Centre Nacional de Microelectrònica IMB

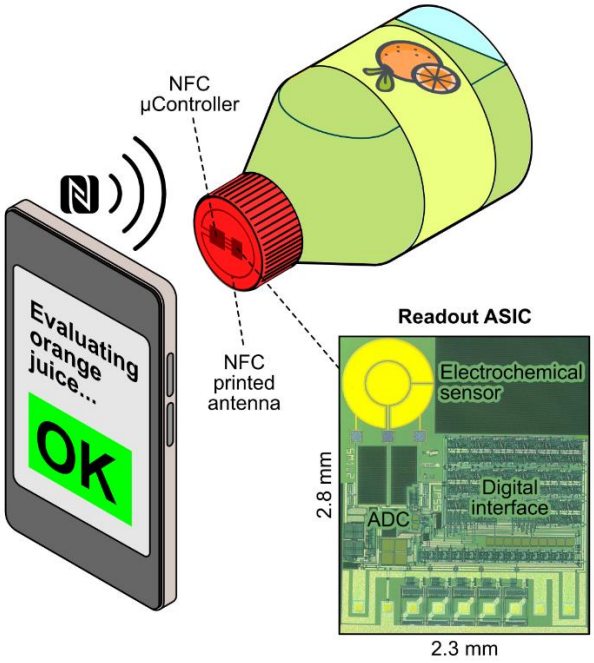
CSIC Consejo Superior de Investigaciones Científicas

Treball Final de Grau

Smart Bottle Cap for Electrochemical Sensing of Beverages

Description

This work aims to develop a low-cost electronic bottle cap that can measure the quality of its beverage contents using electrochemical sensors and report the digital results to mobile devices through contactless communications. At the core of this smart cap is an application-specific integrated circuit (ASIC) designed and fabricated in CMOS technology at the clean room of the IMB-CNM(CSIC). This ASIC incorporates the amperometric sensor, the potentiostatic ADC and the digital device interface. The companion of the readout ASIC will be a commercial µcontroller with near-field communication (NFC) capabilities for both the contactless powering and interfacing from a smartphone. A custom printed circuit board (PCB) carrying the two chips and the NFC printed antenna will be developed and mechanically adapted to standard plastic bottle caps. The resulting smart cap will be tested in lab with commercial beverage products.



Background and skills

- Electronic engineering or any similar curriculum covering the following topics: analog and digital circuit design, µcontroller and NFC platforms, instrumentation and data processing.
- Knowledge of EDA tools for PCB design.
- Experience in app programming.
- Capability of working as a team.
- Good spoken and written English.

Tasks

The student will propose the architecture of the smart electronic cap by understanding the requirements of the readout ASIC and choosing a suitable NFC µcontroller companion. Based on this concept, the student will design, manufacture and assembly a prototype of the custom PCB, compatible with standard bottle caps, to carry the two chips and the NFC printed antenna. As part of the testing phase, the student will also develop a minimalist app for smartphones to display the electrochemical readout. All the above tasks will be performed at the IMB-CNM facilities in the UAB Bellaterra Campus.

Contact

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