SPECTRAL ENGINES

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

Future smart home appliances will tell us about the food we consume

Smart home innovations have mainly been 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. The next generation of smart-home devices will give 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. Approximately 35% of the world's population can be classified as obese. Excess weight is a problem in all age groups, and 43% of children under school age are overweight.

When it comes to food, health issues are not the only problem the world is facing. Also, the authenticity of food products is a huge problem in many developing countries and keeping the products fresh through the time-consuming supply chain are matters that need to be taken into consideration.

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

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.

The FoodScanner solution utilizes the world's smallest true NIR spectral sensor, advanced algorithms, cloud-connectivity, and a vast spectral signature library to reveal the fat, protein, carbohydrates and total energy content of food items with

good accuracy. Our FoodScanner solution utilizes well-proven near-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 key benefits of Spectral Engines' technology are:

- Usage of true NIR wavelengths above the 1100 nm region which increase the sensitivity and selectivity of the measurement
- Highly compact and portable aterial scanners, ultimately capable of being integrated into a cell phone
- Mass-producible MEMS-sensor technology provides a cost-effective 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 material scanner has the potential to significantly impact people's health 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. The solution includes an easy-to-use mobile app and it supports 3rd party developers for openness and IoT connectivity. Sensor operations, calibrations, and data analytics are run by advanced 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 a nutshell

- **Bluetooth-connected, battery-powered material scanner**
- **Result: Energy, fat, carbohydrate and protein content**
  - Advanced algorithms enables to rapidly update library
  - 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**

CARB:
8.2 g/100g
ENERGY:
35 kcal/100g
PROTEINS:
0.2 g/100g

SPREADS:
Butter, vegetable oil, mixes

DAIRY PRODUCTS:
Cheese, Milk

FRUITS AND BERRIES:
Fruit and berry purees

PASTA:
Tagliatelle

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 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, fruits, vegetables, meat, fish, cereals and dairy products.
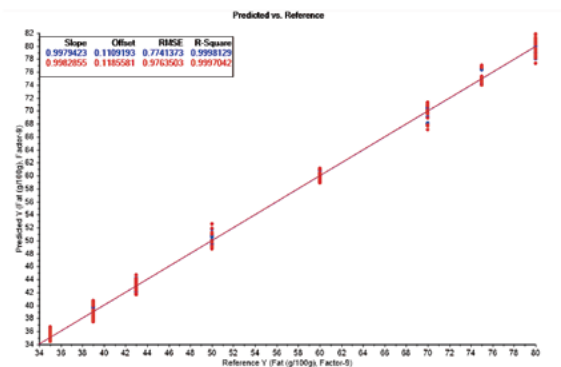
Typical example of calibration curve

Conclusion

Our FoodScanner solution has gained international attention attention. It was the winner of the Horizon Prize, a challenge competition organized by the European Union, in March 2017. Spectral Engines has developed a novel spectral sensing platform that offers unique benefits in many applications, such as food sensing and analysis. FoodScanner solution 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. 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 differentiated from our competitors by developing both food scanning hardware and software.

FOR MORE INFORMATION:

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