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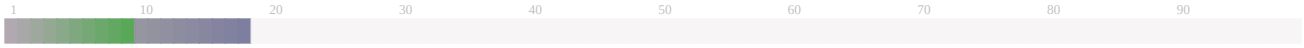

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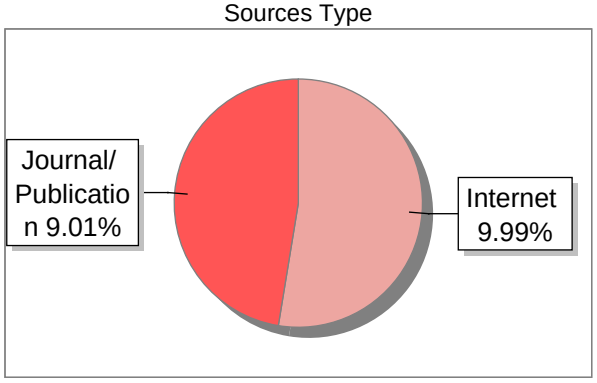

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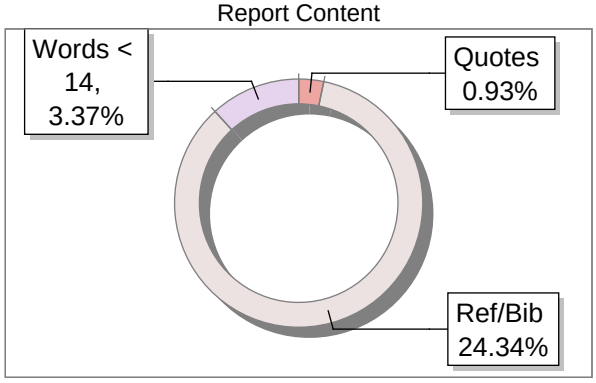

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Automatic Clothes Segregator

Suvarna Kadam
Department of E&TC, Pimpri Chinchwad College of Engineering, Akurdi Pune, India
suvarna.gaikwad@pccoepune.org

Varsha Bendre
Department of E&TC, Pimpri Chinchwad College of Engineering, Akurdi Pune, India
varsha.bendre@pccoepune.org

Ishya Vyas
Department of E&TC, Pimpri Chinchwad College of Engineering, Akurdi Pune, India
isha.vyas@pccoepune.org

Sanika Deshpande
Department of E&TC, Pimpri Chinchwad College of Engineering, Akurdi Pune, India
sanika.deshpande21@pccoepune.org

Yash Dhond
Department of E&TC, Pimpri Chinchwad College of Engineering, Akurdi Pune, India
yash.dhond21@pccoepune.org

Anuj Gavhane
Department of E&TC, Pimpri Chinchwad College of Engineering, Akurdi Pune, India
anuj.gavhane21@pccoepune.org

***Abstract*— In today's era, washing machines are used mainly for cloth washing. Both coloured and white clothes, if washed together there, are possible to mix colours. Colour segregation is needed for washing machines to avoid such situations. The proposed system introduces an Automatic Clothes Segregator that employs the TCS3200 colour sensor and Arduino Uno microcontroller as fundamental components. The Automatic clothes segregator operates on the TCS3200 sensor and detects the colour of incoming garments, converting light intensity into digital signals processed by the Arduino Uno controller. Upon analysis, the controller initiates segregation, directing garments to designated compartments based on colour. Rigorous testing validates the system's reliability and accuracy, showcasing high precision in colour detection and segregation while accommodating a broad spectrum of colours. The proposed system holds significant promise for industries reliant on efficient sorting processes, including laundry services, garment manufacturing, and retail. Integrating advanced sensor technology and microcontroller systems is a transformative step towards automation, promising heightened productivity and resource optimization across diverse operational contexts.**

Keywords*— *Arduino nano, Automation, Color Detection, Segregation, TCS3200

I. INTRODUCTION

This project presents a novel solution called the Automatic Clothes Segregator (ACS), which is aimed at optimizing the sorting process of garments based on their colours. Utilizing the precision of the TCS3200 colour sensor alongside the flexibility of the Arduino Uno microcontroller, the ACS automates the identification and separation of clothes based on their distinct colours. Adhering strictly to IEEE standards, the system ensures the dependability and precision of its functions. The ACS holds significant promise for transforming industries reliant on efficient sorting methods, including laundry services, garment manufacturing, and retail, offering enhanced productivity and resource utilization through integrating advanced sensor technology and microcontroller platforms.

