

ERASMUS+ PLACEMENT
Master-Project Internship – 2020/2021

Biosensor for COPD diagnosis and follow-up using salivary biomarkers

Background and Motivation: Detecting diseases from patient’s saliva could be a revolution in health care. Although not so popular nowadays in clinical analysis, saliva owns great potential to monitor a wide range of diseases and health complications, including but not limited to cardiovascular diseases, diabetes, malignant cancer, and lung diseases, such as chronic obstructive pulmonary disease (COPD). Recent studies have demonstrated the feasibility of salivary biomarkers to diagnosis and follow-up in COPD patients. The COPD disease is one of the chronic diseases with highest prevalence and death rates in Norway, along with heart diseases and cancer, 14% in adults age between 30 and 90; the newly diagnosed cases are estimated to be 20 000 per year. The detection of COPD exacerbations is, often, too late. After admission into hospital, the recovery is too long and expensive. From this point, we plan the development of a saliva electronic biosensor, using cutting edge materials and techniques, for an efficient follow-up of COPD patients. The main objective is the prediction of the worsening of COPD patients, through the c-reactive protein, interleukin-8 and matrix metalloproteinase-9 saliva biomarkers, leading to early treatments and less health burden.

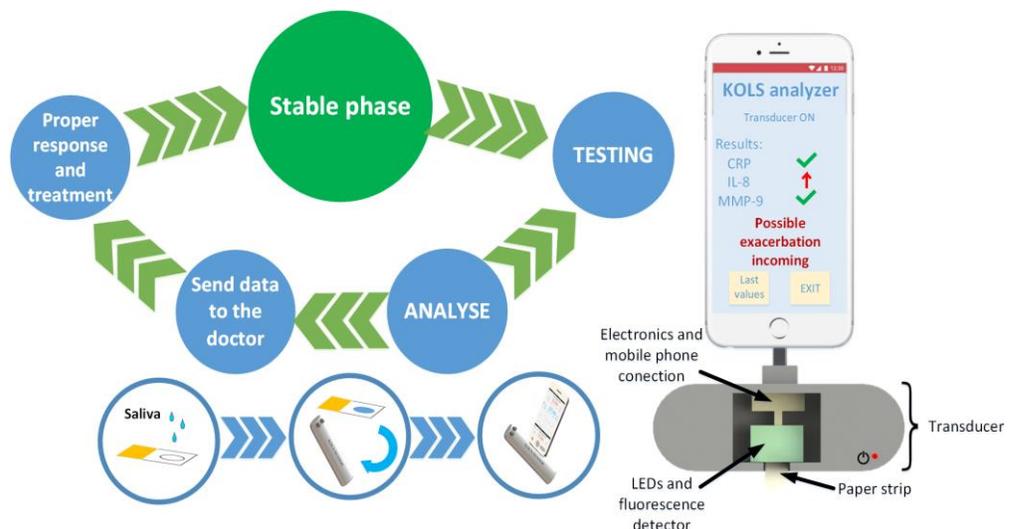
Proposed tasks for Placement project: An intern with undergoing master’s study in Microelectronics, Biomedical Engineering or Micro/nanotechnologies fits well to this Erasmus Placement Internship project. Taking into account workload expected from the number of ECTS credits to complete, the intern will participate in two of the following proposed activities:

- Microfabrication of the biosensor microchip with functionalization with bio-recognition sequences;
- Testing of biosensor microchip towards the proteins CRP, IL-8 and MMP-9 in artificial and real saliva samples;
- Preparation of an electrochemical readout for recording photoelectrochemical measurements with the biosensor microchip.

The intern will work in a team of multi-cultural background, including other junior researchers and a senior researcher. Overall, the project team develops the biosensor and investigates a smartphone APP for data storage and communication with the user. The intern is responsible for the progress with tasks discussed and assigned within the project team.

Work environment & cooperation: The ERASMUS Placement internship is supported by a cooperation

of tech companies, SensoVann AS and Aqua Alarm AS (both located in Horten, Norway and being partners in the same project team). Project itself has cooperation with local municipal medical centers. Internship receives academic supervision from



the University of South-Eastern Norway (USN) so as to ensure education and academic value of the internship. The candidate conducts full-time equivalent work, and weekly meetings are typically arranged for progress checking and discussions.

Important remarks:

A final report is required as the delivery material for finalizing the internship. There's the possibility of preparing an academic journal paper together with the team, depending on success of the results achieved. The period of internship is 6 months preferably, with possibility of extension upon to agreement between both sides. Starting date is from September 1st, upon to discussion with the candidate.

The host institution, to which Erasmus Placement agreement is made (either SensoVann or Aqua Alarm), is responsible to cover support to living costs with a minimum value of 2500 NOK monthly until the termination of internship. This is in addition to the regular Erasmus Placement scholarship.

Application material:

- **Copy of course transcripts**
- **Curriculum vitae**
- **Motivation letter**

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References:

- [1] José Luis López-Campos, Wan Tan, and Joan B. Soriano. "Global burden of COPD." *Respirology* 21.1 (2016): 14-23.
- [2] Xuan Chen, Tao Dong, Xueyong Wei, Zhaochu Yang, Nuno M. M. Pires, Juan Ren, Zhuangde Jiang, "Electrochemical methods for detection of biomarkers of Chronic Obstructive Pulmonary Disease in serum and saliva," *Biosensors and Bioelectronics* 142 (2019): 111453.