conveyor and to control the speed of the motor with the help of RPM Sensor. Automated conveyor systems can be used in a number of different industries for the safe transportation of materials because of the fact that they minimize manual labour and at the same time improve efficiency. Automated conveyor systems are quite easy to install in a warehouse and are also much simpler to operate than a forklift and other similar material handling equipment. Automated conveyor systems can also be used to move and transport all kinds of loads no matter the weight, size and shape. Automated conveyor systems such as belt conveyors can be operated with the least amount of supervision during all shifts, holidays and weekends.

KEYWORDS: Material Handling, Industrial Automation, Automated Belt Conveyor

I. INTRODUCTION

This proposed system is a microcontroller based smart Automatic Belt Conveyor. This Automatic Conveyor for Industrial Automation has RFID reader and tag. They will detect the objects and send the signal to the motor driving circuit to turn on or off the motor. It also has RPM control circuit. This will control the speed of the motor driving the conveyor. The conveyor will move only if the RFID reader detects and reads the passive UHF RFID tag attached with each item which comes on the conveyor belt and simultaneously the speed of the conveyor belt is also altered by the RPM sensor according to the weight and size of the item which comes on the conveyor.

II. PROBLEM STATEMENT

As almost all the industries use some or the other types of conveyor for the transportation of materials in their units, it is clear that they are an important part of all the industries. But always these conveyors require labour for handling them. Also, as there will be need of transporting materials at regular intervals, those conveyors are mostly in ON condition throughout the day. Any equipment operated by human cannot be without any human error. So, in this way if we automate the conveyor and make it activate only if the materials come over the conveyor, we can save a large amount of power and also the need for the labour to operate the conveyor is eliminated. The human error while operating the conveyors can also be eliminated as the labour is not needed for operating conveyors. The speed of the conveyor cannot be controlled in conventional conveyors. But here as we use RPM sensor, we can always maintain a stable speed even if the weight of material is more.

III. SURVEY

Material Handling involves the movement of materials from one place to another for the purpose of processing or storing. According to American Material Handling society, 'Material Handling is an art and science of involving the movement, packing and storing of subsystems in any form. Thus, material handling function includes all types of movements vertical, horizontal or combination of both and of all types of material fluid, semi fluid and discrete items and of movements required for packing and storing. The material handling function is considered as one of the most important activities of the production function as out of total time spent by the materials inside the plant area, about



20% of the time is utilized for actual processing on them while remaining 80 % of the time is spent in moving from one place to another, waiting for processing or finding place in sub-stores. Moreover about 20 % of the total production cost is traceable as material handling cost. Mr. Nasif Hassan Khan Presented paper on “Fabrication of a Conveyor Belt with Object Sorting and Counting Facility” includes factors and basic component used in conveyor system. In this paper we studied about how to use factor and basic component in a conveyor system and avoid accident and defective parts by using control system. In this paper they include design of mechanical and electrical component and program related to control system.

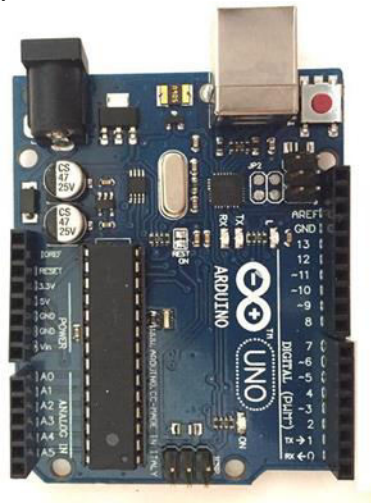
IV. HARDWARE COMPONENTS

The following are the hardware components used.

1. ARDUINO - UNO
2. RFID Tag
3. RFID Reader

V. ARDUINO - UNO

Arduino Uno is a microcontroller board, which is completely based on an 8-bit ATmega328P microcontroller. Along with ATmega328P, it consists of some other components to support the microcontroller such as crystal oscillator, serial communication, voltage regulator, and so on. The board has 14 digital input/output pins (out of which six of them can be used as PWM outputs), six as analog input pins, a USB connection, A Power barrel jack, a reset button and an ICSP



header.

