

# DESIGN AND DEVELOPMENT OF TESTING EQUIPMENT FOR FAULTY PRODUCT DETECTION AND SEPARATION

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## ABSTRACT

*All manufacturing units must have fault product detection and separation system to make some product and need to maintain status. So we making such a model employing a mini conveyor belt system. I deliberate a model a fault product detection and separation system each product has different mechanism to detect faulty product. Currently we detect faulty products based on height we used an ultrasonic sensors. Here we used rollers and belts to develop a mini conveyor belt mechanism this mechanism is operated by a motor we are using two motor one for operating a mini conveyor belt and another motor for separator box. products are moved through conveyor belt sensor will sense the product less then minimum height are automatically detected through ultrasonic sensors .If the product meets the requirement then its move on to storage.*

**Keywords-** *Fault detection, Sensors, Motors,*

## I. INTRODUCTION

Quality maintenances are one of the important aspects of manufacturing a product. To maintain high quality must required skilled workers and high class equipment. But doing so the cost of the product goes high that can lead to loss to the company. To overcome such a problems the quality department is set in every manufacturing department. The work of this department is to test the quality of the product after it is manufactured .In the automated manufacturing process, the product is manufactured and packed on the same line. The quality of the product may be of many types

Depending on the type of product .If the product does not meet the requirement of the product then it is considered as there is some fault in the product the fault can be of a size, height, shape, weight, operation etc. Fault detection is the process in which the faulty product is identified and separated from the set so that it can be used as raw material or can be sent back to the production line for improvement. Detection of fault can be done by many method like batch testing one by one testing, or testing of the product on the production manually. All these methods are time-consuming and require human resources. In this, we use a fault product detection system.

## II. PROBLEM STATEMENT

Detection of fault in the product is one of the major problems as it plays a vital role in maintaining the quality of the product. Even a slight change in the size or shape of the product can change the configuration of the product and that leads to malfunction of the product. In automation manufacturing, the process is handled by the computer or some controller. The entire product is manufactured and packed on the production line and stored. Here we talk about lock as our application. To detect a problem on the production line is difficult as the process is automatic. Due to this the lock manufactured can be defective and can fail to lock the door or where it is used to lock the facilities. Sometime in mass production the key for lock is fitted with different keys due to this the lock fail to work. Due to this when the product reaches the customers it fails to work which can lead a replacement of the product which is time-consuming as the interchanging of the key is between two lock but that can lead to testing of all lock manually. Something during manufacturing in the key, there is wrong cut made which tends to fail to work thus lock does not work.

## III. LITERATURE SURVEY

V. H. Nguyen, C. Ruten, and J.C. structural dynamics research group, Aerospace & engineering Department, Chiming des chevreaux, Belgium: Fault diagnosis in engineering structures maintained eyeless basis parting technique by one single vibration sensors. In this project, the most basic technique is the incapacity toward modal analysis once a little quantity of devices accessible, which restrictions the usage as damage detection technique supported modal evidence. Still its frequently the situation in exercise that only 1 sensor is employed intended for observing a mechanism. During in the paper certain different supported utilization of henkel conditions are accessible towards beat the problem. Within this method the order is decided by staring at the cumulated alterations within the

remarkable value diagram, while within the ESOB method order collection is predicated happening the modal contribution indicator of the bases, Result obtain from commercial instances demonstration that recognition provided by both methods is sort of instinctive, speed and dependable.

Fault detection and recovery in wireless sensor Network using cluster by AbdulFazal

Sensor network fault cannot be advanced similarly as old-style wired or wireless network because of the subsequent reasons traditional wired network procedure don't seem to be concentrated with energy feasting as they constantly powered and wireless unexpected network also rechargeable frequently could spread through the network.

This means there is a particularly strong imperative to recognize, remove, or mitigate faulty sensor data in a networked sensor some fifty years or more. The research field has been driven by rapid global progress within the field of semiconductor technology, where solid-state microcontrollers and memory devices have revolutionized many aspects of instrumentation and process control, and have facilitated explosive growth in data management and wireless communications. Further, as a leap forward to the acceptance of the interdisciplinary concepts and their developments, disciplines like electromechanical systems, optoelectronics, concurrent engineering, and biotechnology, and then on has emerged because of the primary research areas.

## IV. OBJECTIVES

The main objective of our project is to eliminate the time consumed in testing the product. For this project, we use an ultrasonic sensor so that the product can stop exactly below the IR Sensors for testing. The ultrasonic sensor senses the movement of the product. The servomotor is used to run the conveyor belt. Using this instrument, the product is

the case lock, we can test its size, shape, and working automatically so there is no need for any testing department or any extra-human resourced to test the product

## V. METHODOLOGY

The entire setup is fixed on a frame of conveyor. To complete this project we are going to use ultrasonic sensors to check or compare the standard set for the specific product or in this case a lock, the specification like the size of the product, height shape of the product. An ultrasonic sensor is used to measure the height of the product.

