Smartphone-Based Food Diagnostic Technologies

A new generation of mobile sensing approaches offers significant advantages over traditional platforms in terms of test speed, control, low cost, ease-of-operation, and data management, and requires minimal equipment and user involvement. The marriage of novel sensing technologies with cell phones enables the development of powerful lab-on-smartphone platforms for many important applications including medical diagnosis, environmental monitoring, and food safety analysis. This paper reviews the recent advancements and developments in the field of smartphone-based food diagnostic technologies, with an emphasis on custom modules to enhance smartphone sensing capabilities. These devices typically comprise multiple components such as detectors, sample processors, disposable chips, batteries and software, which are integrated with a commercial smartphone. One of the most important aspects of developing these systems is the integration of these components onto a compact and lightweight platform that requires minimal power. To date, researchers have demonstrated several promising approaches employing various sensing techniques and device configurations. We aim to provide a systematic classification according to the detection strategy, providing a critical discussion of strengths and weaknesses. We have also extended the analysis to the food scanning devices that are increasingly populating the Internet of Things (IoT) market, demonstrating how this field is indeed promising, as the research outputs are quickly capitalized on new start-up companies.

Food scanners are hand-held devices that are able to analyse the composition of food with a simple point and shoot.

In March last year, the European Commission awarded a [food scanner innovation prize](http://ec.europa.eu/research/horizonprize/index.cfm?prize=food-scanner&pg=finalists). It was part of their Research Innovation Horizon Prizes, with three successful finalists.

The winner was the Finnish start up [Spectral Engines](https://www.spectralengines.com/products/scanner-platform/foodscanner/). Founded in 2014, the start-up developed a food scanner based on Near Infrared Spectroscopy. With advanced algorithms and cloud-connectivity and a vast library, it can "see" a lot. According to the company, it can ["reveal the fat, protein, sugar and total energy content"](https://www.spectralengines.com/products/scanner-platform/foodscanner/) of foods.

## OTHER FOOD SCANNERS

These scanners are different in that they are unique portable devices. But other companies have also tried to develop food scanners as mobile apps.

These work differently and have focused around calorie scanners and macronutrients scanners. For instance, [MyFitnessPal](https://www.myfitnesspal.com/) has an app called Calorie Counter that does just this. With millions of dishes in their database and the possibility to scan barcodes, they made figuring out exactly what you're putting into your body easier.

# APPLICATIONS

## Preventing allergic reactions

These whether they come in the form of scanning apps or scanning devices, they have a lot of potential.

For many people with allergies to specific foods, they can help save numerous lives. [According to Food Allergy Research & Education](https://www.foodallergy.org/life-food-allergies/food-allergy-101/facts-and-statistics), 1 in 13 children in the US alone have food allergies. And about 30% of these are allergic to more than one food. In the US, food allergies send over 200,000 people to emergency rooms a year - one person every 3 minutes. And there's no cure except for avoiding these foods.

But, in many situations, it's impossible to avoid them altogether. This becomes even harder when on vacation abroad or when eating out. Food scanners can provide valuable warning signs prior to ingesting food.

## Controlling your weight and eating what's right for you

But even for those without food allergies, they can be useful. They could potentially be used to count the calories you're about to ingest, in case you're trying to lose a little weight. While some apps already help with this by scanning the barcodes or choosing the dish you are eating, they are not infallible. But in the future, this may change.

On top of that, with the progress in the fields of [genetics and biotech](https://www.futuresplatform.com/theme/human-enhancement), you may soon get a complete read of what foods are good for you and which you should avoid. For instance, you may figure out you are too sensitive to caffeine or that you should avoid eating more than 1 egg per day. Using molecular food scanners, you could get accurate information on the content of the foods you are eating. And avoid things you shouldn't eat.

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