



Smartphone analysers for on-site testing of food quality and safety

Issue 5 – June 2019



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Welcome to the fifth FoodSmartphone e-Newsletter!

Dear reader and FoodSmartphone follower,

Our FoodSmartphone life has been quite thrilling over the past six months. All the ESRs prepared themselves for the mid-term review meeting in Wageningen at the end of February and presented an overview and the latest achievements of their projects to the EC project officer and her accompanying external expert. Prior to the meeting, the scientific and financial midterm reports had been meticulously prepared by the work package leaders and the coordination team. We were all very pleased to receive excellent reviews and feedback. In June a very-well received network-wide summer school on citizen science, software development and exploitation was organized by the team at Queens University Belfast. The school was interrupted by a one-day full consortium meeting by the lovely coast of Northern-Ireland in the presence of our external Advisory Board. Again, our ESRs presented their latest achievements and received valuable feedback from the audience. Last but not least, we are very glad that the group of ESRs has been further extended following the recruitment of Julian Guercetti at CSIC in Spain and Chi Xiao at LIU in Sweden.



Meanwhile, most of the ESRs completed their second year with a lot of exciting scientific results, alongside trying to overcome several hurdles and obstacles, and developed themselves further through complementary skills training courses ranging from scientific writing, to presenting with impact and language courses. Their stories in the weekly blogs at www.foodsmartphone.blog are as exciting as their scientific results presented in open-access peer-reviewed papers and presented at leading conferences, either as a poster or as an oral presentation. So keep updated with the latest progress by signing up on our website or by following the stories of our ESRs in their weekly blogs at www.foodsmartphone.blog, or simply by following us on twitter (@FoodSmartphone) and tweet us using the hashtag #FoodSmartphone. Feel free to contact us at foodsmartphone@foodsmartphone.eu with any suggestions for improvement of this e-Newsletter, for future collaboration or dissemination opportunities, or just for a friendly chat.

For now I wish you some great summer holidays, wherever you go!

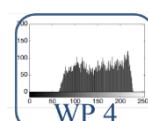


**Michel Nielen,
coordinator**

FoodSmartphone progress versus research objectives

Key facts:

- Grant Agreement:** 720325 – FoodSmartphone - H2020-MSCA-ITN
- Start date:** January 2017
- Duration:** 48 months



The major science and innovation gaps to be addressed by the FoodSmartphone project relate to high-speed and novel biorecognition of food contaminants, novel optical and electrochemical detection schemes in conjunction with smartphones, simplified

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[IXceX3TITzs](https://www.youtube.com/channel/UCXceX3TITzs)



WP1 leader

M.-Pilar Marco (CSIC)

WP2 leader

Gert Salentijn (WFSR)

WP3 leader

Daniel Filippini (LIU)

WP4 leader

Karen Rafferty (QUB)

WP5 leader

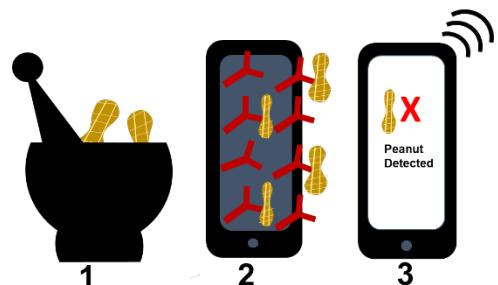
Jana Hajsova (UCT)

microfluidic sample handling solutions that enable non-expert operation, advanced software architecture and the development of application demonstrators for food quality and safety issues of concern, viz. for antibiotics, pesticides, allergens, mycotoxins, food spoilage and marine toxins. Several ESRs are currently making the turn from single food contaminant model systems towards the development of multiplex screening tools having smartphones with optical or electrochemical readouts: examples comprise multiple food allergens, multiple antibiotic residues and multiple pesticides detection in combined assay designs. Several 3D-printed prototypes have been designed and tested in order to facilitate user-friendly and simplified sample preparation and reagent delivery. A lot of progress has been made in the reliable reading of colorimetric assay signals by smartphones without the inconvenient use of cardboard boxes or 3D-printed attachments to control ambient light conditions.