II. LITERATURE SURVEY

The Automatic Clothes Segregator (ACS) employs a TCS3200 colour sensor and Arduino Uno microcontroller to segregate clothes based on their colour [1]. Numerous studies have demonstrated the viability of using Arduino and the TCS3200 for colour sorting in diverse applications, such as sorting industrial parts, tomatoes, and educational aids [1-16]. The potential applications of the ACS span across several industries, including laundry services, garment manufacturing and retail [1, 14, 16]. Automatic sorting can significantly enhance efficiency, reduce human error, and potentially mitigate damages caused by color bleeding during washing [1, 18]. This versatility suggests that the ACS could be a valuable tool in streamlining processes and improving the quality of services in these sectors. The project utilizes established components and presents a novel application focusing on clothes segregation [13, 14, 17]. Existing studies often address sorting in broader contexts, such as object recognition or industrial automation. This targeted approach towards clothes segregation adds a distinctive dimension to the project's contribution to the field of automated sorting systems. Recognizing the limitations like sensitivity to ambient light and the necessity for regular sensor calibration [17-20], future studies could explore integrating advanced sensor technologies and machine learning algorithms. These enhancements could significantly improve colour detection and classification accuracy, thereby boosting the overall effectiveness of the ACS [1, 13, 17].

III. METHODOLOGY

The process flow of the proposed system is shown in Fig.1.This figure explains the working flow of the model and the work of all components to carry the mechanism of clothes segregation.

This automated system commences by identifying incoming clothes and employing a TCS3200 colour sensor interfaced with an Arduino Uno microcontroller to analyze their colour. The servo motor 1 places the clothes below the colour sensor. The clothes are then directed to a designated bin for white clothes or coloured clothes using the servo motor 2. The segregation process is coordinated by Arduino Uno, which operates two servo motors.A battery regulated to 5V via a voltage regulator is used to power this system. This battery supplies energy to Arduino Uno, the color sensor and the servo motors. This setup ensures efficient clothes segregation based on colour, enhancing workflow automation across diverse applications.

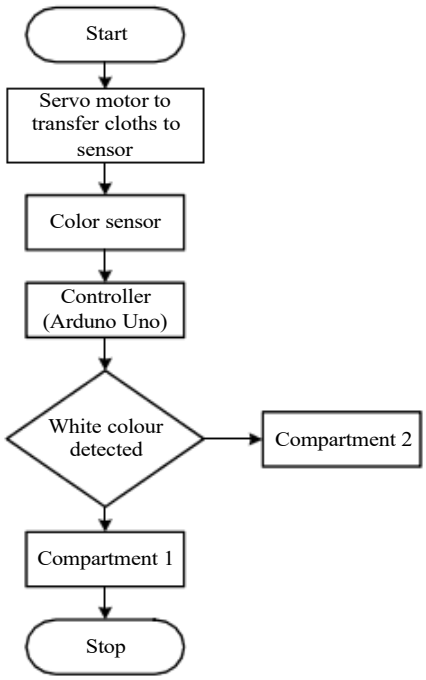

Fig. 1. Process flow of Automated Clothes Segregator

By integrating precise colour detection with servo-controlled segregation, the system offers a reliable and adaptable solution for industries reliant on efficient sorting processes, such as laundry services and retail.

