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Conveyor Belts

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Abstract:- The main feature of this project is focused on the canned food process, since irregularities have mainly been detected in the food industries, such as the position of the label and in cases it is not placed, causing delays and downtime in the process.

In order to provide a solution to this problem, sensors were installed on a conveyor belt to identify and classify poorly labelled products, as well as an LCD screen that allowed the collection of information from poor quality products. Also the conveyor belt meets the function of product transfer, in order to improve the manufacturing time and selection of quality products.

Keywords:- *food, process, manufacturing, time.*

I. INTRODUCTION

Conveyor belts have been used for decades for the transportation of goods and have proven their value in the industrial world, as conveyor belts can be adapted to almost any local condition. The demand for the use of conveyor belt technology has increased more than ever, which has led to the acceleration of its development to implement new regulations, especially with regard to its impact on product transfer.

For the manufacture of canned food, they have production lines for the food manufacturing process that form different workstations, in the area of labelling of cans problems were found of bad labelling, the main objective of the conveyor belt design is to detect product labelling by colour and proximity sensors and thus to provide a quality assessment, at the same time separate the mislabeled product and take it to another station for label correction.

II. MATERIALS AND METHODS

A. Parts Constituting a Conveyor Belt

Conveyor belts are basically formed by a flexible closed belt moving on free-rotation rollers, a drive drum which is responsible for transmitting movement to the belt, an engine and a motorcycle-reducer that are responsible for generating and defining the movement and speed, these and other components are housed on a metal structure called frame that provides support and cohesion as shown in figure 1 (Valbuena, 2011).

The flow diagram is the structure of the conveyor belt operation starting with the ignition of the components. (FIG.1)

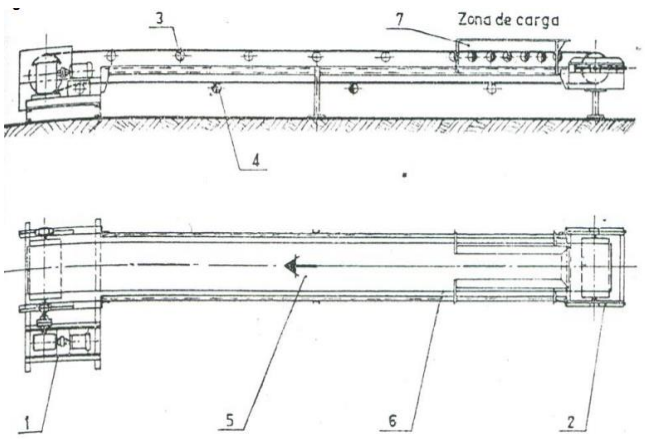

Fig. 1 Constitution of an elementary belt.

1 Driving head.
2 Assembly head and tensioner
3 Upper rollers (load stations)
4 Lower rollers (return stations)
5 Belt.
6 Frame.

