Construction of Software Control and Monitoring System for Autonomous Parking Lot Using S7-1200 PLC and Monitoring Control Through WinCC Interface

Chu Quang Vũ
Thai Nguyen University of Information and Communication Technology
Thai Nguyen University, Thai Nguyen, Vietnam
student468@ictu.edu.vn

***Abstract*—This thesis focuses on the development of a software control and monitoring system for an autonomous parking lot using the S7-1200 PLC and WinCC interface. The author explores the operation principles of autonomous parking systems, the S7-1200 PLC, and WinCC software. The work involved programming the control of an autonomous parking model using S7-1200 and designing a monitoring interface with WinCC. The system was connected to the hardware to control and monitor its operations. The project aimed to address the growing need for efficient parking solutions in Vietnam, where the increasing number of vehicles, especially cars, has led to infrastructure challenges. The author successfully developed a system for an autonomous parking lot using S7-1200 PLC and WinCC, but no specific evaluation metrics or performance data were provided.**

***Index Terms*—PLC S7-1200, WinCC, autonomous parking, control system, monitoring interface**

I. Introduction

The thesis addresses the increasing need for efficient parking solutions in Vietnam, where the number of vehicles, particularly cars, has surged, leading to significant infrastructure challenges. The author highlights the implementation of automated multi-level parking systems in various countries, including both Asian and Western nations. The project aimed to develop a system for an autonomous parking lot using S7-1200 PLC and WinCC. The work involved researching autonomous parking systems, understanding the S7-1200 PLC and WinCC software, programming the control system, and designing the monitoring interface. The author also connected the software with the hardware to control and monitor the operations of the parking lot model [1]. Related earlier ICTU undergraduate theses provide context for this English summary [7], [8], [9], [10], [11].

II. Methods

The methods involved researching autonomous parking systems, understanding the S7-1200 PLC and WinCC software, programming the control system, and designing the monitoring interface. The author also connected the software with the hardware to control and monitor the operations of the parking lot model. The S7-1200 PLC was used to control the parking model, while WinCC was employed to design the monitoring interface. The author implemented various functions, including Move Step, Set_Home_Step, and Jog_Move_Step, to control the parking model's movements. The system was connected to the hardware to ensure seamless operation and monitoring [1].

Supervisor: Vũ Thành Vinh, Thai Nguyen University of Information and Communication Technology (vtvinh@ictu.edu.vn).

III. Results

The author successfully developed a software control and monitoring system for an autonomous parking lot using S7-1200 PLC and WinCC. The system included programming the control of the parking model, designing the monitoring interface, and connecting the software with the hardware. However, no specific evaluation metrics or performance data were provided to assess the system's effectiveness or efficiency. The implemented functions, such as Move Step and Set_Home_Step, were designed to control the parking model's movements, but their actual performance was not reported [1].

IV. Discussion

The author discussed the findings related to the operation principles of autonomous parking systems, the S7-1200 PLC, and WinCC software. The work involved programming the control of the parking model and designing the monitoring interface, which were then connected to the hardware for control and monitoring. The author acknowledged the limitations of the project, such as the lack of specific evaluation metrics, and expressed a desire for further improvements.

V. Conclusion

The author concluded that the project successfully developed a software control and monitoring system for an autonomous parking lot using S7-1200 PLC and WinCC. The author identified opportunities for further improvement. The project aimed to address the growing need for efficient parking solutions in Vietnam, but no specific performance data or evaluation metrics were provided to demonstrate the system's effectiveness [1].

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