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# SORTING OF COMPONENTS BY USING LOAD CELL

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**Abstract -**A few year ago, sorting of components was performed by a manually on the basis of human effort. It is used in a various fields in a daily life. Now a days, requirement of product quantity and it's quality is more. In the sugar industries for producing and packaging a different type of quality sugar, sorting is used.
It is also used in a food industry, coal industry, courier companies and production and assembly department in industries. Sorting is performed on a various properties may be weight, colour, size etc. Out of which we performed on the basis of weight. Weight cannot be calculated by a visual inspection. It is effective in the situation, where weight of component is consider in a sorting system..

***Key Words***:Load cell, sorting, Step up transformer, Actuator, Arduino etc.

## 1.INTRODUCTION

The method of sorting of components on the basis of weight by using fluidics is increases the efficiency of the operation. It reduces the human effort, sorting time and give a more production rate. In the courier companies, charges are incurred depending upon the weight of the package, there is need to sort the packages on the basis of weight. It can be used to sort the agricultural products at the market places with added advantages like greater accuracy and elimination of human errors. Presently, most of the systems used for sorting are based upon the principles like machine vision, image processing, density difference etc. which have several drawbacks like a high initial costs, software requirements, complex programming and cameras etc. It is also performed on basis of a colour and size of component, they have also drawbacks of low efficiency and inaccuracy.
They are electromechanical systems use proximity sensors along with pneumatic system for sorting objects .These systems having demand costly and energy consuming devices like compressors and pneumatic auxiliaries.The component of different weight will be placed one by one on the conveyor belt. Then the switch of robot motor will be start, the spindle of robot motor is connected to pulley. It will start the conveyor and the component will flow to discharge end. During its travel i.e. flow from input end to discharge end, load cell senses the weight of the component. The output signal of the load cell will be given to the arduino kit. So according to that signal or voltage pushing mechanism will be activated and large or medium weight component pushed out of conveyor belt. While small weight component will flow on the conveyor belt then the pushing mechanism cannot activated. The small weight component will go without any pushing mechanism to other end of conveyor belt.
It will flow to discharge end. After sorting of the component, flow of conveyor belt will be stop by switch off of robot motor. The Arduino kit will give input to pushing mechanism to activate respectively as per weight of component i.e. medium and large weight of component. If the weight of component is medium, then pushing mechanism 1 will activate and if the weight of component is large then pushing mechanism 2 will activate. After this activation of pushing mechanism, the small, medium, large weight component will be go to the straight, left and left side of the conveyor belt.

## 2. Problem statement

In the present work, it is proposed to study the risk of accidents associated with sparking and heating, which is possible in electrical systems, is eliminated by providing pneumatic system.

- Aim of Paper:

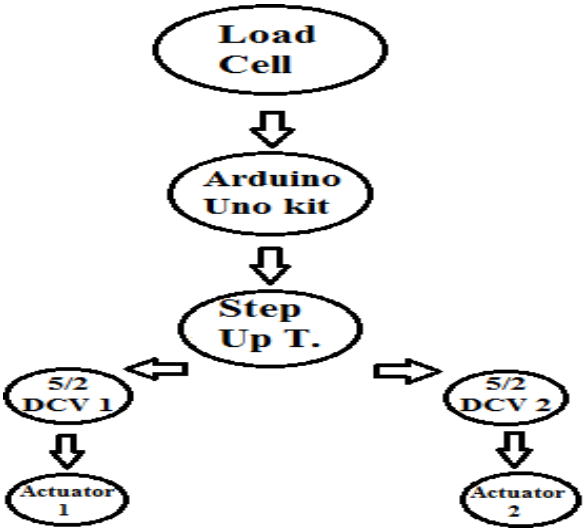
The aim of this paper is to investigate the production of components with explosive nature. The checking of size and weight of components can be done with the help of an automatic device based on fluidic sensors, fluidic logic, and pneumatic actuators.

**Table -1.1: General features of biogas**

| Name of Component | Specification of Component |
|---|---|
| Pneumatic Cylinder | Double Acting Cylinder<br>Bore Diameter=25mm<br>Rod Diameter=8mm<br>Stroke Length=50mm |
| Flow Control Valve | Pressure Range = 0.05-0.85 Mpa<br>Maximum working pressure = 1.0 Mpa |
| Direction Control valve | Solenoid operated 5/2 Directional control valve<br>Supplied voltage = DC 12 V<br>Supplied Pressure = 0.15 – 0.8 Mpa |
| Sorting Component | Material=Aluminium<br>Density of Aluminium = 2.7 g/cm3<br>Cost of Aluminium = Rs. 220 Per kg |
| Motor | Robot Motor 10 RPM<br>Power = 0.5374 w |
| Conveyor Belt | Material = Rubber<br>size of belt Length = 1.5 m<br>Width = 65 mm Thickness = 3 mm<br>Volumetric Cap. = 3.7815 × 10-7 |

| | |
|---|---|
| | m3/s<br>Mass Capacity = 3.6756 Kg/hr |
| Roller | Material= Plastic<br>Diameter= 50 mm<br>Length = 65 mm |
| Load Cell | Model = CZL601-6Kg<br>Range = 0 —6 kg<br>Precision = 0.02 kg<br>Voltage= 5V - 18V |
| Arduino Uno circuit | ATmega 328 microcontroller<br>14 digital input/output pins<br>6 analogue inputs |
| Square Bar | Material = Mild steel Size,<br>Cross section area = 2.54 × 2.54 cm2<br>Length of sq. Bar is,<br>L1 = 800 mm; L2 = 500 mm |

