

“INDUSTRIAL OBJECT SORTING ON THE BASIS OF HEIGHT”

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Abstract: In early days, object sorting was done by the operator manually. But, this method has some drawbacks such as increase in the cost of the product, slow, and inaccuracy due to the human mistake. Previously quality inspection, sorting, assembly, painting, packaging etc. were done manually. But, this technique has some drawbacks such as increase in the rate of the product, slow, and inaccuracy due to the human mistake. Existing sorting methods are used Ultrasonic sensor to differentiate height. Ultrasonic sensor detects the height of the particular object. Ultrasonic sensor sends the data to the microcontroller. In some existing systems of sorting, objects are placed on conveyor belt and according to movement of belt objects are get sorted, but the drawback of this system is, if bottle is not conveyor belt then this bottle will not consider for the sorting process. Here we use system which will make use PIC microcontroller which is interfaced with ultrasonic sensor to sort the bottles. This is a simple and cost effective. This system can be used to sort any kind of product.

Keywords: sorting, ultrasonic sensor, object, microcontroller, conveyor

I. Introduction: The main aim of this project is developing an ultrasonic sensor to recognize height of the different objects. The project presents a smart approach for a real time inspection and selection of objects in continuous flow. Embedded system in today's world grabs massive attentions as it leads to possibilities of broaden application in many fields of high technology. The challenge is how to improve existing sorting system which consists of four integrated steps of identification of height of the bottle, processing on data coming from ultrasonic sensor, selection and sorting of bottle with a ultrasonic object detection system. Existing sorting method uses a set of inductive, capacitive and optical sensors do differentiate object height. The project involves sensor that senses the object's distance, size and sends the signal to the microcontroller. The microcontroller sends signal to circuit which drives the various motors of the conveyor belt to grip the object and place it in the specified location.

II. Literature Survey:

Rucha Kulkarni et al. [1] described PLC Based Object Sorting Automation. They have tried to create a setup that will decrease human effort and succeeded to an extent by using the low cost automation system (LAC) to avoid risk, improve precision, rise speed of manufacture and decrease the cycle time. Restrictions will be there due to the practical complications in programming of the project according the availability of the resources and apparatuses. This setup can be further improved to a sorting system that sorts the items based on the other various sensors. In production it can be used for sorting of several objects, tools, with high degree of precision and superiority with an automation. A. P. Shinde et al. [2] described Sorting of Objects Based on Colour, Weight and Type on A Conveyor Line Using PLC. They have proposed a system which would increase the production rate and accuracy of material handling systems. The system would separate out objects based on their form i.e. metal or non-metal, weight and colour as required by the consumer. Usage of PLC with the frame of logic gates will make program alteration easy and thus, we can modify the system according to the requirement.

A. Kulkarni et al. [3] described Object sorting system using robotics arm. This project can work successfully and separates different objects using sensors. The device management systems which drive the pick and place robot to pick up the object and place it into its labelled place can work if accurately designed. It has two different steps in identifying part, objects detection and recognition. The system can fruitfully perform handling station task, namely pick and place tool with help of device. Thus a cost effective Mechatronics system can be designed using the simplest concepts and efficient result can be observed. P. Syamala Devi et al. [4] described Object Sorting System Using Wireless Media and Sensor Technology. The concept of a developing an object sorting system has been executed. They develop an automated machine they can sort on the basic height. The size of material will be shown in LCD and simultaneously send to remote PC using wireless media.

Rohan Prakash Chumble et al. [5] described Automatic Sorting Machine Using Conveyor Belt. The programmed sorting machine using conveyor belt is mainly beneficial for sorting the yields in the industry definitely large scale industries where mass production is carried out. The machine also lessens the hard work of the workers by decreasing the time spent for material handling. The tender

area of this machine is large in industries everywhere automation is made. Swarnendu Sarkar et al. [6] described Automation of Object Sorting System Using Pick & Place Robotic Arm & Image Processing. The steps in sensing part, objects detection and recognition. The system can effectively perform conduct station task, namely pick and place mechanism with help of instrument. So a budget effective Mechatronics system can be planned using the simplest concepts and effective result can be detected.

