

IOT Color Based Object Sorting Machine

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Abstract

There is a wide usage of many products in our day to day life, and manufacturing of this products are done in many large scale and small scale industries. Arranging makes quality consistency issue. Nowadays the main difficulty that is faced after the production is of sorting Arranging of items in an industry is a dull modern process, which is by and large done physically. Consistent manual the need of this type of machine in the industries will help in sorting the machine according to their weight, size, color, shape, etc. This paper gives a brief information about the sorting of objects according to their color using TCS3200 color sensor, Arduino UNO and servo motors. The identification of color is done frequency scaling of color detection.

Keywords: Internet of Things (IoT), Color Sensor, Arduino Uno, Global System for Mobile Communications (GSM) module etc.

INTRODUCTION

The Internet of Things (IoT) will be a present correspondence model that envisions a not so aloof future, clinched alongside which those questions from claiming standard normal presence will be furnished for microcontrollers, handsets for electronic correspondence, Furthermore sensible gathering stacks that will make them prepared will talk with one another Also with the clients, turning under a vital bit of the web [1]. The IoT idea, consequently, goes for making the Internet considerably more immersive and inescapable. Besides, by empowering simple access and collaboration with a wide assortment of gadgets, for example, for example, home apparatuses, observation cameras, checking sensors, actuators, showcases, vehicles, et cetera, the IoT will cultivate the advancement of various applications that make utilization of the possibly huge sum and assortment of information produced by such questions give new administrations to subjects, organizations, and open organizations [2]. For closer future, the IoT is relied upon to have house and business utilizes, to add to the personal satisfaction. For instance, brilliant houses will empower their tenant to naturally open their carport when achieving home, set up their espresso, TVs and different employments. Keeping in mind the end goal to understand this potential development, rising advances and

thoughts, and administration applications need to develop relatively to coordinate market requests and buyer's need. Besides, gadgets should be produced to fit client needs as far as accessibility anyplace and whenever. Additionally, new principles are required for correspondence similarity between fluctuated things.

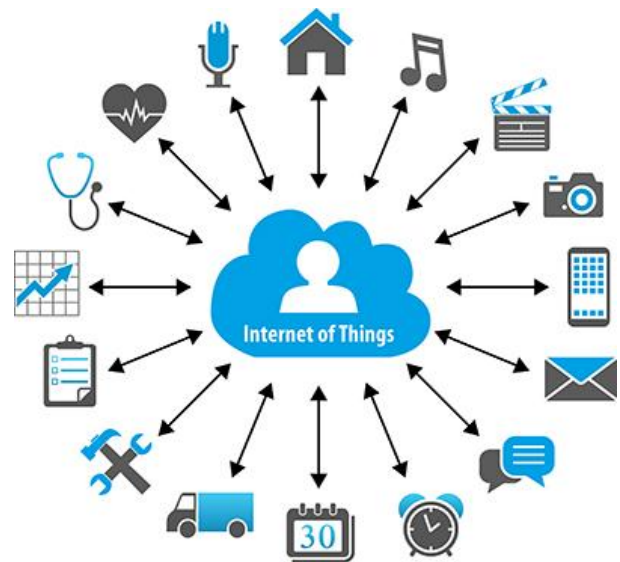


Figure 1: IOT Much bigger than we think [3]

The IoT enables physical things to look, listen, assume and perform businesses by having them "talk" together, to share information and to orchestrate choices. The IoT changes these articles from being conventional to shrewd by its basic advancements, for example, worldwide computing, embedded gadgets, correspondence advances. Shrewd questions alongside their appointed undertakings constitute space particular applications while universal registering and scientific administrations frame application area autonomous administrations Fig-2 shows the general idea of the IoT in which each area particular application is cooperating with autonomous administrations, while in every area sensors and actuators discuss specifically with each other [4].



Figure 2: Innovations due to IoT [5]

LITERATURE REVIEW

This isn't a special idea, for the execution of object sorting machine based on colour, size, weight, etc. The idea has existed for quite a while, after there has been advancement in technology.

Design And Development of Colour Sorting Robot Lim Jie Shen*, Irda Hassan [4] –This gave us the knowledge of how a robot is used for the sorting process and no manual help or labor was needed [7].

Automated Object Sorting Using Raspberry Pi N.Arthi1 , P.Sahithi2 , P.V.Sitaramaih, M.InduVardhani, N. Ranjith Kumar, D. SuneelVarma –This published work gave different ideas in which this sorting mechanism can be taken into consideration [8].

Sorting Of Objects Based On Colour,Weight And Type On A Conveyor Line Using PLC, S. V. Rautu, A. P. Shinde , N. R. Darda,A, V.Vaghule, C, B.Meshram, S. S. Sarawade –their gave us the knowledge of how different sensors are responsible and helpful for the sorting based on weight, colour and metal [9].