When an object is placed on the conveyor belt, it is sensed by the load cell which then generates an DC voltage output. The output DC voltage of load cell, is proportional to the weight of the object. It is sent to the Arduino Uno microcontroller. The arduino then actuates the input actuator 1 through a 5/2 DCV 1 and ultimately pushing mechanism performed. The weight measured is displayed on a LCD provided on the base. Based on the weight of the object, the arduino provides a signal to the 5/2 DCV 2 which results into actuate a actuator 2.



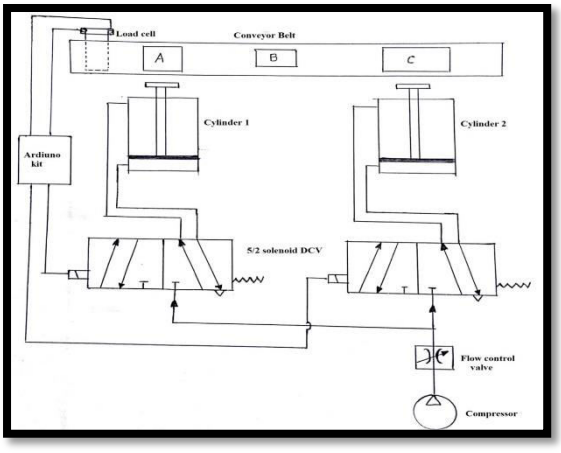
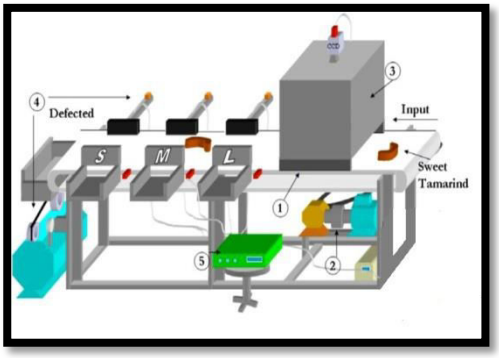




**Fig.1.1 Block Diagram of System**

**Fig.1.2: Pneumatic Circuit Diagram**



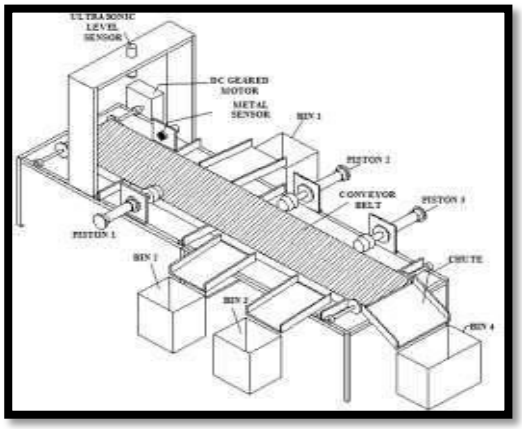



**Fig.1.3: Fabrication of project**

**Fig.1.4: Sorting conveyor system**

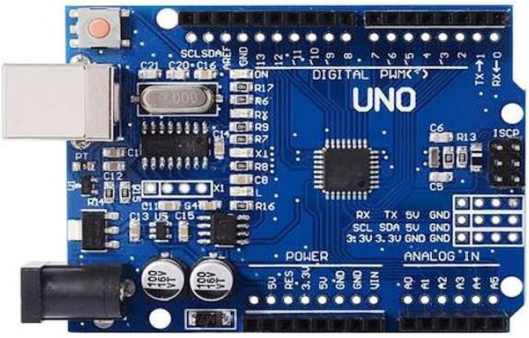



**Fig.1.5: Arduino Uno Kit**

The Arduino UNO is a microcontroller board based on the ATmega328. 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. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. "Uno" means one in Italian and is named to mark the upcoming release of Arduino 1.0. The Uno and version 1.0 will be the reference versions of Arduino, moving forward. The UNO is the latest in a series of USB Arduino boards, and the reference model for the Arduino platform; for a

comparison with previous versions, see the index of Arduino boards.