So far, the scientific results of the project have been presented by the ESRs and/or their supervisors at numerous conferences. Apart from that, the following reviews and research papers are available at our [website](#):

- ESR10, Andriy Kuzmyn, designed and synthesized novel hierarchical antifouling layers for biosensor surfaces, based on tuneable polymer brushes. His work entitled "Bioactive antifouling surfaces by visible-light-triggered polymerization" has been published in *Adv. Mater. Interfaces* (doi.org/10.1002/admi.201900351).
- ESR 3, Jordi Nelis, wrote a visionary review entitled "The Smartphone's Guide to the Galaxy (review): In Situ Analysis in Space" for the journal *Biosensors* (doi.org/10.3390/bios8040096), in which he elaborates on the future needs of smartphone biosensing and its design compatibility with space requirements.
- ESR1, Gina Ross, wrote a review entitled "Consumer-friendly food allergen detection: moving towards smartphone-based immunoassays" in *Anal. Bioanal. Chem.* (doi.org/10.1007/s00216-018-0989-7), in which she critically discuss the current status and future needs for truly consumer-friendly home testing for allergens in foods. This review has been very well received and downloaded 4000 times.
- ESR5, Yunfeng (Jack) Zhao, published a symposium paper "Spectral Illumination Correction: Achieving Relative Color Constancy Under the Spectral Domain" in the proceedings of the 2018 IEEE International Symposium on Signal Processing and Information Technology (ISSPIT). In this work he developed novel algorithms that achieved the best performance on nonuniform illumination correction and relative illumination matching, respectively, when benchmarked against others.
- ESR1 published a research article entitled "Rapid Antibody Selection Using Surface Plasmon Resonance for High-Speed and Sensitive Hazelnut Lateral Flow Prototypes" in *Biosensors* (doi.org/10.3390/bios8040130) featuring the use of surface plasmon resonance biosensing for the critical assessment of antibody performance in unpurified mixtures and the subsequent development of ultrafast lateral flow immuno assay test strips capable of detecting traces of hazelnut allergens in seconds rather than several minutes.
- A joint team of ESRs consisting of Jordi Nelis, Arisz Tsagkaris, Yunfeng Zhao and Javier Lou-Franco, authored a paper for the high-impact journal *Biosensors and Bioelectronics* entitled "The end user sensor tree: An end-user friendly sensor database" (doi.org/10.1016/j.bios.2019.01.055) in which they provide a comprehensive biosensor repository from an end-user perspective. The work has been featured in e-Newsletter No. 4 last year.



Feature: 3rd FoodSmartphone Summer School in Belfast



The third annual summer school on "Software Design, Citizen Science and FoodSmartphone Exploitation" was organized in Belfast, Northern Ireland by the Queens University Belfast. It lasted from the 10th until the 14th of June 2019 and it was full of interesting talks. The meeting kicked off with a fascinating day on entrepreneurship by professor A. Fee where the ESRs started generating business ideas. At the end of day one, all 11 ESRs enjoyed a traditional Irish dinner during which they elected Safiye Jafari

as their new ESR representative in the project's Supervisory Board. In day two, we were taught the basics on software engineering and cloud security, two very important aspects for developing a business. In the afternoon of the same day, an interactive demo was performed by our partner organization ZEULAB, a very inspirational workshop as in FoodSmartphone we are aiming to develop citizen science applicable methods and we got to see that in action. Wednesday was the official annual general meeting of the FoodSmartphone consortium. Advisory board, supervisory board and ESRs took a quick tour at the Bushmills distillery before starting the oral presentations with the ESRs latest update on their experimental results. The following day was back into the summer school at QUB, where we had a workshop on smartphone application, and we got the chance to create our own apps! In the afternoon, we learned about intellectual property rights for protecting ideas and we also got an insight into finances for business development. Putting everything we learned together, on the final day, we pitched three business ideas, making for a nice closing for a very busy week. A panel judged the final pitches and the winner was team 'Drink Safe'.

ESRs Georgina & Ariadni.



Quotes from FoodSmartphone ESRs on www.FoodSmartphone.blog



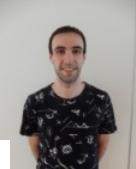
ESR1: Georgina Ross , WFSR, Wageningen University & Research, The Netherlands:
One of the highlights of this year, was being invited to give a guest lecture at Bournemouth University, where I studied for my BSc and MSc. The talk lasted for 2 hours and was to 40+ third year forensic science students; this experience has shown me how well I actually know my topic. It was fascinating to adapt my talk from smartphone based food diagnostics to smartphone based forensic applications, and it has actually further strengthened my love of the topic.



