Control of Ventilation Fans in Factories Using PID Algorithm

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***Abstract*—This thesis focuses on the control of ventilation fans in factories using the PID algorithm. The author describes the design and implementation of a system that uses an Arduino microcontroller, temperature sensors, and relays to control the fans based on temperature readings. The system was tested and found to be compatible with software. However, the experimental model was simple and further improvements are needed. The study covers the structure and operation of ventilation fans, the control of factory ventilation fans, and the design of the hardware and software. The author acknowledges the limitations of the experimental setup and the need for more advanced testing in the future.**

***Index Terms*—PID control, ventilation fans, Arduino, temperature sensors, relays**

I. Introduction

The thesis provides an overview of ventilation systems in factories, their importance, and the role of fans. It covers the classification of industrial fans and the design and calculation of ventilation systems. The author introduces the PID control algorithm, explaining its components and how they are combined. The study aims to improve the efficiency and effectiveness of ventilation systems in industrial settings by implementing a PID-controlled fan system [1]. Related earlier ICTU undergraduate theses provide context for this English summary [9], [11]. Published books on the methods and subject of this project provide context for this English summary [10].

II. Methods

The methods section details the design of the system, including the use of an Arduino microcontroller, temperature sensors, relays, and other components. The author describes the system's operation and the algorithms used to control the fans based on temperature readings. The system was tested using a simple experimental setup, which involved connecting the temperature sensors to the Arduino and controlling the fans through relays. The author also mentions the use of a software interface for monitoring and controlling the system [1].

III. Results

The thesis reports a constructed experimental model for ventilation-fan control with Arduino hardware, a temperature sensor, and PID-based control logic. Its conclusion states that the prototype ran compatibly with the control software, while describing the model as simple and in need of further improvement. The document provides the hardware design and algorithm flow but no reliable aggregate performance benchmark for factory operation. The result therefore supports a proof-of-concept prototype rather than validated industrial deployment [1].

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IV. Discussion

The author discusses the basic knowledge gained from the study, including the structure and operation of ventilation fans, the control of factory ventilation fans, and the design of the hardware and software. The system was tested and found to be compatible with software, but the experimental model was simple. The author suggests that the system could be improved by incorporating more advanced sensors and control algorithms. The study provides a foundation for further research into the application of PID control in industrial ventilation systems [1]. Earlier ICTU undergraduate work addressed computer-assisted fan control and aerodynamics [8].

V. Conclusion

The author concludes that the project successfully completed the design and implementation of a ventilation fan control system using the PID algorithm. However, the experimental model is still simple, and further improvements are needed. The author acknowledges the limitations of the current setup and the need for more advanced testing in the future. The study provides valuable insights into the application of PID control in industrial ventilation systems and paves the way for future research and development [1].

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