Fig 1: ARDUINO model

VI. RFID TAG (UHF---ULTRA-HIGH FREQUENCY PASSIVE RFID TAG)

In this project we are using ultra-high frequency passive type of RFID tag. The RFID tag is a kind of sticker this will be pasted on all the objects coming over the conveyor belt. This RFID tag will be sensed by RFID reader.

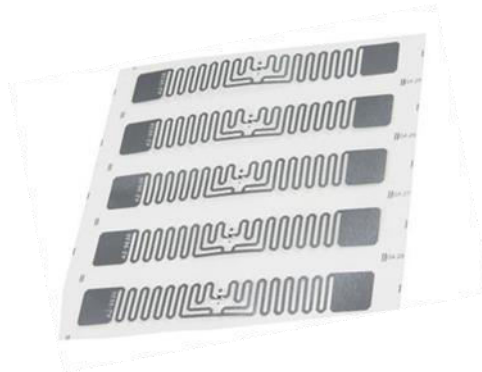


Fig 2: Passive UHF RFID Tag

VI. RFID READER (PASSIVE UHF RFID READER)

The purpose of the RFID reader is to deduct the RFID tag which is pasted on the object. Until the RFID reader senses the RFID tag the conveyor belt will not move. Only if it senses the tag, then the reader will pass the information to the Arduino and then this Arduino makes the conveyor to move



Fig 3: Passive UHF RFID Reader

VII. RPM SENSOR





Rpm sensor will be fixed in the shaft of the motor. If load which is coming on the conveyor belt is increased the speed of the motor will get reduced because of the weight, and hence the speed of process will be affected. So in this case to maintain the optimum speed we are using the RPM sensor. This sensor will deduct the speed of the motor and sends the information to microcontroller.

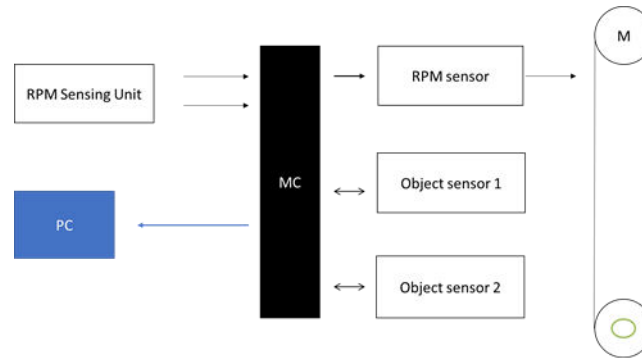


Fig 4: Block Diagram

The block diagram shows the overall working of the system. The conveyor belt is driven by the motor and the power supply is given to the motor. RFID reader and tag they will detect the objects and send the signal to the motor driving circuit to turn on or off the motor. RPM control circuit will control the speed of the motor driving the conveyor. The conveyor will move only if the RFID reader detects and reads the passive UHF RFID tag attached with each item which comes on the conveyor belt and simultaneously the speed of the conveyor belt is also altered by the RPM sensor according to the weight and size of the item which comes on the conveyor.

VIII. OBJECTIVE OF AUTOMATED CONVEYOR SYSTEMS

1. To increasing in productivity.
2. To reduce human efforts
3. To reduce accident with the help of sensor and monitoring.
4. To reduce time of material handling.
5. To minimize cost of material handling.
6. Minimize delays and interruptions by making available the materials at the point of use at right quantity at the right time.

Prevention of damage to materials.

