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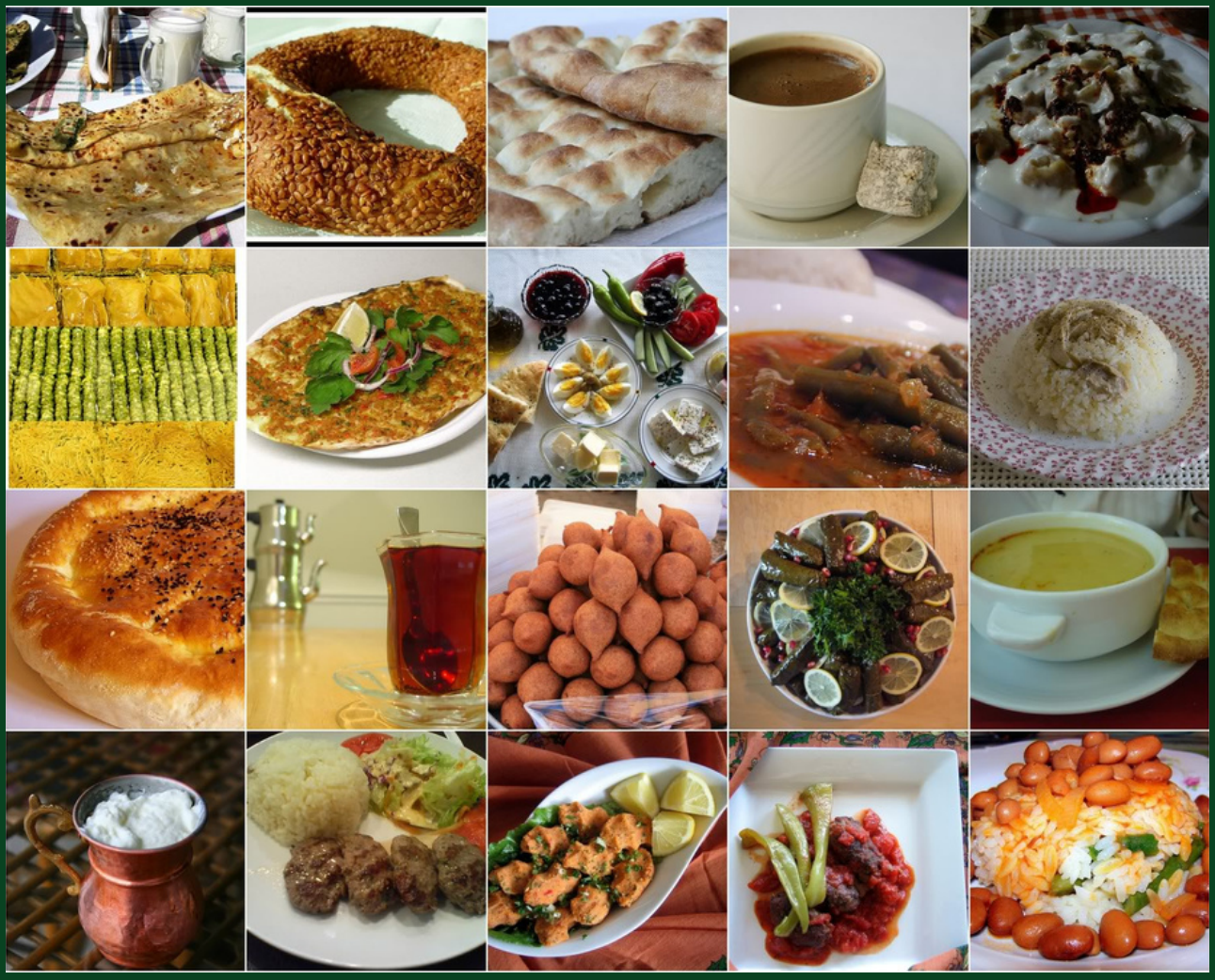

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THE ROLE OF 3D PRINTING TECHNOLOGY IN PROVIDING FOOD SAFETY

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ABSTRACT

Introduction: Food security faces increasing threats from population growth, low agricultural investment, and distribution inequalities. This insecurity results from various challenges, such as diseases, technological limitations, and distribution issues, especially in vulnerable regions where conventional technologies and food safety tests may be insufficient for detecting foodborne diseases. In this sense, 3D printing technologies offer an opportunity to create portable, reliable, and low-cost sensors that can address these gaps in food safety (1).

Main Text: 3D-printed sensors play a critical role in sectors like agriculture (2,3), water safety (4,5), food processing (6,7), and handling, where there is a need for reliable and affordable tools to detect food safety threats. Particularly in vulnerable areas, the need for portable and cost-effective devices to identify such threats has driven innovation in this field (1). These devices can detect not only food security but also health risks associated with food contamination. Additionally, they can detect toxic substances in water, which is crucial for preventing health issues caused by waterborne contamination (1).

Fresh produce, including meat, vegetables, fruits, and dairy, is prone to contamination that is not visible to the naked eye. Using sensors with colorimetric indicators on product packaging could alert consumers to potential food spoilage, helping them use items within their shelf life and lowering the risk of food poisoning. In addition, this technology has the potential to be used on an industrial level in product collection, processing, packaging, and distribution processes, with devices and sensors that can be used in large-scale agricultural fields (1).

Conclusion: 3D printing sensors that can be integrated into systems have great potential to improve food safety with their flexible and customizable nature. As the challenges of using 3D printing technologies in large-scale production are solved, innovations focusing on food production and safety will pave the way.

Keywords: 3D printing technologies, 3D printing sensors, food safety

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