Chapter 6
AI-Powered Culinary Innovation:
Exploring the Intersection of Technology and Gastronomy in Smart Cooking

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ABSTRACT

The way food is prepared, cooked, and consumed is changing as a result of the culinary industry's adoption of artificial intelligence (AI). This essay examines how artificial intelligence (AI) is improving cooking techniques, from automating meal preparation to customizing culinary experiences. By increasing productivity, encouraging creativity, and promoting sustainability, AI-powered appliances like smart ovens, robotic chefs, and meal planning assistants are transforming kitchens in both homes and businesses. Applications for computer vision and machine learning make it possible to identify ingredients, automate cooking procedures, and create novel flavour combinations based on personal preferences. Additionally, by decreasing food waste, maximizing energy use, and enhancing cooking efficiency, AI-driven tools provide substantial sustainability benefits. With systems made to meet dietary and health needs, this study also emphasizes AI's expanding impact on personalized nutrition.

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INTRODUCTION

Artificial intelligence is rapidly revolutionizing the culinary industry, transforming various aspects from farm to fork. At its core, AI brings enhanced efficiency, precision, and personalization to food production, service, and even culinary creativity. This includes optimizing agricultural practices for better yields and sustainability, streamlining food manufacturing processes with automated quality control and predictive maintenance, and revolutionizing supply chain management through accurate demand forecasting and waste reduction (Singh et al., 2024; Deri et al., 2024; Chourasia et al., 2025). In restaurants, AI powers everything from intelligent ordering systems and robotic chefs that ensure consistent dish quality, to personalized customer recommendations and efficient delivery logistics. Beyond operational improvements, AI is also impacting the culinary arts by assisting with recipe development, flavor profiling, and even guiding food presentation, fostering innovation and pushing the boundaries of traditional cooking. The overall impact is a more efficient, sustainable, and customer-centric food ecosystem (Singh et al., 2024; Deri et al., 2024). The integration of Artificial Intelligence (AI) into the culinary industry is rapidly transforming food preparation, cooking, and consumption. From robotic chefs to AI-driven recipe generators, these technologies enhance efficiency, creativity, and sustainability. For instance, smart ovens leverage machine learning (ML) to optimize cooking parameters, reducing energy consumption by 12–18% in pilot studies (Chen et al., 2021), while AI meal planners minimize household food waste by up to 20% (Garcia et al., 2022). These advancements create a bridge between automation and artistry, allowing both professionals and home cooks to explore innovative techniques.

Importance of AI in Culinary Practices

AI is now a vital collaborator in the artistic process of cooking, going beyond simple automation in food preparation. As a result, home cooks and professionals alike are now free to try out novel methods and ingredients. AI is revolutionizing the way people think about and experience food by suggesting creative recipes and customizing meals to suit individual preferences and dietary requirements. Furthermore, AI has an impact on sustainability initiatives, where it is applied to reduce waste and maximize resource management, resulting in a more sustainable food system. AI's ability to support individual health goals by personalizing nutrition adds even more value to the technology (Sharma et al., 2025). The innovations discussed in this paper build upon patented technologies and designs related to culinary AI systems and sustainable food management (Majumder et al., 2023).