

Spectral Engines' award-winning FoodScanner technology combines affordable material sensors and cloud computing

Future smart home appliance will tell about the food you consume

Smart home innovations have been mainly focused on smart lighting, intelligent air and temperature control, smart entertainment systems, connecting devices to the internet and social networks, and home security systems.¹ More and more innovations have also been seen in smart devices related to smart kitchen appliances. Next generation smart-home devices will tell consumers more information about food, such as nutrition facts.

The width and gravity of food-related health problems are substantial issues: allergies, obesity, diabetes, and cardiovascular diseases are constantly growing problems, while approximately 35 per cent of the world's population can be classified as obese. Excess weight is a problem in all age groups, and includes 43 per cent of children under school age being overweight. When it comes to food, health issues are not the only problems the world is facing. The authenticity of food products is a major topic in developing countries; keeping products fresh throughout the time-consuming supply chain is always a matter that needs to be taken into consideration.

The European Commission has awarded Spectral Engines the main Horizon 2020 prize for solving the challenge of developing an affordable and non-invasive mobile food scanner solution that enables users to measure and analyse their food intake.

Spectral Engines' solution utilizes cloud computing and portable NIR technology to generate nutrition information about food ingredients

Spectral Engines has developed a novel spectral sensing platform that offers unique benefits in many applications, such as food sensing and analysis. The FoodScanner solution utilizes the world's smallest true NIR spectral sensing module, advanced algorithms, cloud-connectivity, and a vast spectral

signature library to reveal the fat, protein, sugar and total energy content of food items with good accuracy. Our FoodScanner solution utilizes well-proven infrared spectroscopic methods for material detection, giving it a high measurement performance in a compact size. The solution is truly portable and easy to accommodate to other applications, both industrial and consumer. The benefits of Spectral Engines' technology are:

- Usage of true NIR wavelengths above the 1100 nm region increase the sensitivity and selectivity of the measurement
- Highly compact and portable sensors, ultimately capable of being integrated into a cell phone
- Mass-producible MEMS-sensor technology provides a low-cost price point even in consumer applications
- Simple optical configuration
- Non-invasive and fast measurements
- Enables multiple measurement parameters and applications
- Supports integration with Internet of Things platforms.

Our technology brings food analysis and dietary guidance within reach of the consumer through compactness, low cost and ease of use. This wireless IR analyser platform has the potential to significantly impact on people's health in the EU and globally, and will generate enormous business potential for sensing, electronics, and information industries.

The main nutrition factors, fat, protein, carbohydrates, and energy content can be measured to below 5% detection limits. Also, the detection of allergens like egg, milk and gluten has been carried out successfully. The device software includes an easy-to-use graphical user interface and supports 3rd party developers for openness and Internet of Things connectivity. Sensor operations, calibrations, and data analytics are run by sophisticated algorithms, making the platform reliable and automated. This gives rise to a new ecosystem around improving people's lives through better diets.

¹ <http://gadgets.ndtv.com/others/features/forget-the-smart-home-how-about-smart-food-712022>

Spectral Engines FoodScanner in nutshell

- **Bluetooth-connected, battery-powered Scanner device**
- **Result: Energy, fat, carbohydrate and protein content**
 - Cloud platform enables to rapidly update calibration
 - Advanced pre-treatment methods could be implemented
- **Mobile phone app to run the device and obtain analysis results from the cloud**
 - Fast measurement (less than 0.5 s)
- **14 food categories, multiple scan possibility**



SPREADS:

Butter, vegetable oil, mixes

DAIRY PRODUCTS:

Cheese, Milk

FRUITS AND BERRIES:

Fruit and berry purees

PASTA:

Tagliatelle, Fettucine



SWEETS:

Chocolate

MEAT:

Pork, Beef, chicken, salmon

VEGETABLE:

Carrot, tomato, cucumber

CEREALS:

Breakfast cereals
Flour, gluten-free flour

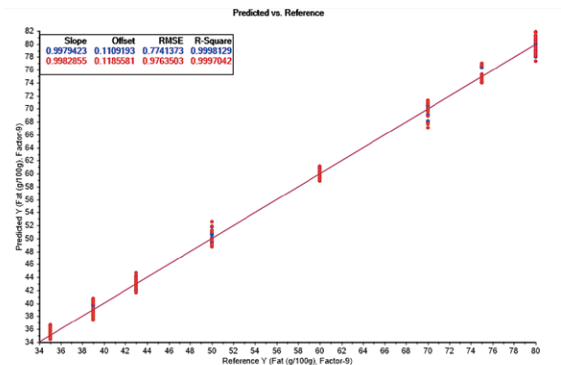
Food Scanner device can be used for over 500 well-known food items.

USE CASE

Use case of FoodScanner

A comprehensive spectral library has been built by measuring 10 000 different food products. There are 14 different food categories, for example, meat, dairy, and alcohol. New food products can be easily added to the library. As the number of measurements only grows, the smart algorithm will further improve measurement results.

Spectral Engines' FoodScanner has its own calibration models for well-known food ingredients, such as beverages, chocolate, snacks, fruits, vegetables, meat, fish, cereals and dairy products.



Typical example of calibration curve

Conclusion

Our FoodScanner solution has gained attention. It was the winner of the Horizon Prize, a challenge competition organized by the European Union, in March 2017. According to the jury, Spectral Engines' innovation provides a major step forward towards better food-sensor devices and may play a significant role in the emerging field of the 'Internet of Food' and smart personal nutrition. We were able to differentiate from our competitors by developing both food scanning hardware and software. FoodScanner is a next-generation Spectral Scanner platform that combines an affordable spectral sensor and advanced cloud computing algorithms and can be used as a stand-alone portable device or be integrated into smart kitchen appliances.

FOR MORE INFORMATION:

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