Rahul sonas et al.[7] Object Sorting using Image Processing described the proposed system has a conveyor belt which runs with the help of stepper motors and corresponding pulleys at the motor and its opposite ends which frequently run at a desirable speed. The stepper motors are initialized to run the conveyor belt. Material is fed on the feed-side of the belt and landed on the rotating conveyor belt, and they rely on the conveyor belt friction to be delivered to discharge end. USB camera is used to continuously monitor the objects and identify them. Once the objects are recognized or classified into a particular group, the actuators are activated thereby sorting the objects. Himanshu Patel et al. [8] IOT Color Based Object Sorting Machine described Objects which are to be separated are fed in tube. A color sensor senses the items coming in its sight and code for the same is coded in arduino in such a way that only the desired object colors are sensed and collected in the bins at the end using servo motors.

III. Hardware Implementation:

Block Diagram-

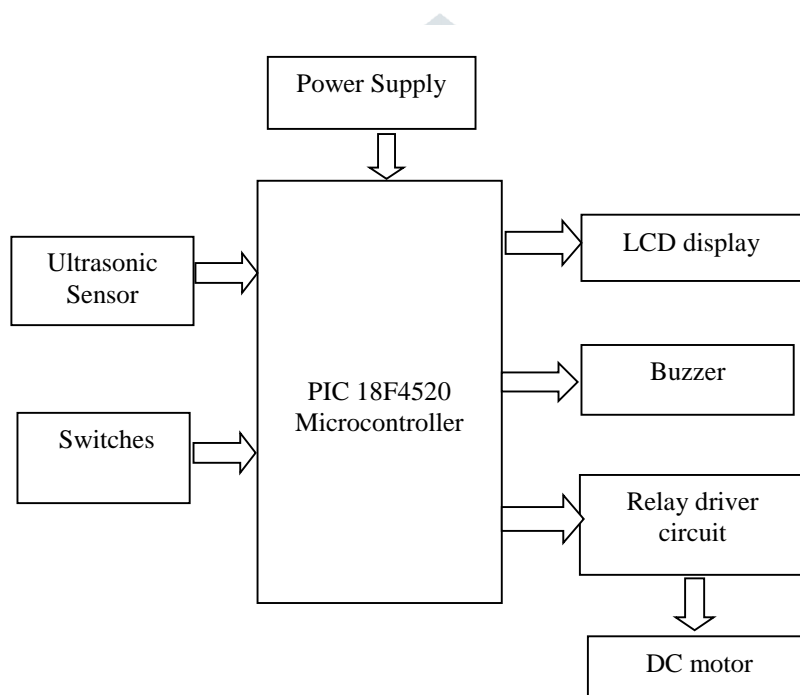


Fig.1. Block Diagram Object Sorting System

The “INDUSTRIAL OBJECT SORTING SYSTEM” block diagram is shown above. Ultrasonic sensor detects the height of the different bottles and sends the signal to the microcontroller and based on that microcontroller takes action. If the height of the bottle is more and ultrasonic sensors reading is below 20 then bottle goes straight over the conveyor belt and placed in pre-programmed place. If the height of the bottle is minimum and ultrasonic sensors reading is below 40 then this bottle is placed in pre-programmed place. If the faulty bottle is their then bottle is place in the respective box and number of bottle and height of bottle is display on the LCD screen.

1. PIC MICROCONTROLLER: PIC 18f4520 devices feature a 14-bit wide code memory, and an improved 8-level deep call stack. PIC 18f4520 has 10 bit internal ADC. It has internal oscillations. We choose PIC 18f4520 because of its user friendly nature.. There are a few additional instructions, and two additional 8-bit literal instructions, add and subtract. PIC12 and PIC16 are the majority devices are available with mid-range core.

