

Review on Design and Manufacturing of Metal & Non-metal Sorting Using Metal Detector

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Abstract: In recent years, sorting of scrap material using various automated techniques has gained a lot of focus. One of the multiple steps in the recycling of non-ferrous metals is the separation of shredded material into different groups. In our project, we propose the concept of "Metal & Non-metal Sorting Using Metal Detector". This system of sorting products is optimized to differentiate between metal & non-metals product, which is done with the help of a metal detector. A continuous conveyor belt carries the different products, and with the help of a control motor it separates metal from non-metal.

In a nutshell, this system consists of a metal sensor. When the conveyor belt carries the products, it goes through a metal detector, if it's a metal product the control motor separates it with the help of a bar and the skipped product goes further to another container for non-metal. GSM technique is also introduced for mobiles messaging. The counter displays the metal count. This project is useful in automobile industries, steel plants and industry for separation of metal and non-metal element in the industry on a large basis. It can also be used for waste management so also beneficial for the environment.

I. INTRODUCTION

In recent years, sorting of scrap material using various automated techniques has gained a lot of focus. One of the multiple steps in the recycling of non-ferrous metals is the separation of shredded material into different groups. In our project, we propose the concept of "Metal & Non-metal Sorting Using Metal Detector". This system of sorting products is optimized to differentiate between metal & non-metals product, which is done with the help of a metal detector. A continuous conveyor belt carries the different products, and with the help of a control motor it separates metal from non-metal.

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Sorting is the first step of a waste management process. It should be sorted according to the type of material. so the main idea of our project is to design and implement a machine that sorts, and classifies three different types of materials which are iron, aluminium, and plastic. Then guide materials to different carts to prepare for the material recycling process.

II. LITERATURE REVIEW

Shen and Hassan [1] states that an approach for continuous recognition and the sorting of objects into their respective and desired location can be implemented as an image of colour processing that can attract an enormous attention leading to a possible widening scope of application in a different field in a modern technology. A colour-sorting robot is designed and developed using an Arduino Uno microcontroller, SG90 Tower Pro Servo Motor, TCS3200D colour sensor and several other electronic components. The system has the potential to sort the objects according to their colours into their relevant colour station in a less time. A distinct code for this system is developed.

According to Yunardi et al. [2], a 3D volume of the packed box is well quantified from the 2D images using the techniques of image processing. The 2D image consists of two images captured on the camera with a horizontal view and a vertical view. With the parameters, that is, the length, width and the height, a multiplication program is used to obtain the result of the volume. Consequently, contour based object detection can be appertained to the automatic sorting system to measure the volume of an object in a computer-based vision.

According to Babita [3], sensors are embedded at several places that detects and senses the materials of various sizes that gets sorted at different stations based on their sizes. For sensing, the material used is an infrared sensor that is so sensitive. All the process is controlled and handled by a PLC.

Kulkarni et al. [4] has implemented the sorting of the boxes using a barcode, which is decoded by raspberry pi. This raspberry pi sends a signal to the motor driver to start and stop the motor accordingly. Proximity switches are implanted on every cylinder to sense the box position, which again sends back the signal to raspberry pi. Relay is used as an interface for the motor driver and motor. The relay used is of solid relay type. Raspberry pi uses cameras of five megapixels to capture the image, which will then be decode

III. PRINCIPLE OF OPERATION:

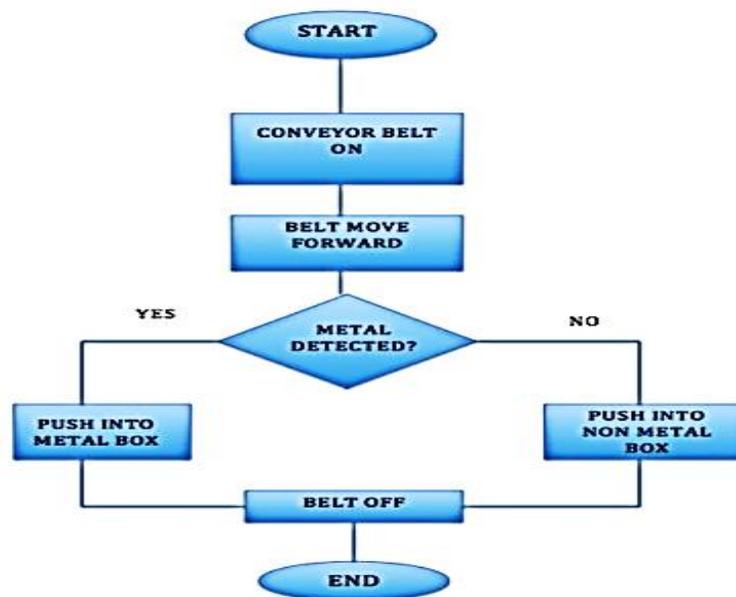


Fig.1. Flow Chart

IV. PROPOSED WORK:

OBJECTIVE:

1. To Design, build & control an automated material sorting machine.
2. To sort and classify three different types of materials which are iron, aluminum and plastic

Phase I: Literature Survey: -

Design and Development of a Sorting System Based on Machine Vision Guiding. It is desired to make a vision-based control strategy to perform a high-speed pick and place tasks between two synchronous conveyors using Delta robot. The

whole control system in this project composed of vision module and motion control module, the vision module is consisting of a computer, image acquisition card, and camera, and the motion control module is composed of a computer, motion control card, and motor. The communication between these modules is realized by a computer.

Phase II: Preparation of Manufacturing Drawing:

A Suitable assembly drawing will be prepared which will help visualize actual drawing and make necessary adjustment taking into consideration the design and placement of various components.

Phase III: Manufacturing of Component & experimentation:

- **Metal Detector:**

A metal detector is used for detecting the presence of a metal. Metal detectors are useful for finding metal inclusions hidden within objects, or metal objects buried underground. As per sensing capacity we chosen the required metal detector.

- **Transformer:**

As per our project requirement voltage must be reduce so for this requirement of project the transformer will be selected for reducing the voltage.

- **Rectifier Bridge**

As per our project required DC voltage so far converting AC to DC will select rectifier bridge.

- **Motor Driver**

As per requirement we select motor driver we will select.

- **Pusher:**

As per requirement of project we are designing the pusher.

- **DC Motor**

Completing considerable research on the application of the Metal & Non-metal sorting using by metal detector, the motor will select. The motor market was thoroughly investigated, and information from vendors is obtain. After examining the motor's availability and cost, the decision will taken.

As per the Conveyer design with requirement we will select the DC Motor.

- **Arduino Uno**

The Arduino UNO is an open-source microcontroller board. As per requirement and literature survey we will select the Arduino Uno.

Phase IV: Performance Testing:

Following parameters can be checked during testing: Conveyer speed will be checked for proper operation We will check sorting speed of component. Another parameter is load carrying capacity of conveyor belt. Next, we will check power required for sorting speed and pusher speed.

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