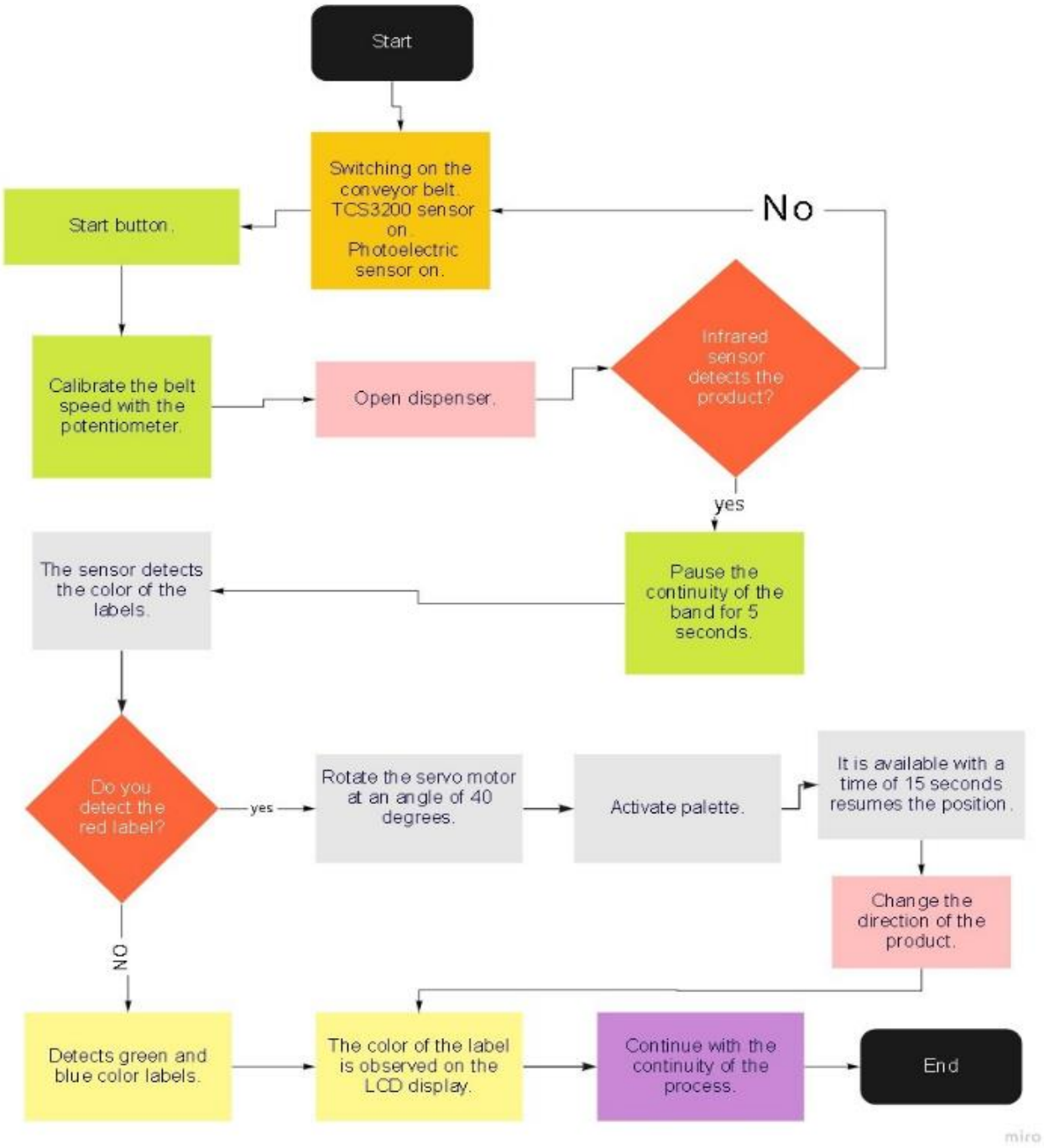

FIG.1 Flowchart

The conveyor belt manufactured in 3D printing (SolidWork) in plastic type PLA, has tension system for a correct performance of the system, should not be exposed for extended times to temperatures greater than 60° C.(FIG.2)
Total height is 80 mm.

It is 54 cm long.

Bandwidth is 60 mm.