2. ULTRASONIC SENSOR:

Product features:

Ultrasonic locomotor module HC - SR04 provides 2cm - 400cm non-contact measuring operate, the locomotor accuracy will reach to 3mm.The modules includes inaudible transmitters, receiver and negative feedback circuit.

The basic principle of work:

- (1) Victimization IO trigger for a minimum of 10us high level signal,
- (2) The Module mechanically sends eight forty kc and discovers whether or not there is a pulse signal back.
- (3) IF the signal back, through high level , time of high output IO length is that the time from causation inaudible to returning.

3. DC MOTOR DRIVE ASSEMBLY:

Geared DC motors is outlined as associate degree extension of DC motor that already had its Insight details demystified. A double-geared DC Motor includes a gear assembly hooked up to the motor.

The speed of motor is counted in terms of rotations of the shaft per minute and is termed as revolution.

4. CONVEYOR SYSTEM:

The conveyor motor receives power and signal from the central provide through rectifier and feedback circuit. The feedback circuit consisting of a potentiometer can permit the user to manually management the speed of transporter by the regulative knob. Polyester is used as a belt material. A transporter consists of 2 or additional pulleys, with one or both the pulleys are hopped-up, moving the belt and therefore the material on the belt forward. The hopped-up simple machine is termed the drive simple machine whereas the unpowered simple machine is termed the do-nothing.

5 RELAY SYSTEM AS A SWITCH:

RELAY:

Relays are used as mechanical device switches. They need high current rating and each AC and DC motors is controlled through them as a result of motor are going to be fully isolated from the remaining circuit. Relays square measure used as driving circuit for motor.

6. LCD Display:

LCD Display generally used to display the height of bottle & count bottles. It is a 16X2 characters display.

LCD (Liquid Crystal Display) screen realize a large vary of applications. LCD (Liquid Crystal Display) screen is an electronic show section and find a wide range of applications. A 16x2 LCD show is very basic module and is very usually used in several devices and circuits. These modules are chosen over seven sections and other multi segment LEDs. The reasons being: LCDs are efficient; easily programmable; have no limitation of displaying exceptional & even custom characters (unlike in seven segments), animations and so on.

IV. Working of the prototype

- 1) On the application of power supply the conveyor starts moving.
- 2) Height of the bottle will be detected by the Ultrasonic sensor.
- 3) Count is displayed on the LCD.
- 5) If the height of the bottle is below 20 of the ultrasonic sensor reading, then bottle will be forwarded over the conveyor belt.
- 6) If the height of the bottle is minimum then this bottle is placed in the respective box.
- 7) As the bottles sort this are counted and display on the LCD.

Algorithm:-

1. Start
2. Initialization of LCD
3. Detect height of bottle by ultrasonic
4. If bottle is big placed it in preprogram place
5. If bottle is medium placed it in preprogram place
6. If bottle is faulty placed it in preprogram place
7. Show bottle no and height of bottle on LCD
8. Go to step 3

Flow chart:

