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Colour Detection Using Arduino

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***Abstract*—**Colour detection plays a significant role in various industrial and automation applications, ranging from quality inspection to robotics. This paper presents a colour detection system implemented using Arduino and TCS3200 colour sensor. The system detects the RGB components of an object and classifies the corresponding colour in real time. The proposed system is cost-effective, reliable, and suitable for educational as well as industrial purposes..

***IndexTerms*—**Arduino, Colour Detection, TCS3200, RGB Sensor, Automation..

I. Introduction

Colour identification is widely applied in industries such as textiles, printing, packaging, and food processing. Automated colour detection systems reduce human error and increase efficiency. Conventional systems are costly and require advanced image processing platforms. Arduino-based solutions offer low-cost alternatives that can perform efficient real-time colour detection.

This project aims to develop an Arduino-based colour detection system using the TCS3200 sensor. The RGB values obtained from the sensor are processed and displayed through the serial monitor or LCD, providing accurate colour recognition.

LITERATURE SURVEY

Numerous studies have proposed colour sensing systems with varying levels of complexity. Image processing approaches using Raspberry Pi and OpenCV offer high accuracy but at higher cost. Arduino-based designs with TCS3200 sensors provide affordable alternatives with reasonable accuracy for real-time applications.

Table I shows a comparison of common colour detection methods:

Table I. Comparison of Colour Detection Methods

Method	Hardware Used	Accuracy	Cost
Image Processing (OpenCV)	Raspberry Pi + Camera	High	High
RGB Sensor	Arduino + TCS3200	Medium+	Low
Spectroscopy	Specialized Sensors	Very High	Very High

PROPOSED SYSTEM

The proposed system is designed using Arduino Uno and TCS3200 colour sensor. The sensor detects RGB values based on

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reflected light, which are then processed by Arduino. Depending on the intensity of red, green, and blue components, the system identifies the closest colour match.

Fig. 1. Block Diagram of Colour Detection Using Arduino

System Components:

- **Arduino Uno:** Microcontroller for processing.
- **TCS3200 Colour Sensor:** Detects RGB intensity.
- **LCD Display/Serial Monitor:** Displays detected colour.
- **LED Indicators:** Provide visual feedback of identified colour.

The system is simple, reliable, and adaptable for multiple real-time applications.

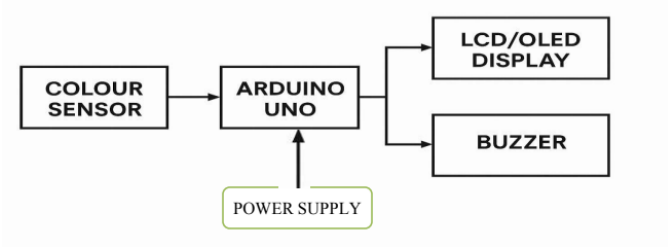

FIG 1: BLOCK DIAGRAM

RESULTS AND DISCUSSION

The prototype was tested with objects of primary colours (red, green, and blue) and secondary colours (yellow, cyan, magenta). The system achieved an accuracy of 88% under controlled lighting conditions and 75% in varying ambient light.

Fig. 2. Sample Output Display of Detected Colours

Results demonstrate that the system can effectively identify and classify colours. However, external factors such as ambient light and distance between sensor and object affect performance. Adding filters or calibration improves accuracy.

CONCLUSION AND FUTURE SCOPE

The Arduino-based colour detection system is an effective low-cost solution for industries and educational purposes. It successfully detects and classifies colours using the TCS3200 sensor. The system can be enhanced by integrating advanced filtering techniques, wireless communication, and machine learning for improved classification.

Future applications include integration with robotic systems, automated sorting machines, and smart packaging solutions.

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