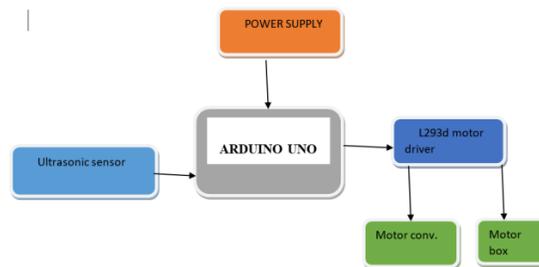
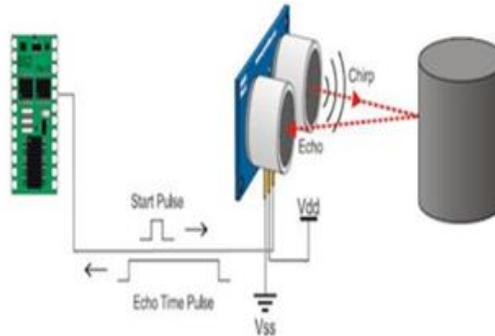


Fig.01 Block Diagram of working model

For making all sensors work a controller is required and in this case, use the arduino controller. The entire sensor is connected using the Arduino controller and programming is required so that the entire sensor work properly and in sequence. To perform mechanical operations like moving the product servo motor with a conveyor belt is used. In this case two servo motor is used first servo motor help to drive the product by rotating conveyor belt mounted on the motor, the second servo motor is used to filter or separate the product by putting the particular box just below the conveyor belt. To drive both the servo motor L293d module is used, with a single we can control two motors.

The main purpose of our project is to eliminate the time required to test the padlock during quality testing. For doing so we have built our own conveyor belt to carry the lock to the sensor position so that tests can be performed. our conveyor is simple as it uses a conveyor belt and a conveyor motor to operate the motor. Conveyor is simple as it uses a conveyor belt for handling the equipment that moves material from one location to another, All the sensor are placed exactly where required. Ultrasonic sensor is used to measure the distance of the product. If the product meets the requirement then it moves on to storage

## VI .ULTRASONIC SENSOR



**FIG 02 ULTRASONIC SENSOR**

Ultrasonic Sensors:- Ultrasonic sensors are used to detect the presence of targets and to measure the distance to targets in many robotized processing plants and process plants. Sensors with an ON or OFF digital output are available for detecting the presence of objects and sensors with an analog output which changes relatively to the sensor to target separation distance are commercially available.

### Ultrasonic working

Ultrasonic obstacle sensor consists of a set of ultrasonic receiver and transmitter which operate at the same frequency. The point when the something

moves in the zone secured the circuit's fine offset is aggravated and the buzzer/alarm is triggered.

The sensor detects objects by emitting a short ultrasonic burst and then listening for the eco. Under control of a host microcontroller, the sensor emits a short 40 KHz explosion. This explosion ventures or travels through the air, hits an article and after that bounces once again to the sensor. The sensor provides an output pulse to the host that will terminate when the echo is detected; hence the width of one pulse to the next is taken into calculation by a program to provide result in distance of the object.

