Design of a Parking System Control and Monitoring for Autonomous Parking

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***Abstract*—This thesis focuses on the design and implementation of a control and monitoring system for an autonomous parking facility. The author explores the current state of parking systems, the use of PLC S7-1200 and HMI for communication, and the implementation of a model parking system. The work contributes to the understanding of autonomous parking systems and their practical application. The author successfully designed and implemented a model autonomous parking system, including the control and monitoring system through the HMI. However, the project faced limitations due to the scarcity of relevant literature and the constraints of time and experience. The author acknowledges the need for further research and development in this field.**

***Index Terms*—PLC S7-1200, HMI, autonomous parking, control system, monitoring system, parking facility**

I. Introduction

The thesis addresses the increasing demand for parking spaces in major Vietnamese cities due to rapid growth in personal vehicles. It highlights the challenges of traditional parking methods and the benefits of autonomous parking systems, which can improve traffic flow, urban aesthetics, and convenience for car owners. The author, a Vietnamese undergraduate, chose this topic to explore the practical implementation of autonomous parking systems using PLC S7-1200 and HMI. Related earlier ICTU undergraduate theses provide context for this English summary [7], [8]. Published articles on the methods and subject of this project provide context for this English summary [9], [10].

II. Methods

The author investigated the general overview of autonomous parking systems, studied the PLC S7-1200 and HMI, and designed and constructed a model autonomous parking system. The implementation involved programming and configuring the PLC S7-1200 for communication with the HMI. The author developed several functions, including the control and monitoring of parking spaces, the movement of vehicles, and the positioning of parking bays. The project utilized a combination of theoretical knowledge and practical experience to design and implement the system [1].

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III. Results

The author successfully designed and implemented a model autonomous parking system, including the control and monitoring system through the HMI. The system was tested with a series of functions, such as vehicle movement and parking bay positioning. However, due to the limitations of the project, no quantitative evaluation was conducted to measure the system's performance. The author documented the implementation process and provided code for the control and monitoring functions [1].

IV. Discussion

The thesis provides insights into the design and implementation of an autonomous parking system, focusing on the use of PLC S7-1200 and HMI. The author acknowledges the limitations due to the scarcity of relevant literature and the constraints of time and experience. The project faced challenges in finding comprehensive resources and in the practical implementation of the system. The author suggests that further research and development are needed to improve the system's efficiency and reliability [1].

V. Conclusion

The author concludes that the project helped consolidate and expand their knowledge, and provided practical experience. The project, while successful in its basic implementation, highlights the need for more extensive research and development in the field of autonomous parking systems [1].

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