ESR(1)2: Ariadni Geballa Koukoula, WFSR, Wageningen University & Research, The Netherlands:
"This life, painful from certain points of view, had, for all that, a real charm for me. It gave me a very precious sense of liberty and independence. If sometimes I felt lonesome, my usual state of mind was one of calm and great moral satisfaction." - from Marie Skłodowska-Curie's autobiographical notes.



ESR3: Jordi Nelis, Queens University, Belfast, United Kingdom:
I am very happy to announce that my little daughter was born on May 31st :-) Both her and mom are doing fine and we are very very happy! So this is a happy announcement and a note in one, since I will be on parental leave for the next couple of weeks and not be doing so much work.



ESR4: Javier Lou Franco, Queen's University, Belfast, United Kingdom:
Special attention must be paid at the validation process: as important as developing an analytical assay is validating it and making sure it works in field conditions.



ESR5: Yunfeng Zhao, Queen's University, Belfast, United Kingdom:
I am really enjoying the cool summer here in Belfast, especially with all the Early Stage Researchers (ESR) gathering together here at Queen's University Belfast attending the 3rd FoodSmartphone Summer School.



ESR6: Aristeidis Tsagkaris, University of Chemistry and Technology, Prague, CZ:
Have you ever thought of a personal food analyzer in your pocket?? For 1.5 year, all FoodSmartphone members have been working on this concept.



ESR(1)7: Julian Guercetti, CSIC, Barcelona, Spain:
Let me introduce myself as the new member of the FoodSmartphone project, taking the place of former ESR7 at the Nanobiotechnology for Diagnostics group (IQAC-CSIC) since March 2019. I was born in Argentina and obtained my MSc in Biotechnology at the National University of Rosario. My background is in molecular and cellular biology and due to my previous experience I was studying breast cancer and melanoma. Now my project consists of developing a platform to detect antibiotics in milk samples using DNA-addressable array technology with an optical smartphone readout.



ESR8: Klaudia Kopper, CSIC, Barcelona, Spain:
We have to think about our responsibilities as scientists towards the people of the public. We have to keep in mind the future impact that we want to make in the food safety industry and more importantly we have to work more on the communication of

our research to the people by making them aware of the fact that in a few years food testing with the help of a smartphone will indeed be possible.



ESR(1)9: Chi Xiao, Linköping University (LIU), Sweden:

Let me introduce myself, the new ESR9 ('ESR19') Chi Xiao from China, who joined the Linköping University in May 2019. I was born and raised in Guangdong and graduated at the School of Science and Engineering of the Jinan University of China. I continued my master study in optics and photonics and did my master thesis in the field of optical bioassays and infrared spectroscopy. Within my individual FoodSmartphone research project, I will investigate Lab-on-chip (LOC) devices for smartphone imaging Surface Plasmon Resonance (iSPR) detection, all operating on regular cell phones.



ESR10: Andriy Kuzmyn, Aquamarijn, The Netherlands:

My job as a researcher in the FoodSmartphone project is to create coatings on the surface of the biosensor that will allow us to see our Wally clearly, when I say Wally I mean pathogen, allergen or toxins in food. This will allow us to have efficient and reliable biosensors.



ESR11: Safiye Jafari, CSEM, Switzerland:

What happened to me when an interview about my research as part of the FoodSmartphone project had been published in the local newspaper "Bündner Woche", both in German and English languages: a few days later, I received an email from a reader with a picture of some mouldy conserved jar of apricots and she wanted to know, since the apricots are intact with no mould, whether it would be ok to eat them and if the mould would be poisonous or not? This question just reminded me that how much easy and fast food safety testing is an everyday life need and how much our final prototypes could be useful and beneficial in these types of situations. It made me feel a greater appreciation for the research and have more motivation to work even harder.

Forthcoming events / meetings



AOAC2019

8-11 September 2019, Denver, USA

11st Euro Biosensors & Bioelectronics Congress

23-24 October 2019, Rome, Italy

uTAS 2019

27-31 October 2019, Basel, Switzerland

Recent Advances in Food Analysis (RAFA2019)

5-8 November 2019, Prague, Czech Republic

EuroResidue IX

18-20 May 2020, Egmond, The Netherlands

FoodSmartphone final conference and open day

May or June 2020, Barcelona, Spain

Biosensors 2020

26-29 May 2020, Busan, Korea

EuroAnalysis 2021

22-27 August 2021, Nijmegen, The Netherlands

Contact us



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