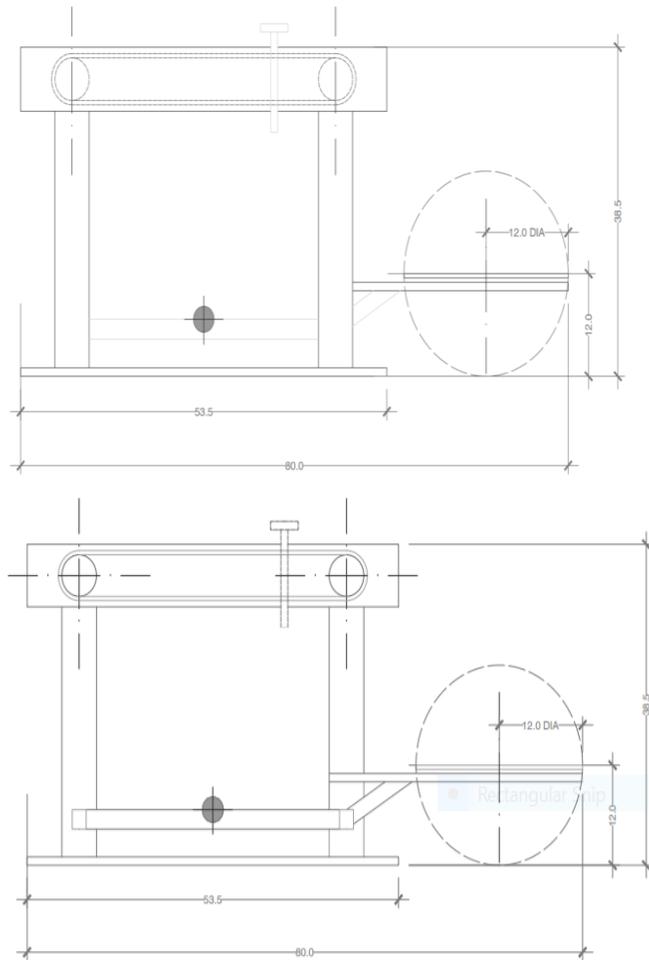
## VII. ARDUINO UNO



**FIG 03 ARDUINO UNO BOARD**

Arduino is a microcontroller programmed , reprogrammed and erased the arduino stage was planned to supply a cheap then straightforward way for , scholars , and specialists to from device that interrelate with their atmosphere using sensors and actuators. It’s also skilled of acting as a mini computer bit like additional microcontroller by taking inputs and monitoring the outputs for a range of electronic devices. It’s also adept of getting and sending data over the net by the assistance of varied arduino shield. arduino may be a sample stage supported user-friendly hardware and software it contain of a card which may be encoded and employed to write down and upload the pc encryption board.

**VIII. AUTO CAD DRAWING**



All dimension in cm

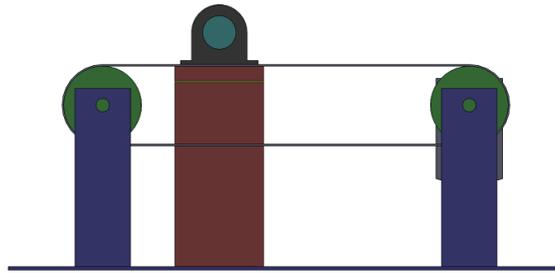


FIG 04 Working model



FIG 05 SENSOR

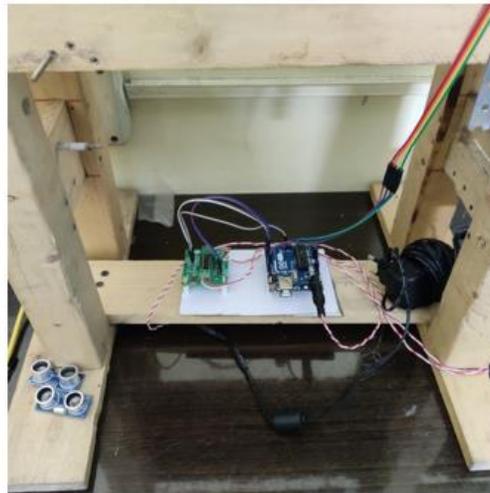
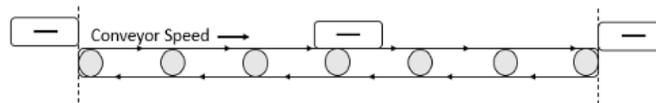


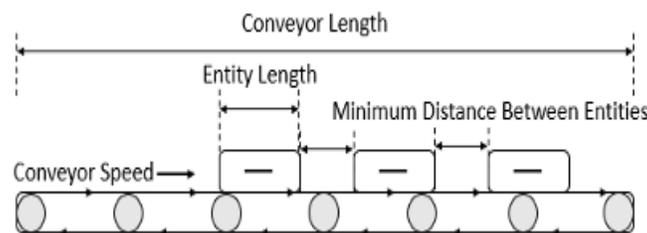
FIG 06 ARDUINO UNO MICROCONTROLLER

<b>Name</b>	<b>Dimensions (cm)</b>
Model total length	80
Model height	38.5
Belt length	52
Belt width	10
Separation small box	15
Separation big box	20
Circular Diameter	12

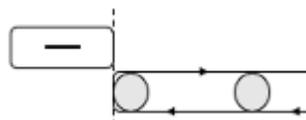
Microcontroller name	<u>Arduino UNO</u>
Microcontroller type	Atmega-32
Belt colour	Black
Motor driver type	L293D
Motor speed	60rpm
Conveyor Motor voltage	12v
Separation motor voltage	12v



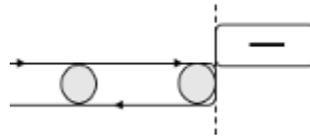
The Conveyor System transports the entities across the surface of a conveyor. Entities enter the system by sliding onto the conveyor surface and that they depart by sliding off. Specify the speed of the conveyor. Use this technique to model transportation applications involving production systems, or logistical systems. The length and therefore the minimum distance between the transported entities are specified as shown below



The entity is considered as inside the conveyor and Entities slide into the conveyor surface then its front side coincides with the surface entry.