TECHNOLOGY FOR OBJECT SORTING

1) Colour sensor

A colour sensor depends on a photodiode which measure the power reflected by the protest for a red, green and blue light source. Because of the same it will help in detecting the specified color. There are total 8 pins in a color sensor.pin no 7 and 8 are selection pins, pin no 1 and pin 2 are frequency scaling pin. Pin 6 is output.

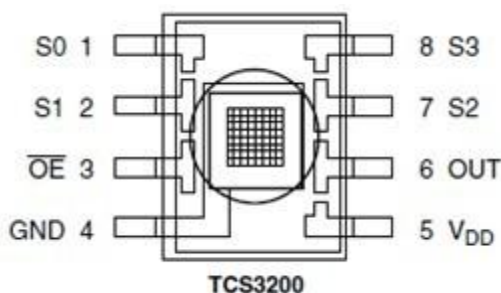


Figure 3: color sensor [6]

Working of color sensor

Each photodiodes have an 8*8 matrix which results into 16 of green filter, 16 or red filter, 16 of blue filter and the rest 16 for clear filter when no colour will be detected.

Pin description of color sensor

Table 1: Pin description [16]

Pin Name	I/O	DESCRIPTION
GND(4)		Power supply ground. All voltages are referenced to GND
OE(3)	I	Enable for fo (active low).
OUT	O	Output frequency (fo).
S0,S1 (1,2)	I	Output frequency scaling selection inputs.
S2,S3 (7,8)	I	Photodiode type selection inputs
VDD (5)		Supply voltage

2) Image processing

In image processing pictures are caught, transmitted, and prepared in advanced frame. Computerized picture handling is one of division in electronic territory where picture is altered to pixels, put away in an advanced stockpiling and prepared by the PC. In result, it diminishes cost computational speed, and adaptability. The center assignment of advanced picture preparing is safeguarding pictures and improves them to the new data structures, to give a superior premise to acquiring and examination of related exercises. Also, the image processing prompts improvement of picture highlights intrigue and helpful data about the scene from upgraded picture could be figured. Propelled picture getting ready, remove information of a photo for taking care of and examination. After taking the photo from the camera, the framework exchanges to a PC for preparing and capacity by utilizing distinctive procedures, for example, picture catching, picture digitization, commotion sifting and highlight recognizable proof [10].

Image processing is done with the following steps.

- Taking the photograph with optical scanner or by electronic mode.
- Analyzing and changing the picture which integrates evidence load and portrait headway and spotting plans that are not to mortal senses like digital TV photos.
- The yield picture can be adjusted representation that relies on picture analysis [14].

3) Robotic technology

In this era where technology is increasing at a high speed, need of manufacturing and handling is also increasing. Robotics has found its place in this area where work can be done without man-handling, resulting into speed and accuracy in work. Robotic technology helps in making task more easily

and efficiently [9]. There are various tasks of a robot which are now widely used. Some of them are:

- Household chores
- Workplace chores
- Hospital works
- Help for the disabled people
- Wars and disasters (calamities that occur) [12].

Hereto be specific, how robotic arm is used for the color sorting machine is discussed. A microcontroller is utilized which does assistance in coordinating the development of automated arm to pick the articles proceeding onward a transport line. This type of arms can be made using different technology and methods like microcontroller, Arduino, raspberry pi etc. In this work it points in grouping the shaded articles which are going ahead the transport by picking and setting the items in its particular pre-customized habitat [13].



Figure 4: Pick and place arm [15]

COMPONENT DESCRIPTION

Apart from colour sensor we have used arduino uno and two servo motors (sg90).

1) Arduino Uno

The Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online. You can tell your board what to do by sending a set of instructions to the microcontroller on the board. To do so you use the Arduino programming language (based on Wiring), and the Arduino Software (IDE), based on Processing.

Over the years Arduino has been the brain of thousands of projects, from everyday objects to complex scientific instruments. A worldwide community of makers - students, hobbyists, artists, programmers, and professionals - has gathered around this open-source platform, their contributions have added up to an incredible amount of accessible knowledge that can be of great help to novices and experts alike.

Arduino was born at the Ivrea Interaction Design Institute as an easy tool for fast prototyping, aimed at students without a background in electronics and programming. As soon as it reached a wider community, the Arduino board started changing to adapt to new needs and challenges, differentiating its offer from simple 8-bit boards to products for IoT applications, wearable, 3D printing, and embedded environments. All Arduino boards are completely open-source, empowering users to build them independently and eventually adapt them to their particular needs. The software, too, is open-source, and it is growing through the contributions of users worldwide [11].



Figure 5: Arduino Uno [17]

2) Servo Motor

It is tiny and lightweight with high output power. This servo can rotate approximately 180 degrees (90 in each direction), and works just like the standard kinds but smaller. You can use any servo code, hardware or library to control these servos. It comes with a 3 horns (arms) and hardware [12].



