

# Design and Fabrication of 360° Rotating Automatic Conveyor Belt with Up Down Motion

S. Suresh balaji\*<sup>1</sup> R.Vignesh\*<sup>2</sup>. S. Dinesh kumaR\*<sup>3</sup>, S.Vinoth Kumar\*<sup>4</sup>.

1. Assistant Professor, 2,3 & 4 UG student, Knowledge Institute of Technology.

**Abstract** -Now in industries only fixed type conveyor belts are available. But a prototype model of a 360 degree rotating conveyor belt with up and down motion mechanism is designed. Existing conveyor belts are manually turned ON and OFF , but our conveyor belt has an advantage of automatic ON and OFF mechanism with presence and absence of objects over the belt.This conveyor belt is also equipped with an infrared sensor to sense the number of objects passing in the conveyor belt and the count is displayed in a 7 segment display. The present work deals with the new trend in the field of belt conveyor system. This conveyor belt does not require frequent lubrication.The present work deals with the new trend in the field of belt conveyor system. A 360° rotating belt conveyor system has been designed for prototype operation and the details of the design, fabrication, modeling and economics of the rotating belt conveyor system is presented in this work.

**Key words :** Infrared sensor, belt, 7 segment display, lubrication.

The Arduino Uno is a microcontroller board based on the ATmega328 (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button.

A conveyor belt is the carrying medium of a belt conveyor system. A belt conveyor system consists of two or more pulleys (sometimes referred to as drums), with an endless loop of carrying medium the conveyor belt that rotates about them. One or both of the pulleys are powered, moving the belt and the material on the belt forward. The powered pulley is called the drive pulley while the unpowered pulley is called the idler pulley. There are two main industrial classes of belt conveyors; Those in general material handling such as those moving boxes along inside a factory and bulk material handling such as those used to transport large volumes of resources and agricultural materials such as grain,salt,coal,ore and more

## I. INTRODUCTION

Now in industries only manually operated belt conveyors are available. But a prototype model of a 360° rotating Automatic belt conveyor belt with up-down mechanism is designed

## II.MODELLING AND ASSEMBLY OF 360° ROTATING AUTOMATIC CONVEYOR BELT WITH UP DOWN MOTION

PTC Creo formerly known as PRO/ENGINEER is a parametric integrates 3D CAD/CAM/CAE solution created by Parametric Technology Corporation (PTC). It is the world's leading CAD/CAM /CAE software, gives a broad range of integrated solutions to cover all aspects of product design and manufacturing. It was the first to market with parametric, feature-based, associative solid modeling software. The application runs on Microsoft windows platform, and provides solid modeling, assembly modeling and drafting, finite element analysis, direct and parametric modeling, NC and tooling functionality for mechanical engineers

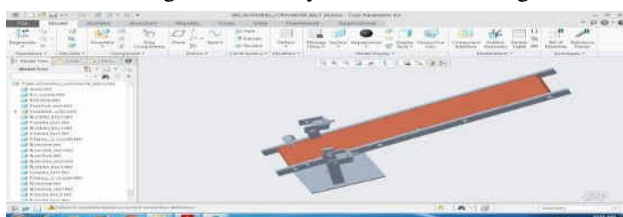


FIG. 1 CONVEYOR BELT

## IV.FABRICATION OF MODEL

In this experiment initially a base plate was arranged. To turn the conveyor belt in 360 degrees rotation a vertical motor is arranged. The Up Down mechanism of conveyor belt would be done with the help of Power Screw Mechanism. This mechanism converts Rotary motion to linear motion.

## V. WORKING OF MODEL

Belt conveyor systems consist of two or more pulleys (a.k.a. drums). An endless loop of carrying medium the conveyor belt rotates about them. To move the belt and the material it carries forward, one or both pulleys are powered. The powered pulley is called "drive pulley," the unpowered one is known as "idler pulley."The circuits are connected in a proper manner

**A. LINEAR ACTUATORS:** A linear actuator is an actuator that creates motion in a straight line, in contrast to the circular

motion of a conventional electric motor. Linear actuators are used in machine tools and industrial machinery, in computer peripherals such as disk drives and printers, in valves and dampers, and in many other places where linear motion is required. Hydraulic or pneumatic cylinders inherently produce linear motion. Many other mechanisms are used to generate linear motion from a rotating motor.



