

3D PRINTING IN THE FOOD INDUSTRY

2023

3D PRINTING APPLICATIONS IN THE FOOD INDUSTRY



Availability

3D-printed food has the potential to solve problems in global food production and to make the food system more efficient. Research is underway to 3D print vegetables to combat food insecurity.



Supply chain

3D printing can reduce food-human contact during manufacturing, customize food for special diets and is possible to print on-site, thus making it independent of traditional supply chains.



Sustainability

To avoid waste, only the material that is actually needed is processed during printing. Food waste can be processed and used in different ways with 3D printing. Additionally, many companies are developing 3D printed vegan meat alternatives.



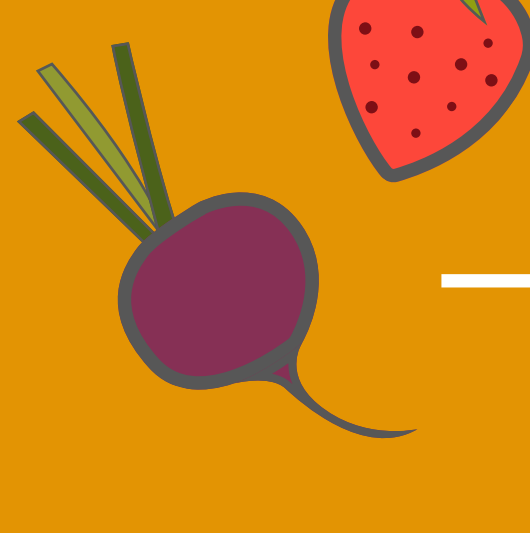
Emerging Applications

There are projects that print food for medical patients with eating difficulties. The U.S. Army has researched 3D printing food for soldiers' MRE meal kits. NASA has been researching 3D printed food for long space missions. Real meat is being 3D printed from lab grown cultured cells.

3D PRINTED FOOD PARTS

MASHED POTATO STRUCTURES (JIANGNAN UNIVERSITY)

Easily extruded, mashed potatoes can be made into bowls, decorations or different shapes to give new complexity to the classic food.

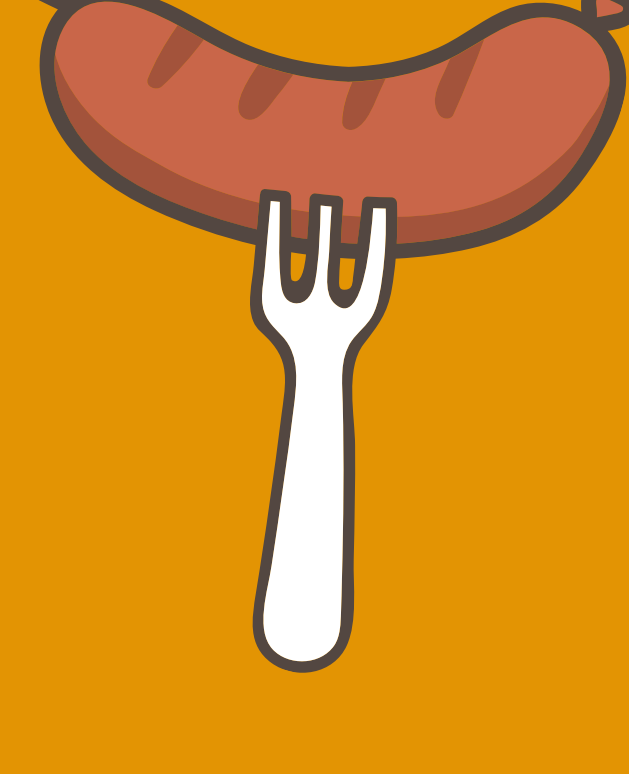


OTHER RECONSTITUTED FRUIT & VEGETABLES (UNIVERSITY OF SINGAPORE)

3D printed shapes made from vegetables and fruit allow people to taste familiar foods in new forms.

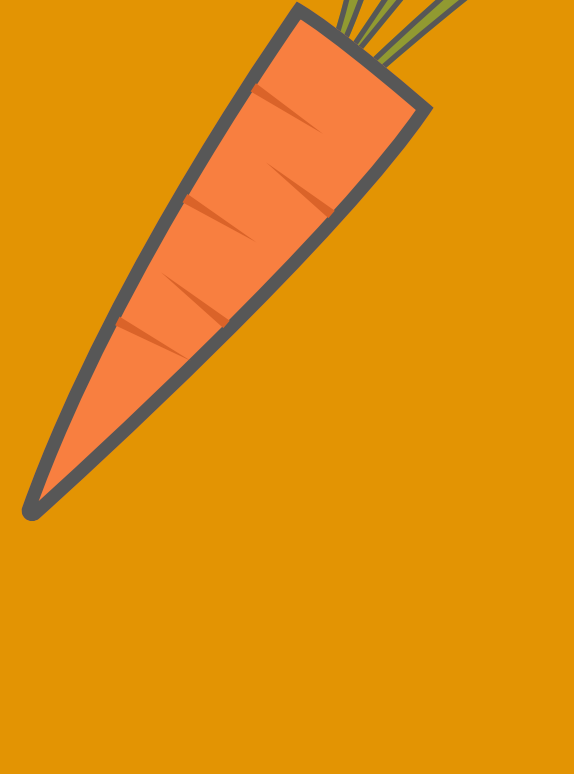
VEGAN MEAT (NOVAMEAT)

3D printing plant-based meat in ways that better create flavor and texture.



SOLID CARROTS (CARNEGIE MELLON UNIVERSITY)

SLA-printed carrots made from edible vegetable ink.