IX. CONCLUSION

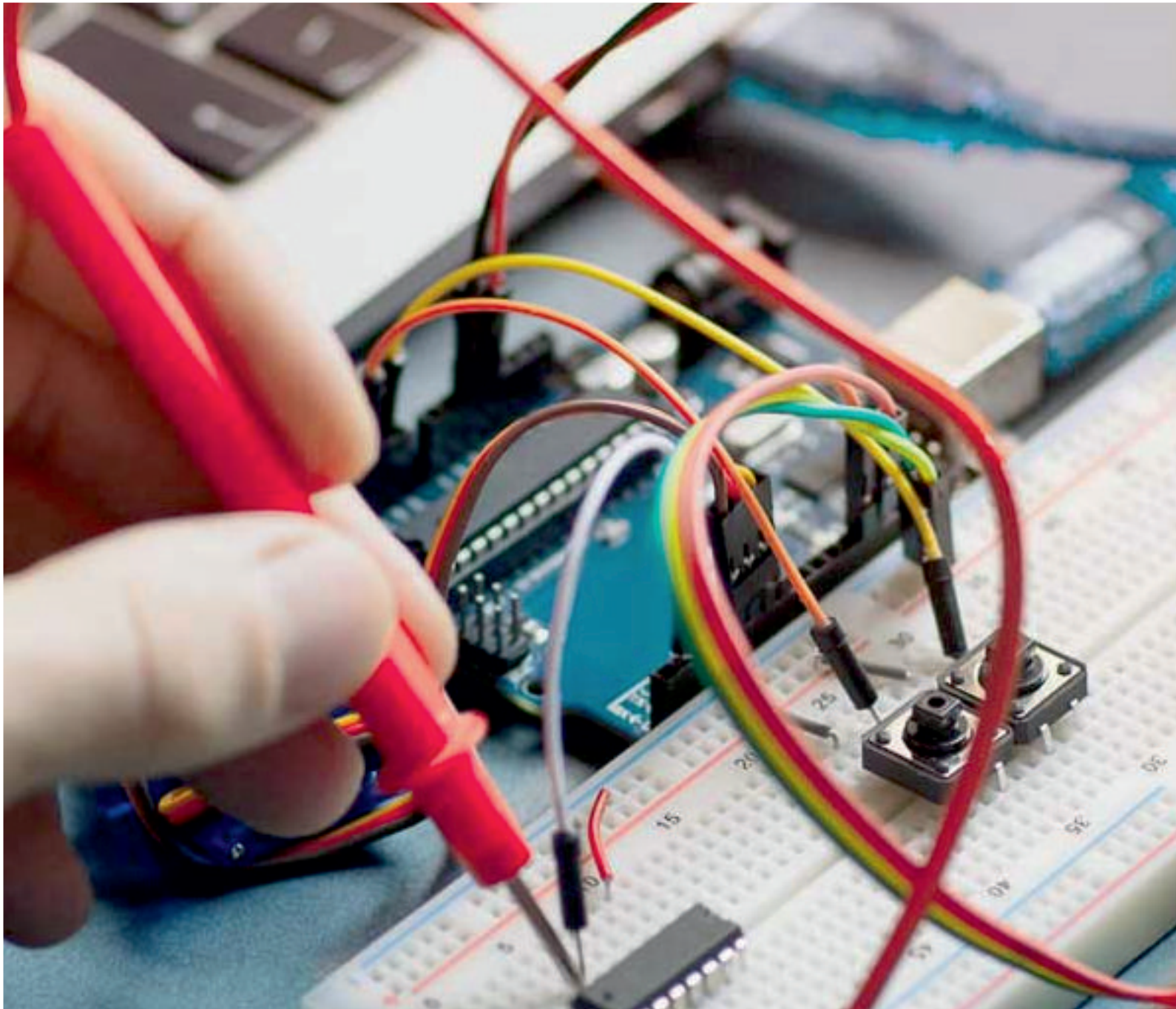




We studied the working of Automatic Conveyor Systems and about different type of conveyors and their configuration. Thus, Automatic Conveyor System use for material handling to improves the speed of material handling. Also, this system reduces the human effort. This system is beneficial and safety for the material handling.

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