FIG2: LINEAR ACTUATOR

**B. CONVEYOR MECHANISM :**

Belt conveyor systems consist of two or more pulleys (a.k.a. drums). An endless loop of carrying medium the conveyor belt rotates about them. To move the belt and the material it carries forward, one or both pulleys are powered. The powered pulley is called “drive pulley,” the unpowered one is known as “idler pulley.” Belt conveyors in general material handling such as those moving boxes along inside a facility form a different class of belt conveyors from those that are used to transport large volumes of resources and agricultural materials.

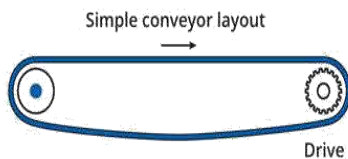


FIG3: CONVEYOR MECHANISM

**C.WORKING OF ULTRASONIC SENSOR :** Ultrasonic sensors emit short, high-frequency sound pulses at regular intervals. These propagate in the air at the velocity of sound. If they strike an object, then they are reflected back as echo signals to the sensor, which itself computes the distance to the target based on the time-span between emitting the signal and receiving the echo

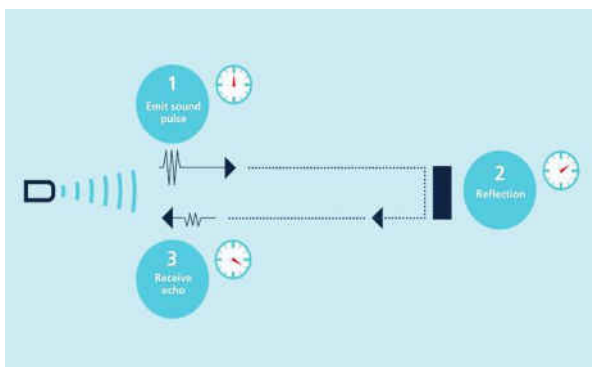


FIG.4: WORKING OF ULTRASONIC SENSOR

As the distance to an object is determined by measuring the time of flight and not by the intensity of the sound, ultrasonic

sensors are excellent at suppressing background interference. Virtually all materials which reflect sound can be detected, regardless of their color. Even transparent materials or thin foils represent no problem for an ultrasonic sensor. Ultrasonic sensors are suitable for target distances from 20 mm to 10 m and as they measure the time of flight they can ascertain a measurement with pinpoint accuracy. Some of our sensors can even resolve the signal to an accuracy of 0.025 mm. Ultrasonic sensors can see through dust-laden air and ink mists. Even thin deposits on the sensor membrane do not impair its function.

$$\text{DISTANCE} = \text{SPEED} \times \text{TIME}$$

Now using the above formula the distance is calculated and if the distance is less than 18cm the conveyor is operated else

**D.WORKING OF INFRARED SENSOR :**

IR Sensors work by using a specific light sensor to detect a select light wavelength in the Infra-Red (IR) spectrum. By using an LED which produces light at the same wavelength as what the sensor is looking for, you can look at the intensity of the received light. When an object is close to the sensor, the light from the LED bounces off the object and into the light sensor. This results in a large jump in the intensity, which we already know can be detected using a threshold.

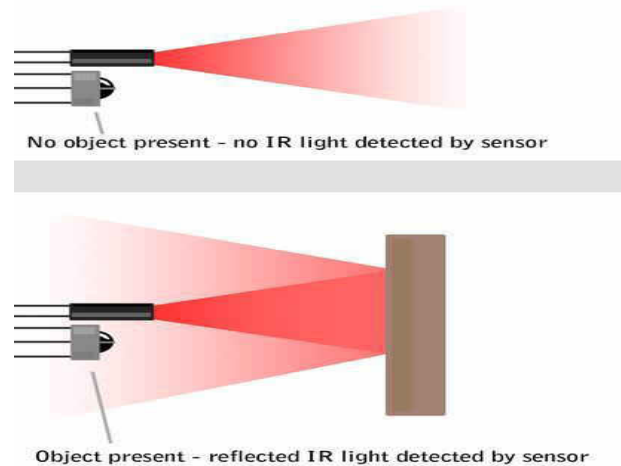


FIG.NO:6 WORKING OF INFRARED SENSOR

When an object passes over the conveyor belt the IR light is reflected and detected by the sensor and it is counted as One