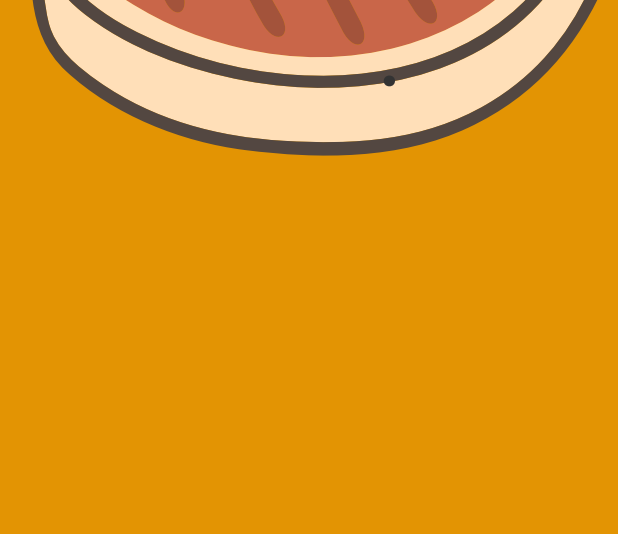
PIZZA (BEEHEX)

Fully automated, 3D printed pizza from dough to sauce and cheese.



RIBEYE (ALEPH FARMS)

3D bioprinted from real meat cells, a new way to enjoy marbled steak cruelty free.



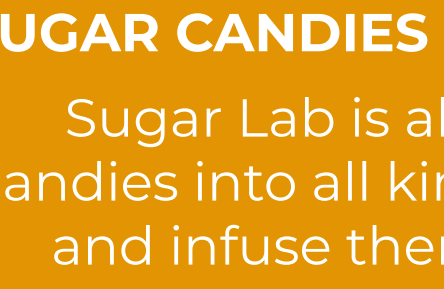
CHEESE STRUCTURES (UNIVERSITY COLLEGE CORK)

Easily melted and reformed, cheese can be printed into delicious creative shapes.



CHOCOLATE (COCOA PRESS)

Versatile and delicious, chocolate is perfect for printing into designer desserts.



PASTA (BARILLA)

From its BluRhapsody line, Barilla presents chic, artistic pasta for appetizers and haute cuisine.



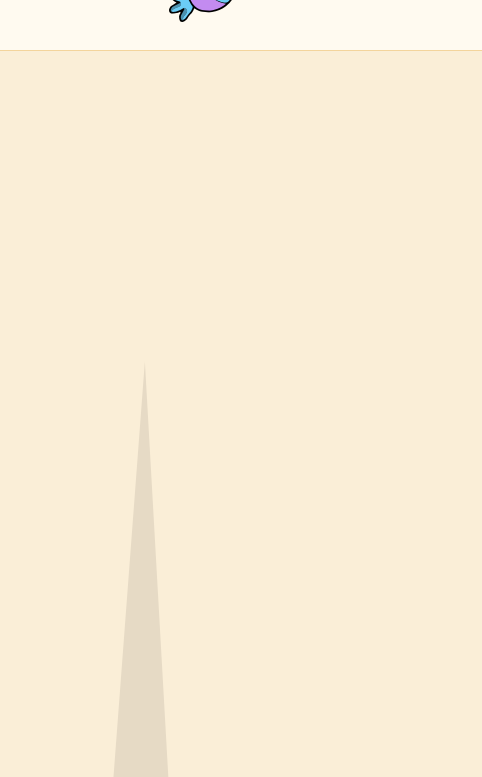
MIXED DRINKS (PRINT-A-DRINK)

Powder printed into biodegradable cups which release when mixed with liquid.



SUGAR CANDIES (SUGAR LAB)

Sugar Lab is able to jet their candies into all kinds of shapes, and infuse them with colors, flavors and textures that let your imagination run wild.



KEY FACTS & FIGURES ON 3D PRINTING IN THE FOOD INDUSTRY

\$472M

The 3D printed food market size in 2022.

(GLOBAL MARKET ESTIMATES)

26%

Global CO2 emissions come from the food supply, mainly through traditional production processes.

(MAASTRICHT UNIVERSITY)

2030

The market size is expected to reach between \$2 to \$5 billion by 2030.

(POLARIS MARKET RESEARCH)

4

There are 4 printing technologies that can be used for food 3D printing. Most applications use extrusion technology, but there are also numerous examples of Binder Jetting (Sugar Lab), Inkjet (Bio Inks) and a powder process similar to SLS printing (candy fab).

(LE-BAIL ET AL. / SCIENCEDIRECT)

7-45 MINUTES

That's the time it takes to print one 3D printed food-item, depending on the complexity of the design and the technology. Post-print cooking can extend the total time.

(XOMETRY)

TIMELINE

- 2006** ● Cornell students launch multi-material 3D printer, Fab@Home, capable of printing with chocolate, cheese or cookie dough.
- 2007** ● Choc Edge becomes the first commercially available food-grade 3D printer.
- 2014** ● 3D Systems releases their first food grade 3D printer, ChefJet.
- 2015** ● Pasta manufacturer Barilla unveils BluRhapsody 3D printed pasta with unique and custom designs.
- 2016** ● Food Ink opens in London, becoming the first restaurant to feature 3D printed food.
- 2017** ● BeeHex develops the Chef 3D, capable of 3D printing pizza.
- 2018** ● Novameat announces world's first 3D printed vegan steak made from plant proteins.
- 2020** ● Kentucky Fried Chicken announces partnership with 3D bioprinting Solutions to test 3D printing chicken nuggets from cultured animal cells.
- 2021** ● Aleph Farms announces first 3D printed ribeye steak made from real cow cells.
- 2023** ● Revo Foods released the world's first commercially 3D printed vegan salmon, now available in Austrian supermarkets.