AUTOMATED SORTING SYSTEM BASED ON COLOR AND THICKNESS OF WASTE MANAGEMENT

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Abstract - *The increase on amount of waste daily due to lack of waste management and enforcement by the government, has created unpleasant views of overflowed waste at the landfill. The past model intended for programmed arrangement of items dependent on the shading. A sensor was utilized to identify the color of the item and a microcontroller is utilized to control the arrangement and the primary disfavour is -that can't perceive the thickness of the object. The goals of the future work is to assemble a prototype with a sensing mechanism that is capable of type recycle waste (including metal, paper and plastic) and automatically sort the waste correctly to specific partition according to their color and thickness. In addition to providing a detailed information for the composition of the waste management, that shows that impurities represented 28% (moist weight) of the plastic waste, and that about 75% of the plastic waste become characterized as Low-Quality applications, indicating some legislative restoration restrictions. The system can be used as a quality controller by adding more sensors. The outcomes of this work show that the recyclable waste management prototype is able to sort the waste successfully especially the plastic waste and it is highly potential to be utilized in the future.*

KEYWORDS: *Sorting, Micro controller, Sensor, Plastic waste.*

1. INTRODUCTION

These days, in the current situation with extraordinary rivalry, creation effectiveness is for the most part viewed as the key of victory. Creation productivity incorporates the speed at which creation gear and creation line can be bringing down material and work cost of the item, improving quality and bringing down rejects, limiting personal time of creation gear and minimal effort creation hardware. Taking this matter viable the task is created which is exceptionally helpful for ventures.[1]

Machines can perform profoundly dull errands better than people. Specialist weariness on mechanical production systems can result in decreased execution, and cause difficulties in keeping up item quality. A worker who has been playing out an examination task again and again may in the end neglect to perceive the shade of item. Computerizing a considerable lot of the errands in the ventures may assist

with improving the productivity fabricating framework. Computerization is the innovation by which a procedure or help. Computerization or programmed control is the utilization of different control framework for working gear, for example, apparatus, forms in industrial facilities, boilers, what's more, heat rewarding broilers, turning on phone systems, guiding and adjustment of boats, airplane and other applications and vehicles with insignificant or diminished human mediation. A few procedures have been totally mechanized. [2]

This system mainly consists of four parts: sorting, color sensor, thickness sensor, metal detection. The output and input of these parts was interfaced using Arduino. This sorting device separates different objects based on color and type which classifies them into respective cups. This is made up of Arduino UNO, RGB Color Sensor, Ultrasonic sensor, Metal inductive proximity sensor, two Servo Motors and some composite funnels and tube parts. [3]

The sorting systems are used in a manufacturing application like quartz sand sorter, plastic particle sorting of colored nuts and bolts etc. It diminishes the human energy, labour and cost. There are the three main steps in sensing parts, objects detection, and recognition. The machine may correctly perform dealing with station task, namely pick and out mechanism with assist of sensor. [4]

The main benefits of the device are less time required to sort the product, because the whole device is achieved via machine there is less possibility of mistake, much less man energy required. If the enterprise can produce the product inside the required range then the call for of the product will be increased. [5]

2. LITERATURE SURVEY

The compilation of system and interfacing of various elements, sensors, servo motors, Hardware and software package interfacing of the system is prescribed by the "Software Interfacing of TCS3200 color device with arduino " "LIM JIE SHEN [1] during this paper a color sorting automaton is researched designed and created with Arduino UNO microcontroller, TCS3200 color device, SG90 tower professional servo motor and alternative physical science element. They found that color device provides totally different results once it tested outside and indoor. Dhanoj

M.[4] was researched on automatonic arm primarily based color sorting robot mistreatment this TCS3200 color device. They were additionally used liquid crystal display display to display the colour detected. In image process image is captured mistreatment real time system like digital camera so objects are often sorted as per our demand like on the idea of shapes and colors[5]. Li Quaoyi [6] has used one methodology to check sensor's output. They took AN one empty tube and at rock bottom of that tube they placed device and white lightweight is placed at the highest of the tube so they visited recognize the filters are gated in turn to live the red, inexperienced and blue values and calculated alternative parameters. a writing written by Bishop and Lee human eye will provide response solely to the lights that are within the vary of actinic ray spectrum[8].

3. METHOLODGY

The methodology of Automated sorting system based on color and thickness discussed as follows:
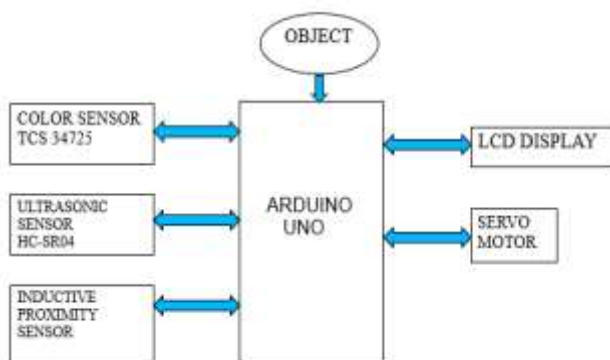
A. BLOCK DIAGRAM

Figure 1: Block diagram of the system

Figure 1 shows the block diagram of the automated sorting system based on color and thickness. In this project we are using two sensors to find out the color and thickness. One is ultrasonic sensor which is used to find the thickness of the object and other is color sensor which is used to determine the color of the object. The observed color and thickness is displayed on LCD display and the sorting process will be done by using servo motors.