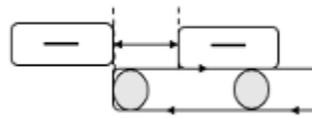


Entities slide out of the conveyor surface and an entity is considered as outside the conveyor surface when its backside coincides with the surface entry.



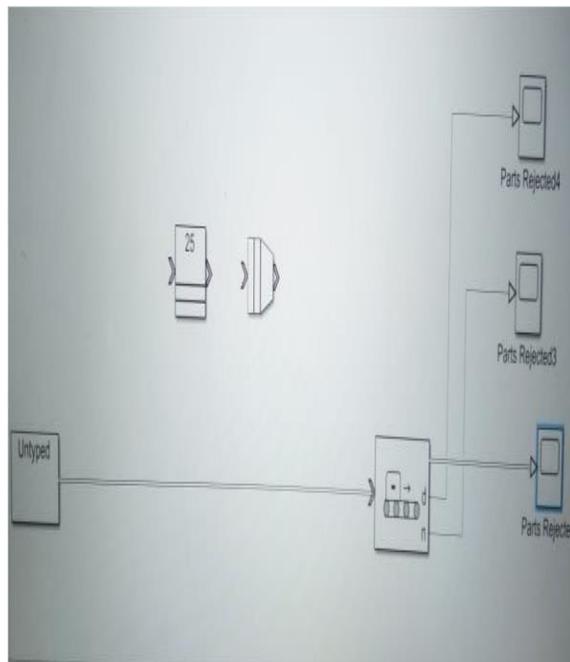
Conveyor speed occurs the total time between an entity entry to the surface and its exit from the surface.

After an entity enters the conveyor surface, the next entity enters after the first one travels to the specified minimum distance between entities.

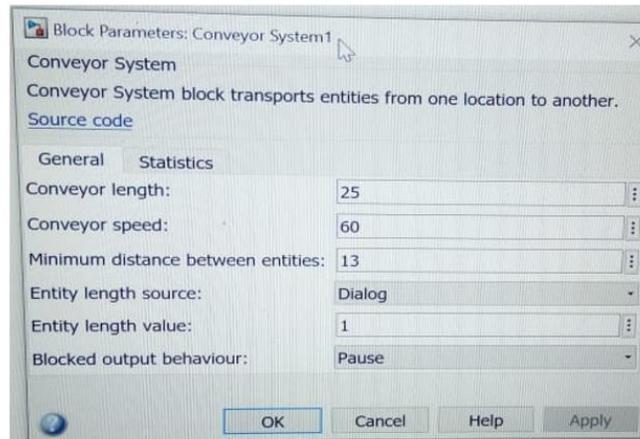


The capacity is determined by the total surface length, entity length, and the minimum distance between entities. The capacity of the conveyor system is the maximum number of entities allowed on the surface

The simulation circuit for the conveyor system is provided below:

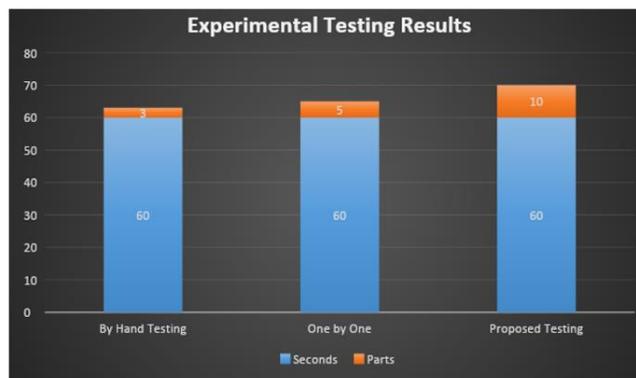


The speed of the conveyor and distance between the objects is mentioned as below:



The length of the conveyor is 25 m and the minimum distance between the objects is mentioned as 13m. Hence the conveyor carries maximum of two objects at any particular instant of time.

**IX. GRAPHICAL REPRESENTATION**



X-Axis – Testing Method  
 Y-Axis – Time in Seconds

I have conducted a sample test based on survey. By hand testing in a 60 sec, it has been resulted in 3 fault products detected. By one by one testing for 60sec 5 fault product has been detected through my proposed model I am getting a satisfactory results when I compare to the other two methods.

**CONCLUSION**

From this it is clear that after a survey and research The problem faced by the company of quality Maintenance and time saving both cannot be done at the same time. To do so there is need to invest in human resources, but that tois the cost consuming it can increase the price of the product and that can lead to loss to the company. This project can save both time and resources of the company so that company can enjoy profit and consumer can enjoy their product with high quality

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