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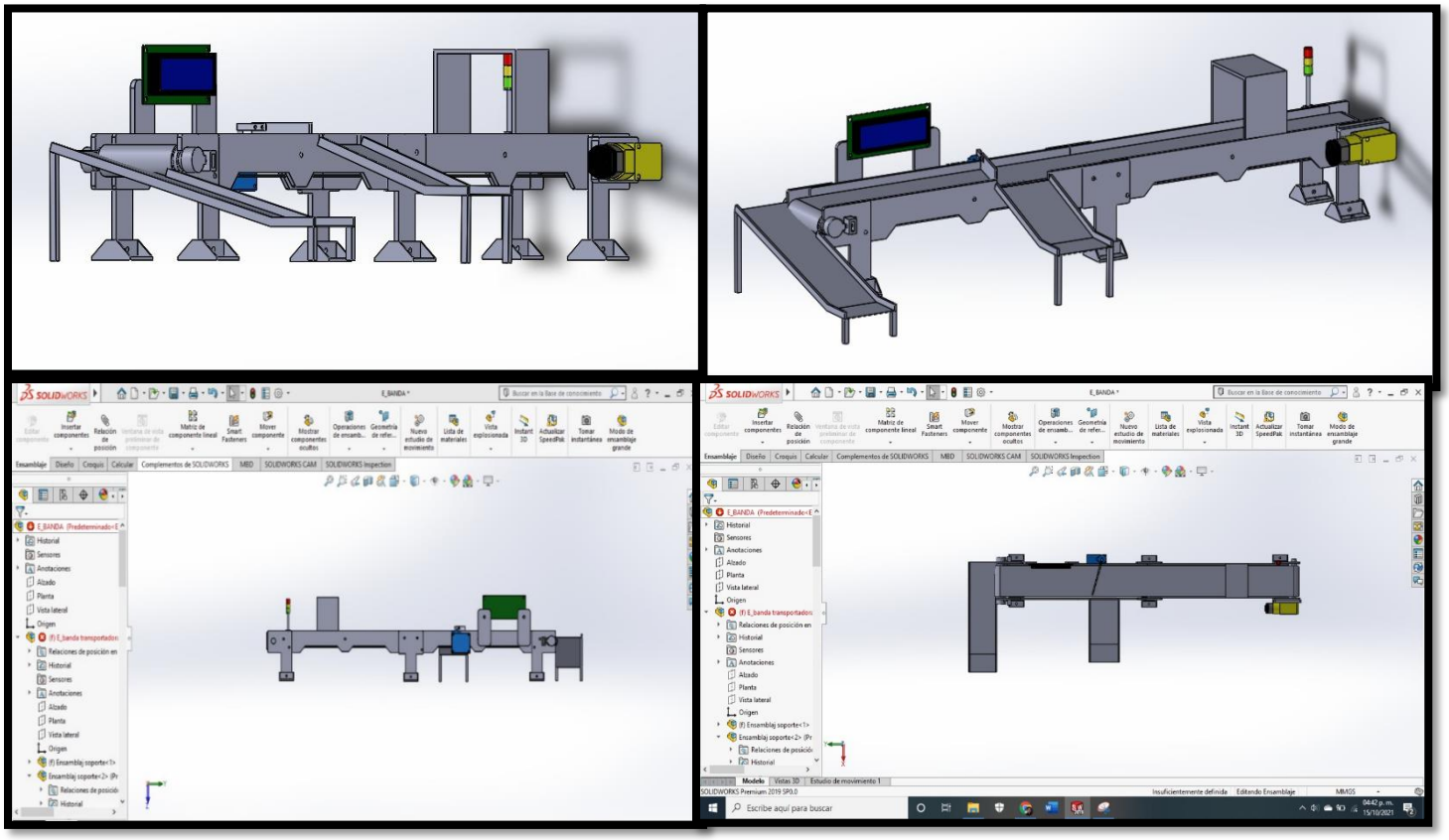

Fig. 2 The Convevor belt manufactured in 3D

B. Arduino

The microcontroller has what is called an input interface, which is a connection in which we can connect different types of peripherals to the board. The information of these peripherals that are connected will be transferred to the microcontroller, which will be in charge of processing the data that reaches you through them therefore the types of peripherals that we are talking about are potentiometer, push button, sensor TCS3200, Sensor E18-D80NK.

It also has the output interface, which is responsible for carrying the information that has been processed in the Arduino with the peripherals the components of the band are: Servomotor, Leds, reducer motor, LCD 16x2 display [1].

Fig. 3 Block diagram of the system.

C. Functionality of the H(L293D) Bridge

The Bridge H determines the position and control of the rotation of the reducer motor of one direction or another that will be commanded by the arduino microcontroller, the integrated circuit is powered with a voltage of 9V and arduino one is powered with 7V, the maximum speed of the reducing motor is 244 RPM and is regulated by a 10K potentiometer.

By means of an appropriate control of the input signals and by connecting the DC motor to power paths the H Bridge can also be added more than one motor in the integrated circuit. In the Table 1. The function that I followed the logical levels according to the control pins corresponding to each working situation is shown [3].

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Operation	S1	S2	S3	S4
Motor moves right	**1**	**0**	**0**	**1**
Motor moves left	**0**	**1**	**1**	**0**
Motor free runs	**0**	**0**	**0**	**0**
Motor brakes	**0**	**1**	**0**	**1**
Motor brakes	**1**	**0**	**1**	**0**
Short Power Supply	**1**	**1**	**0**	**0**
Short Power Supply	**0**	**0**	**1**	**1**
Short Power Supply	**1**	**1**	**1**	**1**

Table I. Management of Logical Levels

The block diagram of the experimental carrier belt support is shown in (Fig. 4).