B. TCS3200 color sensor

This Arduino compatible TCS3200 color sensing element module carries with it aTCS3200 RGB sensor chip and four white LEDs.This TCS3200 color sensor is used to find out the color of the object

The **TCS3200 chip** consist of 8 pins; those are VCC, GND, OUT,S0,S1,S2,S3, The VCC pin is given to 5v pin of Arduino, GND is given to GND pin of Arduino, OUT is given to digital

D8 pin of Arduino,S0,S1,S2,S3 are given to Digital D4,D5,D6,D7 respectively.

Figure 2: TCS3200 Color Sensor

C. ULTRASONIC SENSOR

Ultrasonic sensor is used to find the thickness of the object. It consists of 4 pins. VCC, Eco, Trig and GND.The VCC pin is connected to 5v pin of Arduino, Trig is given to Digital D12 pin of Arduino, Echo is given to Digital D13 pin of Arduino, GND is given to GND of Arduino. When an object is placed Infront of the sensor then the sensor will capture the distance between the object and fixed distance setted up for an ultrasonic sensor.

Figure 3: Ultrasonic Sensor

D.METAL INDUCTIVE PROXIMITY SENSOR

This metal sensor is INDUCTIVE sensor, which means that it induces current when metal is near to it. The metal proximity sensor has three wires. The blue should be given to the ground, brown should be given to 5v of Arduino, black should be given to Analog A0 pin of Arduino and when you take metal near to the sensor it induces more current which results in higher voltage

Figure4: INDUCTIVE PROXIMITY SENSOR

E. ARDUINO UNO R3

The Arduino UNO is a microcontroller board based on the AT mega328. The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits. It has 14 digital input/output pins (of which 6 can be used as PWD output) and 6 analog inputs which are programmable with the Arduino IDE (Integrated Development Environment) via a type B USB cable

Figure 5: Arduino Uno R3

F. SERVO MOTOR

A servo motor is an electrical device which can push or rotate an object with great precision. If necessary, to rotate and object at some specific angles or distance, then servo motor is used. It consists of 3 wires. The yellow is given to

Digital D3 pin of Arduino, red is given to the 5v of Arduino, brown is given to GND of Arduino. Servo motor can be rotated from 0 to 180 degree.

Figure 6: Servo Motor

G. SYSTEM ANALYSIS

This system is used for sorting the plastic objects based on color and thickness so that it is monitored automatically time to time and the color sensor detects the color of the object and ultrasonic sensor detects the thickness of the object. Based on the color values and thickness the motor is setted up to rotate for 0 to 180 degrees. Initially , the coloured skittles which might be held in the charger drop into the platform attached on the top servo motor of the system. Then the servo motor rotates and brings the skittle to the color sensor which detects its color. After that the bottom servo motor rotates to the unique position after which the top servo motor rotates again till the skittle drop into the guide rail.

H. RESULTS

The project "AUTOMATED SORTING SYSTEM BASED ON COLOR AND THICKNESS OF WASTE MANAGEMENT" has been successfully designed and tested. In this project, sensors used to detect color , thickness and metal of the object It is of low cost, and best solution to detect and sort the objects. This system is shown in below figure 8.
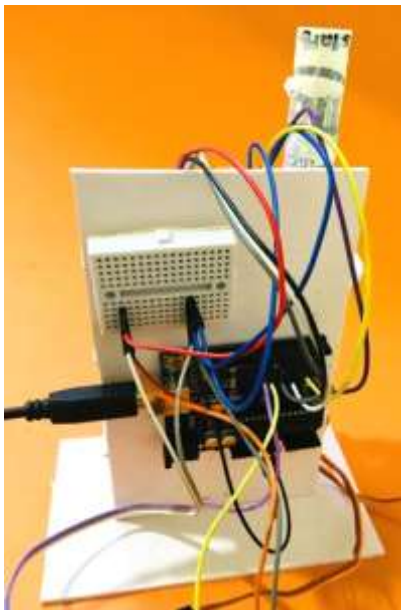
Figure 8: project setup.

After the task has been finished, the undertaking was prepared to be tried. The remote correspondence between Arduino, Sensors and Servo motors are successfully achieved. This prototype is tested and the results are shown below.
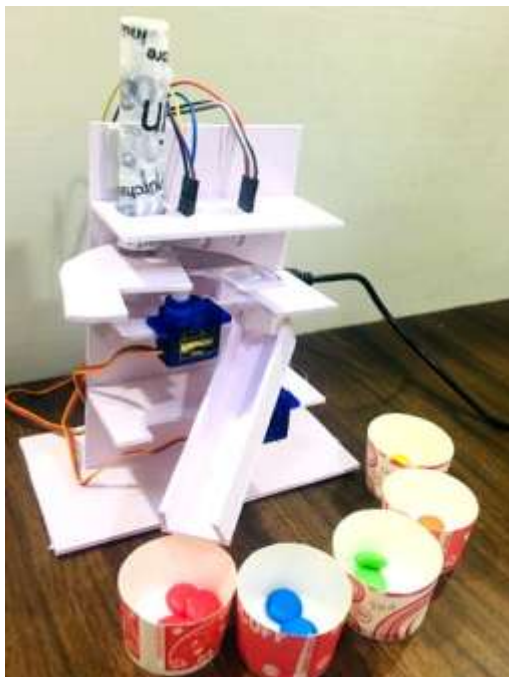

Figure 9: Results after the sorting the objects

From the figure 9, we can see six separate boxes in which different boxes shows the various sorted colors.

4. REFERENCES

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