Design and Construction of a Conveyor-Based Color-Sorting System Using Mitsubishi PLC

Lâm Lục Sơn Bách
Thai Nguyen University of Information and Communication Technology
Thai Nguyen University, Thai Nguyen, Vietnam
student465@ictu.edu.vn

***Abstract*—This thesis presents the design and construction of a color sorting system using Mitsubishi PLC. The system is designed to sort products based on their color using a conveyor belt and sensors. The work includes the design of the hardware and software, as well as the implementation of the color sorting algorithm. The system was tested with different colored products, and the sorting process was observed and documented. The system was able to accurately sort products based on their color, but limitations such as time constraints and limited experience were acknowledged, and suggestions for future improvements were provided.**

***Index Terms*—PLC, Mitsubishi, color sorting, conveyor belt, Arduino**

I. Introduction

The thesis introduces the concept of color sorting systems and their applications in industrial settings. It highlights the advantages of automated color sorting systems and the role of PLCs in such systems. The research aims to develop a practical model for color sorting using Mitsubishi PLC. The project focuses on the design and construction of a color sorting system that can be used in various industrial applications, such as food processing and manufacturing. The system is intended to improve efficiency and reduce human error in the sorting process [1]. Related earlier ICTU undergraduate theses provide context for this English summary [8]. Published articles on the methods and subject of this project provide context for this English summary [9], [10].

II. Methods

The methods section describes the design and construction of the color sorting system, including the selection of hardware components and the implementation of the color sorting algorithm using Arduino and Mitsubishi PLC. The system is tested through practical implementation and validation. The hardware components include a conveyor belt, sensors, and a PLC. The software implementation involves the use of Arduino for initial color detection and Mitsubishi PLC for the final sorting decision. The system was tested with different colored products, and the sorting process was observed and documented. The system was able to accurately sort products based on their color, but limitations such as time constraints and limited experience were acknowledged, and suggestions for future improvements were provided [1].

Supervisor: Nguyễn Ngọc Ánh, Thai Nguyen University of Information and Communication Technology (nnanh@ictu.edu.vn).

III. Results

The results section details the successful implementation of the color sorting system. The system was tested with different colored products, and the sorting process was observed and documented. The system was able to accurately sort products based on their color. The implementation involved the use of sensors to detect the color of the products and the PLC to make the final sorting decision. The system was tested with various colored products, including red, blue, and green, and the sorting process was documented. The system was able to accurately sort the products, but limitations such as time constraints and limited experience were acknowledged, and suggestions for future improvements were provided [1].

IV. Discussion

The discussion section evaluates the performance of the color sorting system. The system was found to be effective in sorting products based on their color. However, limitations such as time constraints and limited experience were acknowledged, and suggestions for future improvements were provided. The system was tested with different colored products, and the sorting process was observed and documented. The system was able to accurately sort products based on their color, but limitations such as time constraints and limited experience were acknowledged, and suggestions for future improvements were provided. The system could be improved by incorporating more advanced color detection algorithms and expanding the range of colors that can be sorted [1].

V. Conclusion

The conclusion reiterates the successful development of the color sorting system and the importance of such systems in industrial applications. It also highlights the need for further research and development to enhance the system's capabilities. The system was able to accurately sort products based on their color, but limitations such as time constraints and limited experience were acknowledged, and suggestions for future improvements were provided. The system could be improved by incorporating more advanced color detection algorithms and expanding the range of colors that can be sorted. The research provides a practical model for color sorting using Mitsubishi PLC and highlights the potential for further advancements in the field [1].

References

[1] Lâm Lục Sơn Bách, ”Design and Construction of a Conveyor-Based Color-Sorting System Using Mitsubishi PLC,” internal undergraduate thesis (original in Vietnamese), Thai Nguyen University of Information and Communication Technology, 2023.

[2] Trần Ngọc Hải, Giáo trình Hệ thống truyền động thủy lực và khí nén, NXB Xây dựng

[3] Phạm Văn Huy, Hệ thống điều khiển Điện - khí nén và thủy lực, Trường đại học kinh tế - kỹ thuật công nghiệp

[4] Nguyễn Ngọc Phương, Nguyễn Trường Thịnh, Giáo trình thí nghiệm công nghệ thủy lực và khí nén, NXB Đại học Quốc gia TP.HCM

[5] Lê Tiến Dũng, Điều khiển khí nén và thủy lực, NXB Giáo dục

[6] Bùi Hải Triều, Hệ thống điều khiển khí nén và thủy lực, NXB Giáo dục

[7] Trần Thu Hà, Phạm Quang Huy, Tự động hóa trong công nghiệp với Wincc, NXB Hồng Đức 73

[8] Nguyễn Quốc Huy, ”Design of a Product Sorting System Based on Color Using S7-1200 PLC,” internal undergraduate thesis, Thai Nguyen University of Information and Communication Technology, 2021.

[9] Aung Thike, Zin Zin Moe San, Dr. Zaw Min Oo, ”Design and Development of an Automatic Color Sorting Machine on Belt Conveyor,” International Journal of Science and Engineering Applications, vol. 8, no. 7, pp. 176-179, 2019. DOI: 10.7753/ijsea0807.1002.

[10] Tasnuva Jahan Nuva, Md. Imteaz Ahmed, Sarker Safat Mahmud, ”Design & Fabrication of Automatic Color & Weight-Based Sorting System on Conveyor Belt,” Journal of Integrated and Advanced Engineering (JIAE), vol. 2, no. 2, pp. 147-157, 2022. DOI: 10.51662/jiae.v2i2.87.