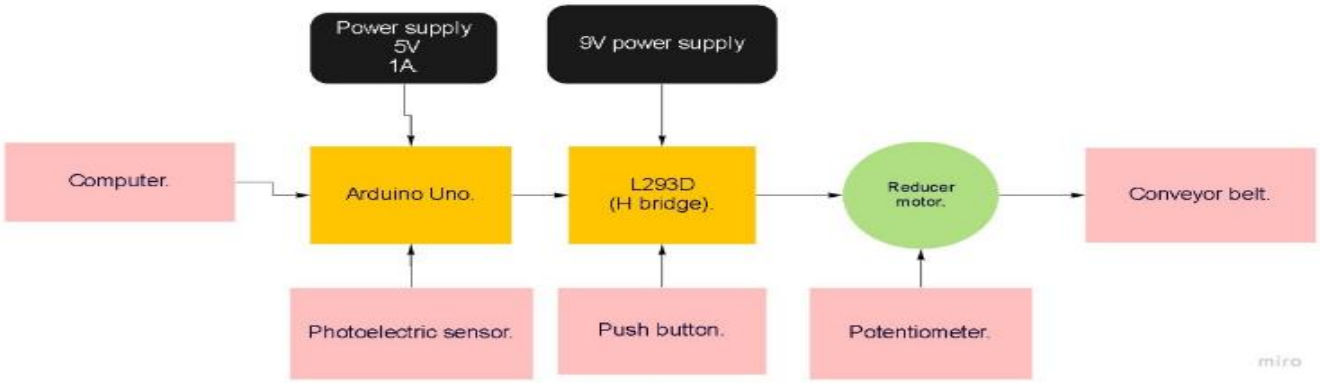

Fig. 4 Conveyor belt block diagram

D. Sensor E18-D80NK

The photoelectric sensor helps us to detect the canned product with a time of 15 seconds taking advantage of the TCS 3200 sensor evaluate the label and resume the sense of the band without contact. To connect it to the arduino microcontroller it is only necessary to connect the sensor output to a digital input.

The output of this sensor is of type NPN normally open, so to detect an object the output will be GND and idle state VCC.

In addition, it has an LED that is activated when the sensor detects an object, which allows us to calibrate and check the proper functioning of the sensor.

Photoelectric proximity sensors use the principle of stopping light intensity. This photoelectric sensor is of diffuse type, therefore, the emitter and the light receiver are integrated within the sensor and do not need an additional fixed mirror such as SLR types). Its function is as follows: the emitter emits a beam of infrared light that when impacting an object is reflected, this reflection is detected by the photoelectric receiver and a stop signal is emitted. The sensor does not emit a signal with distance, it only shows on/off status [5]. (FIG. 5).

The E18 sensor is powered with a voltage of 5V. The sensitivity of the sensor is adjustable by means of a potentiometer inside the sensor [4].

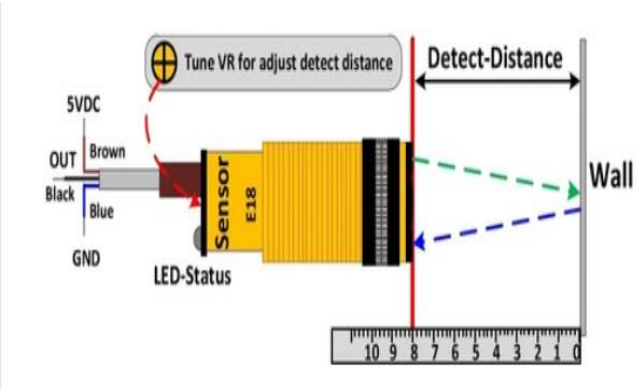

Fig. 5 photoelectric sensor

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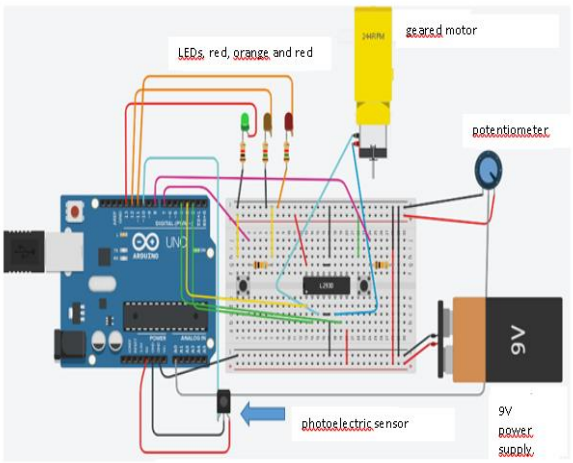

Fig. 6 connection diagram

E. TCS3200 sensor

The colour analyzer consists of the lighting module, the colour recognition module, the data processing module and the display module. The lighting module uses the light-emitting diode (led) with high-brightness white light as a light source for this analyzer; the color recognition module uses TCS3200 as a color sensor, carried out the early identification of the colour information of the objects measured.

