

Minutes of SP4LIFE Workshop 6

Brussels -Belgium, February 15 - 16, 2024

Host: Université libre de Bruxelles, Bruxelles (ULB), Dr. Carlo Saverio Iorio

Attendees:

From Slovakia: Dr. Milan Tysler, Dr. Daniel Gogola, Dr. Fedor Lehocki, Richard Bagín
From Belgium: Dr. Carlo Iorio, Dr. Immacolata Greco, Dr Christophe Minetti, Valérie Tommen
From N. Macedonia: Prof. Ana Madevska Bogdanova, Assoc. Prof. Bojana Koteska, Prof. Vladimir Trajkovik
From Serbia: Stefan Ilić

Thursday, February 15, 2024

The partners met in the premises of ULB in Solbosch Campus. The workshop started with informal discussions and visit of the ULB laboratories.

The formal part of the workshop started after arrival of Dr. Eyup Turmus, project adviser from the NATO SPS Office. After welcome from the organizers (Carlo S. Iorio) and from NATO SPS Office (Eyup Turmus), the project coordinator Milan Tysler presented short overview of the project, its aim, main goals and main achievements in individual work packages:

- Research and development of flexible Laser induced graphene sensors for heart rate and breathing rate sensing,
- Development of a Smart Patch hardware and its integration with wearable monitoring tablets,
- Research and development of software packages for the Smart Patch control, measurement and processing of sensed signals and assessment of patient's vital parameters, for evaluation of these parameters and alerting if they are out of limits,
- AI based methods and software for estimation of blood pressure and oxygen saturation from measured ECG, PPG and breathing, and for predicting health status changes,
- Proposal to modify processes during rescue actions due to the implementation of the Smart Patch technology.

After the presentation, function of the Smart patch prototype, including in-patch signal processing, evaluation and light/sound alerting was demonstrated. Each patch can cooperate with monitoring tablets by sending the measured and computed parameters or also by sending the raw measured data. The tablet can monitor several patches and connect to selected patches, where the patient needs medical attention. In the tablet, AI algorithms for processing the raw data from the patch are implemented and enable to evaluate the patient condition in real time. The whole platform was successfully demonstrated with 4 patches (2 of them could perform real measurements) and two monitoring tablets.

After lunch break the workshop continued with presentations of young researchers who presented the results obtained by individual teams and in cooperation of all partners:

- Graphene sensor development (ICTM, Stefan Ilić)
- Hardware concept of the patch (IMS, Daniel Gogola)
- Bio-compatible integration of the patch (ULB, Immacolata Greco)
- Software for patch control, communication, and signal processing (IMS, Richard Bagin)
- Vital parameters estimation using artificial intelligence (FCSE, Bojana Koteska)
- Implementation of the smart patch into the triage process (FM, IMS, Fedor Lehocki)

Presentations were followed by discussion about possible **project continuation** within existing NATO activities (support of startups, innovation projects) or outside NATO (European grant schemes, ESA support, ...). All present partners expressed their interest to look for such possibilities, but no specific activity was selected.

The discussion also touched possible **application of the project results**. Partners from IMS and FM informed that members of the Fire and Rescue Corps participated in testing of the wearable platform and the patch prototype and suggested practical improvements for the implemented software that now enables network-like behaviour of the smart patches and several monitoring tablets. Recently, incorporation of the smart patch technology into their eTriage platform was discussed.

There was also discussion about the **project funding**. Dr. Turmus stressed that it would be optimal to finish the financing in February to have time to process the accounting documents until project end (on March 10, 2024). The expenditures at the end of the project must be properly justified.

Project coordinator announced, that templates of the required documents for the Final Milestone (Final progress report, Final budget and SPS project questionnaire) will be posted on project Google disk (account "sp4life 2021") for on-line or off-line editing before end of February. Contributions to these documents from all partners and the back-up documentation for each item in the Financial record should be prepared until March 3, 2024.

The first day of the workshop ended with a joint dinner.

Friday, February 16, 2024:

As all planned workshop topics were discussed on Thursday, the second day of the workshop concentrated on the experiments with encapsulating the Smart Patch to PDMS in ULB laboratories. Two samples of the patch electronics were encapsulated and will be sent to IMS for testing and evaluation.

Minutes: Milan Tysler