Figure 6: Servo Motor [18]

The Specifications of servo motor are mentioned below

- Operating voltage: 4.8 V (~5V)
- Operating speed: 0.1 s/60 degree
- Stall torque: 1.8 kgf-cm
- Dead band width: 10 μ s
- Temperature range: 0 °C – 55 °C [16].

PROPOSED WORK

Objects which are to be separated are fed in tube. A color sensor senses the items coming in its sight and code for the same is coded in arduino in such a way that only the desired object colors are sensed and collected in the bins at the end using servo motors.

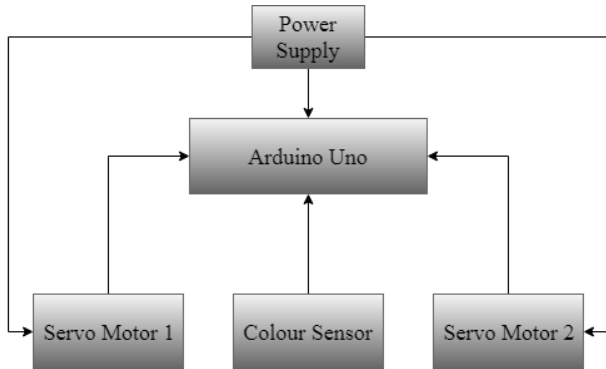


Figure 7: Block diagram of the system

RESULTS AND ANALYSIS

The object are sorted with respect to their colour and dropped into the respective box.

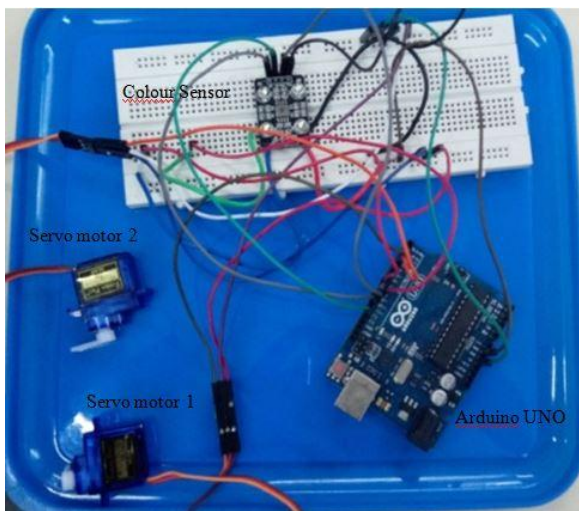


Figure 8: Hardware Implementation of system

Colour Detection Results

When any color from red, green or blue is kept for detection in front of the color sensor then the desired color led is turned on and the output of the sensing of color is seen. First, we keep the green color paper on top of the color sensor, it detects and turns the led on and in the same way, process is done for the other two color which detection is shown in Figure 9 and Figure 10.

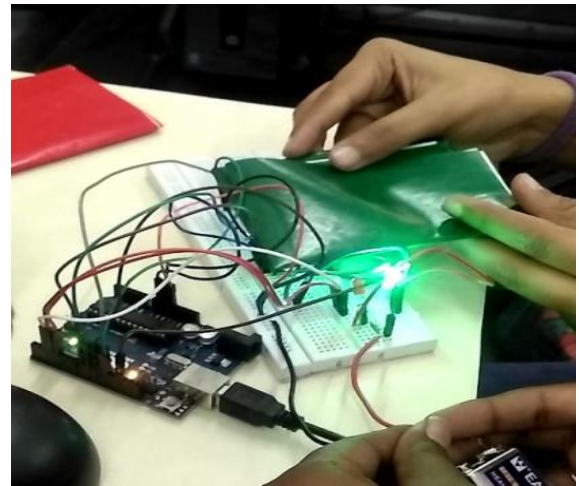


Figure 9: Green color detection



Figure 10: Red color detection

ADVANTAGES AND APPLICATIONS:

Advantages

- Fast
- Accurate
- Good repeatability
- Reduce labor cost
- Less human interference
- Fast
- Accurate
- Good repeatability
- Reduce labor cost
- Less human interference

- Fast
- Accurate
- Good repeatability

- Reduce labor cost
- Less human interference
- Fully automatic operation

Applications

- In food industry to identify rotted fruits and vegetables, in minor scale and big scale productions, to categorize the products established on the several factors.
- In production units to scan and identify the defects in raw materials.
- In fruits and vegetable farming areas (rural areas) where installation of expensive sorters is very difficult.
- In malls (to segregate and separate different clothes, toys, bags etc.) and in small shop.

CONCLUSION

The suggested framework will be a demo rendition which gives expense effective, taking less time and technically the easiest way for differentiating objects. This framework utilizes Arduino Uno which makes this model simple to utilize which is more additional effective. The main failure will be caused if the sensing of object according to color is not done. Therefore, it is very important to have proper and checked sensors. Further, making desirable changes it can be used in small scale and large scale industries as well.

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