**E.WORKING OF 7 SEGMENT DISPLAY :**

A seven-segment display (SSD), or seven-segment indicator, is a form of electronic display device for displaying decimal numerals that is an alternative to the more complex dot matrix displays. The displays common pin is generally used to identify which type of 7-segment display it is. As each LED has two connecting pins, one called the “Anode” and the other called the “Cathode”, there are therefore two types of LED 7-segment display called: Common Cathode (CC) and Common Anode (CA).

**COMMON ANODE 7-SEGMENT DISPLAY**

In general, common anode displays are more popular as many logic circuits can sink more current than they can source. Also note that a common cathode display is not a direct replacement in a circuit for a common anode display and vice versa, as it is the same as connecting the LEDs in reverse, and hence light emission will not take place.

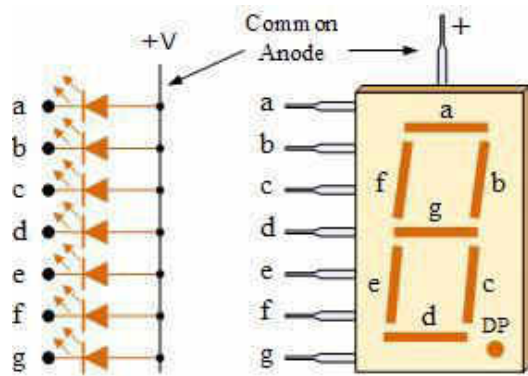


FIG 6 COMMON ANODE SEVEN SEGMENT DISPLAY

Depending upon the decimal digit to be displayed, the particular set of LEDs is forward biased. For instance, to display the numerical digit 0, we will need to light up six of the LED segments corresponding to a, b, c, d, e and f.

PHOTO OF THE FABRICATED MODEL



## CONCLUSION

Any machine must be inexpensive and easy to build if it is to be accepted by the society. This need is recognized and a "360° rotating conveyor belt with up-down mechanism" is designed for Prototype model. This machine will only contain parts that are readily available and in use regularly. This eliminates the need to order or import components just for conveying the product. Thus a "360° rotating automatic conveyor belt with up-down motion" is designed and prototype model is fabricated using D.C motors, batteries sensors and remaining parts with in low cost.

## REFERENCES

- [1] MeshramPradnyaratna A, Dr. SahuA R, "Design, Modelling and Analysis of conveyor system used for transportation of Cartons", International Journal of Research in Advent Technology, Vol.4, No.1, E-ISSN: 2321-9637. January 2016.
- [2] Aniket. A. Jagtap et al "Design of Material Handling Equipment: Belt Conveyor System for Crushed Biomass Wood Using V Merge Conveying System" Ijmerr Vol. 4, No. 2, Issn 2278 – 0149, April 2015.
- [3] Mr. Rajratna A. Bhalerao1, Dr. R.J. Patil2 "Transient And Mode Shape Analysis Of Gravity Roller Conveyor For Weight Reduction" Ijiset - International Journal Of Innovative Science, Engineering & Technology, Vol. 1 Issue 5, July 2014. Issn 2348 – 7968.

Pawer Jyotsna, 2d.D.Date, 3pratik Satav"Design And Optimization Of Roller In Belt Conveyor System For Weight Reduction" Irf International Conference, 01st June-2014, Pune, India, Isbn: 978-93-84209-23-0

G.Velmurugan, Dr.E.Palaniswamy, M.Sambathkumar "Conveyor Belt Troubles (Bulk Material Handling)" International Journal of Emerging Engineering Research and technology, Volume 2, Issue 3, PP 21-30, June 2014

D. Nannaware D.K. and Kharde R.R, "Design and Optimization of Roller Conveyor System", International Journal of Scientific & Engineering Research, July2014, Volume 5, Issue 7, pp. 1254-1258.