The color sensor has four types of filter. When the incident light radiates the TCS3200 sensor, different filters can be activated by controlling the different combinations of S2 pin, S3 as shown in Table 2. Square waves at different frequencies are emitted after the conversion of the current in frequency different colors and light intensities correspond to the square wave at different frequencies. The typical output frequency range is 2 Hz - 500 kHz, using the programming pin S0, S1 of TCS3200 to select the type of output scale factor, as shown in
Table II.

Photodiode type	**S2**	**S3**
RED	L	L
BLUE	L	H
CLEAR (no fitter)	H	L
GREEN	H	H

Table II. Selection of the filter type TCS3200

From the beginning of the three primary colors we know that the color of the canned product label can be obtained through the converter when the values of the primary colors are known. The TCS3200 can only make a color pass when a color filter is selected, so the values of the three primary colors can be obtained in turn by activating different color filters, the colour value of the light irradiated to the TCS3200 colour sensor can be calculated by them with the label configuration (Table III).

Output Frequency scaling	**S0**	**S1**
RED	L	L
BLUE	L	H
CLEAR (no fitter)	H	L
GREEN	H	H

Table III. TCS3200 output scale Factor

III. RESULTS

The result of the finished prototype, operating with a current of 12 volts, is shown.

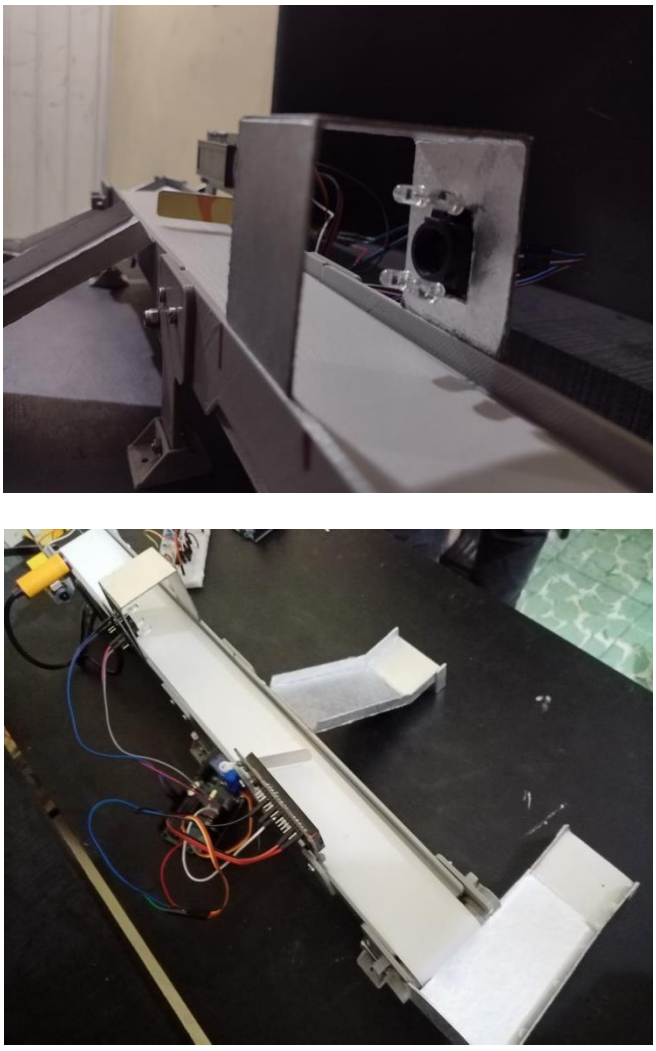

Fig. 7 Results

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IV. CONCLUSION

It is concluded that conveyor belts have been of utmost importance and support in any type of industry, as they reduce the impact on the effort of workers to transport materials and products and most importantly optimize production time.

V. ACKNOWLEDGMENT

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