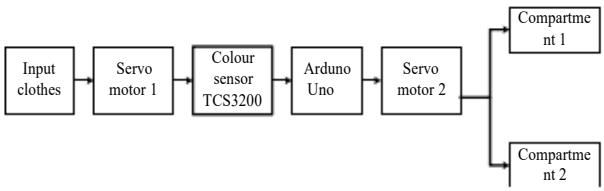

Fig 2. Block diagram of Automated Clothes Segregator

Moreover, its reliance on battery power provides flexibility in deployment, making it suitable for various operational environments where reliable and efficient clothes segregation is essential. The proposed system includes two servo motors, a TCS3200 Colour sensor, and Arduino Uno, two compartments for white and coloured cloths, as shown in Fig.2.

IV. IMPLEMENTATION

Fig.3 shows the interfacing of stepper motors and TCS3200 colour sensor with Arduino nano.

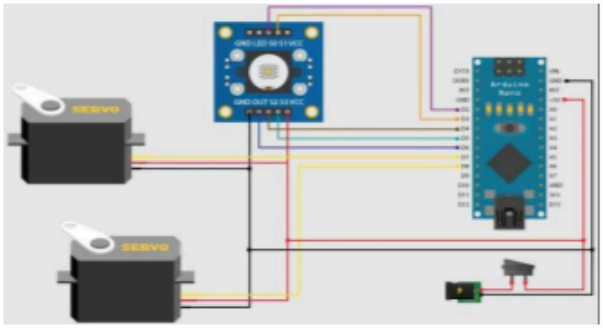

Fig. 3. Circuit Diagram of Automated Clothes Segregator

Fig.4 shows the working prototype model of the Automatic Clothes Segregator.

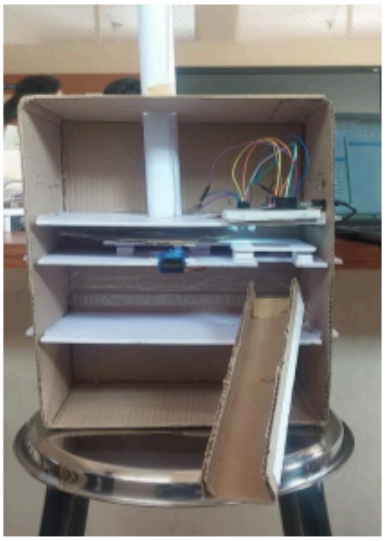

Fig.4. Working prototype model of Automated Clothes Segregator

The servo motor is seamlessly integrated into the system to ensure optimal functionality, with specific connections to the Arduino Nano. Its VCC pin is linked to the 5V pin on the Arduino Nano, providing a consistent power supply. Meanwhile, the GND pin is connected to the ground pin for proper grounding. The servo motor's control signal is intricately tied to a PWM (Pulse Width Modulation) pin, typically designated as pin 9 on the Arduino Nano. This arrangement allows for precise control over the motor's movements. During operation, the Arduino Nano receives input signals from sensors, often indicating the type of clothing detected. Based on this input, the Arduino Nano sends a corresponding signal to the servo motor through the control pin. As a result, the servo motor rotates to a predefined position, activating a mechanism configured for sorting clothing items. This streamlined and automated setup

enhances efficiency and accuracy in various sorting applications.The system demonstrates effective colour-based clothing classification. Accurately identifying colours mitigates issues like colour bleeding and fading in textiles. The proposed system also addressed sensitivity to ambient light and the need for regular sensor calibration. Future research can explore advanced sensor technologies and machine learning algorithms to enhance colour detection and classification accuracy, overcoming existing limitations.

V. CONCLUSION

This project presents a comprehensive solution for automating clothing sorting based on predefined criteria. By integrating servo motors controlled by an Arduino Nano microcontroller, we achieve precise sorting operations in response to input signals. The meticulous connections between the servo motor and the Arduino Nano ensure reliable functionality, with optimized power supply and signal transmission for seamless operation. The project's significance lies in its potential to streamline sorting processes across various industries, including logistics, retail, and manufacturing. With the Arduino Nano as the central controller, the system demonstrates adaptability and scalability, making it suitable for diverse operational settings. By harnessing servo motor technology and microcontroller capabilities, our project underscores the power of automation in enhancing workflow efficiency and precision. Future refinements and enhancements could further expand the project's functionalities, solidifying its role as a valuable asset in modern automation and sorting systems.

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