

Designing 3-D printed foods for personalized nutrition

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GAP-040

Project Objectives

- To identify low-cost nutritious indigenous/underutilized/unexplored food sources as base materials for additive manufacturing.
- To develop and optimize conditions for 3-D printing of foods by integrating technologies like electrospinning and microencapsulation.
- To standardize formulations for new product development based on personalized dietary requirements.

Description

3D printing is a digitally controlled robotic process involving construction of complex solid geometries layer by layer, binding them together either by phase transitions or chemical reactions. In the food industry, 3D printing or Additive Manufacturing (AM) or Food Layered Manufacture (FLM) has the potential to offer a novel platform for mass customization of food. The proposed research will employ a food 3D printer comprising of a frame, mechanical seals, control circuit and motor. The control circuit will be the key component integrating the computer and the printer. With digitization control over the material supply feeding system, we will be manipulating the fabrication process to cater to the needs (of developing personalized products for children and women). After generating the codes, the process parameters will be tuned to print the food. We propose to develop mass-producible strategies for low-cost manufacturing nutrient-rich foods for personalized dietary requirements of persons with critical health disorders/deficiencies. Integrating printing and nutrition model enables the users to calculate the exact data of nutrients and calories requirements. The functional foods are easily fabricated using this technique, they are developed by upgrading or substituting or enriching or eliminating the constituents of the material supply. The personalization of nutrients in printing is done in two ways: controlling the amount of food to be printed and calibrating natural/nutritional ingredients during design. The new development in this field is delivering the nutrients through microencapsulation technique. Hence, food printing provides a convenient way to digitize people's nutrition and energy requirements. The objective of food printing is to increase the production efficiency and reduce the cost of manufacturing. The consumers may configure or transact designs from an e-commerce platform. The consumers are assisted through mobile apps and websites. It reduces the distribution costs, simplifies the food service and products reaches the consumer in short time. With the development of this technique the need for warehousing, transportation, and packaging can be reduced significantly. With a simplified supply chain, it is possible to improve efficiency of popularizing the printed foods.