LED Matrix Display Design and Control via Computer Communication Through RS-232

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***Abstract*—This thesis presents the design and implementation of a LED matrix display, controlled by a computer through RS-232 communication. The system can display up to 7 characters at a time and supports basic effects. The design includes a microcontroller Atmega16 and various components for data transmission. The software part is implemented in C# and C for the computer interface, and the communication was established through RS-232. The system can be applied in various fields such as advertising, currency information, and data collection displays. However, due to the limited time and budget, some issues remain, including the lack of Vietnamese font support and limited color display. The system successfully displays English text and supports basic effects, but further improvements are suggested for future work.**

***Index Terms*—LED matrix, RS-232, microcontroller, C#, C**

I. Introduction

The thesis focuses on the design and implementation of a LED matrix display, which can be controlled by a computer through RS-232 communication. The system is capable of displaying up to 7 characters at a time and supports basic effects. The design includes a microcontroller Atmega16 and various components for data transmission. The system can be applied in various fields such as advertising, currency information, and data collection displays. However, due to the limited time and budget, some issues remain, including the lack of Vietnamese font support and limited color display [1]. Published books on the methods and subject of this project provide context for this English summary [7].

II. Methods

The design and implementation of the LED matrix display system were carried out using a microcontroller Atmega16 and various components. The software part was implemented in C# and C for the computer interface, and the communication was established through RS-232. The system was tested by sending characters from the computer to the microcontroller via the RS-232 interface. The microcontroller then controlled the LED matrix to display the received characters. The system was also tested for basic effects, such as blinking and scrolling. The design and implementation process involved careful selection of components and programming to ensure reliable communication and display functionality [1].

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III. Results

The system can display up to 7 characters at a time and supports basic effects. The content can be changed arbitrarily from the computer through the COM port. The interface is user-friendly and simple. The system can display English text and has potential applications in advertising, currency information, and data collection displays. However, due to the limited time and budget, some issues remain, such as the lack of Vietnamese font support and limited color display. The system was tested with various characters and basic effects, and it performed as expected. However, the lack of Vietnamese font support and limited color display were noted as limitations [1].

IV. Discussion

The system has successfully addressed the requirements set by the thesis. However, there are still some limitations, such as the lack of Vietnamese font support and the limited number of colors. The thesis suggests future improvements, including the design of Vietnamese fonts, increasing the number of colors, and enhancing the effects. The system's performance and functionality were satisfactory, but further development is needed to address the identified limitations [1].

V. Conclusion

The system has successfully addressed the requirements set by the thesis. However, there are still some limitations, such as the lack of Vietnamese font support and the limited number of colors. The thesis suggests future improvements, including the design of Vietnamese fonts, increasing the number of colors, and enhancing the effects. The system's performance and functionality were satisfactory, but further development is needed to address the identified limitations [1].

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