

Université de technologie de Compiègne – Thesis proposal

| Part 1: Scientific sheet | |
|---------------------------------|---|
| Thesis proposal title | Body composition analysis monitoring at home for chronic kidney disease (CKD) |
| PhD grant | CIFRE + European allocation (TBD) |
| Research laboratory | BMBI UMR-CNRS 7338 (UTC Compiègne) Company : Home Habilis SAS, 52 rue Louis Borel, 60000 Beauvais (France) |
| Thesis supervisor(s) | Dan Istrate & Sofiane Boudaoud UTC – BMBI Julien Gautier – Home Habilis SAS (coencadrant) |
| Scientific domain(s) | Biomedical signal processing and eHealth Data science and artificial intelligence |
| Research work | <p>CKD is a major disease for 850 million people worldwide, extremely impacting patients' lifestyle and survival. When kidneys don't work anymore, managing fluid intake and body balance is critical and results directly in good or poor patients' outcomes.</p> <p>A large literature was published about bioimpedance analysis (BIA) to determine body composition in various populations, but only few algorithms dedicated to renal patients are validated.</p> <p>The candidate will review literature to learn from the most recent science and will actively contribute to the design of a new medical device to determine variations in body composition of renal patients in their home.</p> <p>He will work with a prototype to apply validated equations and compare results versus competitive technology in real life. He will participate to collect measures and blood labs to adjust non robust equations and develop new algorithms for unpublished or new biological parameters.</p> <p>He will prepare scientific evidence to get medical certification of the prototype. He will preprocess signals, extract features and propose the first modelling approach. In a second step an artificial intelligence approach will be studied in order to improve patient care.</p> <p>The research work valorization will be made firstly by patent application followed by publication in journal with good impact factor.</p> |
| Key words | bioimpedance analysis, renal disease, chronic kidney disease, homecare, patient empowerment, artificial intelligence, algorithm, body composition |
| Requirements | <p>Biomedical engineer or master 2</p> <p>Knowledge in bioimpedance and photoplethysmography highly recommended or in noninvasive medical assessment</p> <p>Ability to experimental data acquisition in extracorporeal blood circulation conditions at hospital or clinic</p> <p>Physiological signal processing and artificial intelligence is welcome</p> <p>French and English professional</p> <p>Mobility within France</p> <p>Ability to work with uncertainty of innovation in a startup</p> |
| Starting time | September/October 2021 after ANRT validation |
| Location | Beauvais, Lille, Lyon (France) |

| Part 2: Job description | |
|---|---|
| Duration | 36 months |
| Additional missions available | Support to design team and regulatory affairs Drive clinical research program |
| Research laboratory | BMBI CNRS UMR 7338 (UTC Compiègne) Company : Home Habilis SAS, 52 rue Louis Borel, 60000 Beauvais (France) |
| Material resources | Prototypes of new acquisition device, computing resources, bibliography resources |
| Human resources | A PhD specialized in BIA will ensure knowledge transfer to the candidate |
| Financial resources | Operational budget, R&D budget for technical and research expenses |
| Working conditions | Candidate will begin in Lyon for knowledge transfer, then move to Beauvais for prototype evaluation. Clinical studies may require travels to Paris, Lille or Caen (to be determined). Company is a newborn startup, resources will depend on subventions and funding gathered in the coming months. Objective is to develop the candidate to become a full-time employee and a technology expert in the future to drive a continuous research program within the company. |
| Research project | |
| National collaborations | Collaboration with nephrology centers and hospitals. Consortium with industry and research partners. |
| International collaborations | Advice from international nephrologists will be available. |
| International cosupervision (cotutelle) | no |
| Contact | Julien GAUTIER 52 rue Louis Borel, 60000 Beauvais, France +33 6 51 53 61 01 gautier.julien@ymail.com |

Please contact first the thesis supervisor before applying online on <https://webapplis.utc.fr/admissions/doctorants/accueil.jsf>