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AI Based Modelling of Chemical Plant

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Abstract: This project focuses on the design and implementation of an AI-based modeling system for a distillery plant, aiming to enhance process efficiency, optimize resource utilization, and ensure consistent product quality. Traditional distillery operations often face challenges such as fluctuating feedstock quality, energy inefficiencies, and manual control limitations. To address these issues, this project integrates Artificial Intelligence (AI) techniques—including machine learning, predictive analytics, and process optimization—into the core operational workflow of the distillery.

The AI model is trained using historical and real-time process data from key distillery units such as fermentation, distillation, and dehydration. It enables predictive control over critical parameters such as temperature, pH, flow rates, and alcohol concentration. Advanced algorithms like Artificial Neural Networks (ANNs) and Support Vector Machines (SVMs) are employed for process modeling, anomaly detection, and yield prediction. The system also incorporates a user-friendly interface for real-time monitoring and decision-making support.

By deploying this AI-based solution, the distillery can achieve significant improvements in operational reliability, product consistency, energy efficiency, and sustainability. This project demonstrates the transformative potential of AI in modernizing traditional industrial processes and sets a foundation for smart manufacturing in the beverage and biofuel industries..

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