**Memory**

The ATmega328 has 32 KB. It also has 2 KB of SRAM and 1 KB of EEPROM. Input and Output

Each of the 14 digital pins on the Uno can be used as an input or output, using pin Mode, digital Write, and digital Read functions. They operate at 5 volts. Each pin can provide or receive a maximum of 40 mA and has an internal pull-up resistor (disconnected by default) of 20-50 Kohms.

| | |
|---|---|
| InputVoltage (limits) | 6-20V |
| Digital I/O Pins | 14 (of which 6 provide PWM output |
| Analog Input Pins | 6 |
| DC Current per I/O Pin | 40 mA |
| DC Current for 3.3V Pin | 50 mA |
| Flash Memory | 32 KB (ATmega328) of which 0.5 KB used by boot loader |
| SRAM | 2 KB (ATmega328) |
| EEPROM | 1 KB (ATmega328) |
| Clock Speed | 16 MHz |

**Table 1.2:Properties of Arduino Uno Kit**

## 3. Results and Discussions and Conclusion

It has been noted that,Sorting the objects according to their weights can be achieved by the pneumatic machine. Since this system is automatic, it does not require any operator therefore eliminates the human errors incurred by the manual sorting. The efficiency of the machine reduces the time required for the sorting operation to a great extent. We have proposed a system which would increase the production rate and accuracy of material handling rate.The system would separating objects based on their type i.e. metal or non- metal, weight and colour as required by the user. Use of load sensor with the Pneumatics logic will make easy to separate the weight wise component and thus, we can modify the system according to the requirement.

In the system, if component having weight (337.50) range to 250 to350 cylinder one actuates. When a component having weight ranges between 350 to 450 gm , cylinder two actuates. Other weighted component gets to another end of conveyor belt. As the load on conveyor increases rate of components to be started also increases. Use of load sensor and Arduino kit with Pneumatics logic will make easy and efficient to separate the weight wise component and thus. The time required system for sorting get's reduced hence increases the total production rate. It is more economical and environmentally friendly system. Small differences in weight of components can be detected and sorted effectively. Without any interventions system can be work.

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## REFERENCES

1. Prof. Sanjay Prakash Dabade, Rohan Prakash Chumble, "Automatic Sorting Machine Using Conveyor Belt", International Journal of Innovative and Emerging Research in Engineering Volume 2, Issue 5, 2015.

2.Prof. Ghansham B. Firame, Yuvraj S. Kumbhar, Chaitrali M. Shete, Omkar M. Kulkarni, "Design and Fabrication of Automatic Weight Sorting Machine", ISSN: 2321-8169,June 2017.

3. P. Shinde and S. V. Rautu, "Sorting of Objects Based on Colour, Weight and Type on A Conveyor Line Using PLC", IOSR Journal of Mechanical and Civil Engineering (IOSR-JMCE) e-ISSN: 2278-1684,p-ISSN: 2320- 334X PP. 04-07

4Prof. Asanta P. Simeon, Bankole I. Oladapo, V.A. Balogun, A.O.M. Adeoye, C.O. Ijagbemi, Afolabi S. Oluwole, I.A. Daniyan, A. Esoso Aghor, "Model design and simulation of automatic sorting machine using proximity sensor", Engineering Science and Technology, an International Journal 19 (2016) 1452–1456..

5. Prof. Shriya M. Kumar, Sheela S, Shivaram. K. R, Meghashree S, Monica L, Prathima A, Low Cost Automation for Sorting of Objects on Conveyor Belt, International Journal Of Innovative Research in Science, Engineering & Technology, ISSN (Online): 2319-8753, May 2016

6. Mr. Sai kumar Seerla and Mr. Srujan Veer Reddy Kallem B.Tech Student, Department of Mechanical, Vignan Institute of Technology and Science, "Design and Implementation of Weight Based Object Sorting System in roduction Industries", International Journal & Magazine of Engineering, Technology, Management and Research.

7. Prof. Acy M. Kottalil, Boney Alex, "Automatic sorting machine", Journal for Research | Volume 02 | Issue 04 | June 2016 ISSN: 2395-7549

8. Prof. Babita Nanda EEE Department, St.Martin's Engineering college, Hyderabad, India. "Automatic Sorting Machine Using Delta Plc", International Journal of Innovative Research in Advanced Engineering (IJIRAE) ISSN: 2349-2163. Volume 1 Issue 7 (August 2014).

9. Dharmannagari Vinay Kumar Reddy, "Sorting Of Objects Based On Colour By Pick And Place Robotic Arm And With Conveyor Belt Arrangement", International Journal Of Mechanical And Robotics Research, ISSN 2278 – 0149, January 2014

10. Prof. Y V Aruna, Beena S, Department of Electrical & Electronics Engg., Cambridge Institute Of Technology, Bangalore-36, "Automatic convey or System with In–Process Sorting Mechanism. using PLC and HMI System", Y V Aruna et al. Int. Journal of Engineering Research and Applications ISSN: 2248-9622, Vol. 5, Issue 11, (Part - 3) November 2015, pp.37-42

11. Amir Deshmukh, Mahesh Nagane, Vaibhav Awatade, "Design & Development of Automatic Conveyor Controlling System for Sorting of Component on Color basis", International Journal of Science and Research (IJSR) ISSN (Online): 2319-7064 Index Copernicus Value (2013): 6.14 | Impact Factor (2014): 5.611

12. Prof. Manish J. Deshmukh, Mr. Akshay K. Naphade, "A Review of „Improved Automated Conveyor with Auto Separated System for Oil Packaging Industry", International Journal of Research in Advent Technology, Vol.5, No.2, February 2017 E-ISSN: 2321-9637