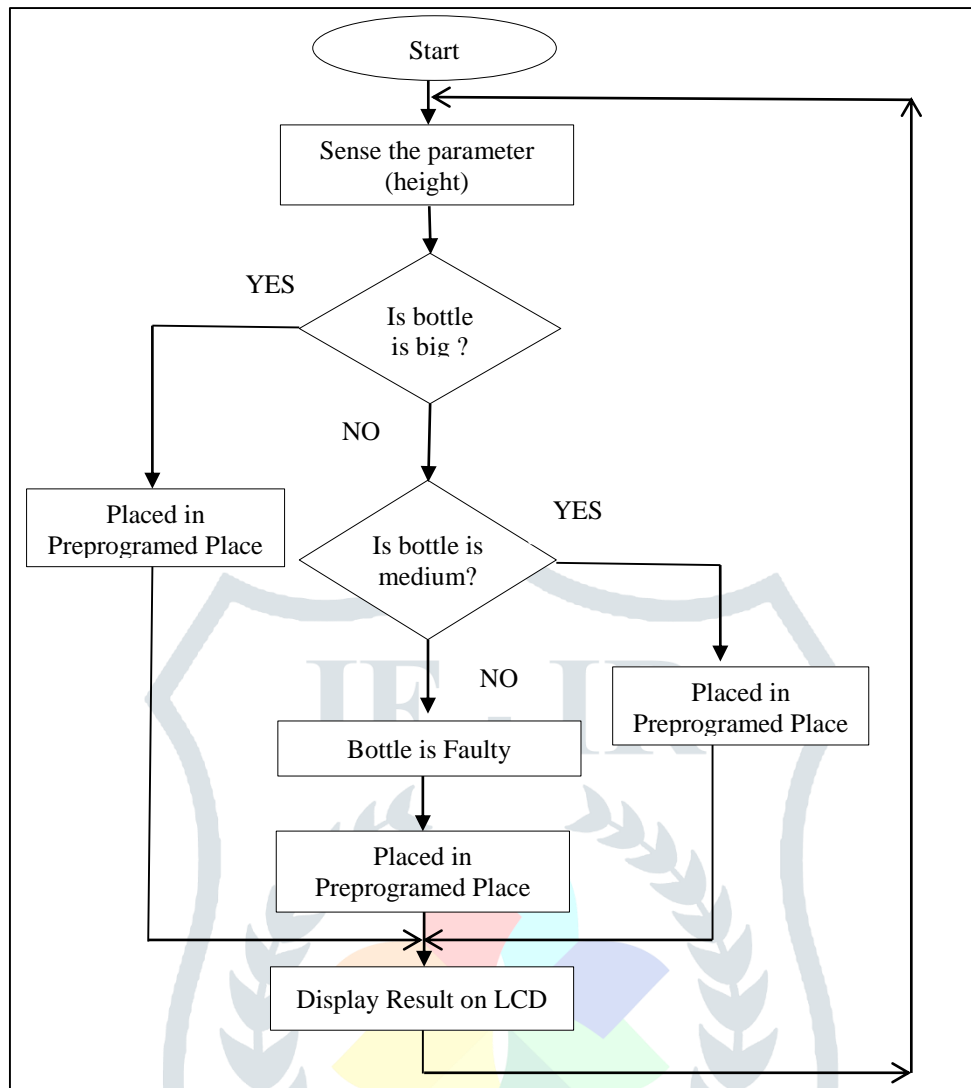


Fig. 2: Flow chart

V. Results Obtained:



Fig.3: Result Obtained

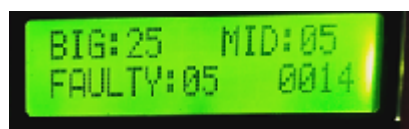


Fig.4: Output of Big Size Bottle



Fig.5: Output of Middle Size Bottle



Fig.6: Output of Faulty Bottle

Discussion on Results:

Here we have made a prototype which will make use PIC microcontroller which is interfaced with ultrasonic sensor to sort the bottles. It is a simple and cost effective. This prototype can be used to sort any kind of product.

Below 20 reading the bottle is of big size. At the reading in between 30-40 Bottle is medium size. Faulty bottle is accessed when reading is in between 60-70.

VI. CONCLUSION AND FUTURE SCOPE:

The project can work successfully and separates different bottles using Ultrasonic sensor. In this there are two steps in sensing part, detection of height of the bottles and recognition. The system can successfully perform the task. Firstly, Ultrasonic sensor detects the height of the various bottles and sends the signals to the microcontroller. According to that microcontroller takes the action and the bottles are placed in preprogrammed place. In this way a cost effective Mechatronics system can be designed using the simplest concepts and efficient result can be observed. In future scope counter can included to count the quantity of items like bottles, speed of the system can be increased by accounting the speed of generation and the system can be utilized as a quality controller by including more sensors.

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