

# Design and Fabrication of Object Sorting Machine

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**Abstract**— The main intention of this project is to elaborate and simplify how different products manufactured in a factory can be put on a single conveyer for its proper distribution and data logging in a random sequence. To upgrade this process, images captured by the webcam can be processed with image processing techniques using software like MATLAB. This image processing technique and color detection techniques are applied for the taken image and the appropriate output is obtained in this project.

**Key words:** Image Processing, Color Detection, MATLAB, Conveyor

**Objective:** In previous types of system the cost of productivity increases. Because of this the sorting speed of any kind of objects can be improved at very high extend. In our system instead of using robotic arm we are using flapper as a sorting device, which is connected to the conveyor belt.

## I. INTRODUCTION

This is the project to build a single conveyor belt for multiple objects in a random sequence, for its proper distribution and data logging. In this project efforts have been made to use a single assembly line for the classifying and sorting purpose of different objects using electronic systems, advanced sensors and image processing technique in MATLAB on the basis of physical and color characterization of each object. The project involves colour identification of an object which is done by a webcam acting as colour sensor which identifies the object's colour and sends the signal to the ATMEGA microcontroller.

A. Let us see how Image Processing Technique helps to Sort the Objects

## II. IMAGE ACQUISITION

To start with when the object on the conveyor is detected by the camera, image is captured by the camera and is sent to the MATLAB workspace. The input image obtained from the webcam cannot be directly given for processing. Pre-processing is done on the image such as thresholding. Then only object image is converted in binary format. This final threshold image of object is now ready for processing.

A. Camera

The camera used in this case will be overhead camera, it will take the snapshot of the object for colour sensing purpose. The image captured by the camera will be processed by image processing using matlab.

## III. IMAGE PROCESSING

The objects are sorted on the basis of color and predetermined shape. To identify the color, firstly the image is converted into gray format and thens thresholding is done. After thresholding color components are extracted and the image is

converted into black and white format which is called as binary format Find region properties & bounding box and the color are identified.



Fig. 1: RECTANGLE (Colour)

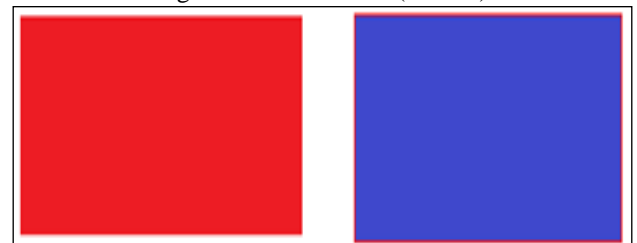


Fig. 2: RECTANGLE (Colour)

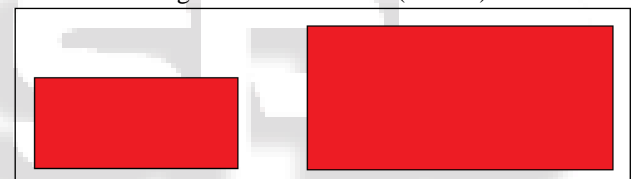


Fig. 3: RECTANGLE (Size)

## IV. SORTING MECHANISM

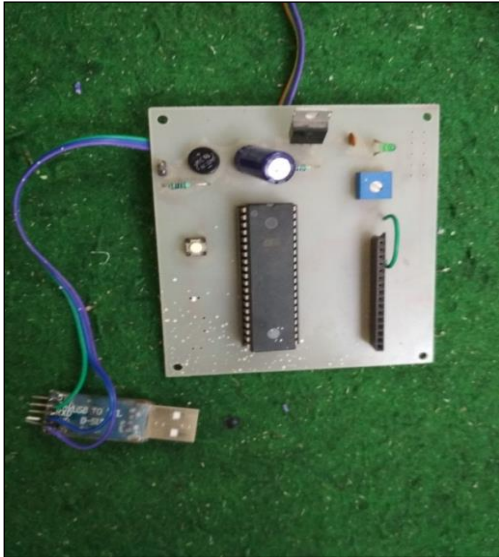
The sorting mechanism consists of a flapper, servo motors and a conveyer assembly. After identifying the colour with predetermined size, command will be sent to direct the flapper through COM port of the computer via the development board. Conveyor assembly is in OFF state for this period. According to the size and colour the servo motors with help of flapper places the objects in their specified place.

## V. MATLAB

MATLAB is a high-performance language for technical computing. It integrates computation, visualization, and programming environment. Furthermore, MATLAB is a modern programming language environment: it has sophisticated data structures, contains built-in editing and debugging tools, and supports object-oriented programming.

## VI. MICROCONTROLLER

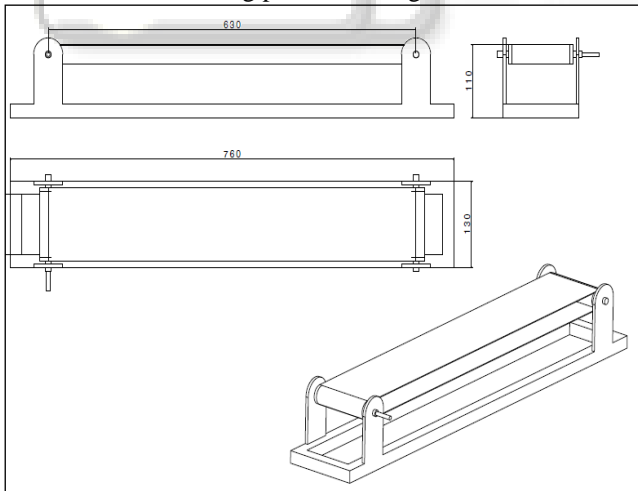
The ATmega328 is a low-power CMOS 8-bit microcontroller based on the AVR enhanced RISC architecture. By executing powerful instructions in a single clock cycle, the Atmega 328 achieves throughputs approaching 1 MIPS per MHz allowing the system designed to optimize power consumption versus processing speed.



### VII. CONVEYOR BELT

The conveyor motor receives power and signal from the central supply through rectifier and control circuit. The control circuit consisting of a potentiometer will allow the user to manually control the speed of conveyor belt by the regulatory knob. Polyester is used as a belt material. A conveyor belt consists of two or more pulleys, with a continuous loop of material - the conveyor belt - that rotates about them.

Here we use hi speed cameras which captures continous images of components and this images are been processed using matlab realtime. As soon as the bottle without cap or label is detected the contrlloing signals are send from Pc to controller to control the flapper in two different direction using predefined angle of rotation.



### VIII. CONCLUSIONS

The Code is generated using MATLAB image processing in conjunction with Arduino. The whole process is documented in the theory sections. There are no more limits but your imagination. One can begin to explore the more advanced functionality that the MATLAB-Arduino platform offer understand as one progress further an further.

It was a valuable experience in making the project design, implementation, and testing of a system that involved digital components. More time was available for the circuit design and implementation, which was able to go through several designs before an acceptable one was reached. Ultimately the system accomplished its primary goal of motor speed control in a clear way

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