



Postdoctoral position or Research Engineer - University of Rouen Normandy

Main subject: Signal Processing and Machine Learning applied to Olympic & Paralympic Swimmers

Secondary subject: Human Movement Analysis, Inertial Measurement Unit

Place: CETAPS (<http://staps.univ-rouen.fr/le-laboratoire-cetaps-191625.kjsp?RH=1379595481948>), Faculty of Sport Sciences, University of Rouen Normandy, Campus of Mont Saint Aignan, France, and seminary at LITIS (<http://www.litislabs.eu>), National Institute of Applied Science, INSA of Rouen, Campus of Saint Etienne du Rouvray, France.

Starting: 01/04/2021. Length: 22 months.

Salary: 2264 €/month net of charge (INM 600).

Criteria of eligibility: to have a PhD or/and an engineer certificate.

Context of the project

The NePTUNE project is a project funded by the French National Agency of Research (ID: ANR-19-STHP-0004 NePTUNE) concerning the call “*Sport of Very High Performance*” (<https://anr.fr/en/call-for-proposals-details/call/dfed2a01f16751361be6f6421e781191/>), especially the 7th challenge about “big-data and artificial intelligence to support performance”. The NePTUNE project is a multi-disciplinary project supported by the French Federation of Swimming (FFN) and French Federation of Handisport (FFH), a consortium of 5 high schools (ENPC, ENS Polytechnique, Centrale and INSA) and 3 universities (University of Rouen, Picardie, Paris XIII). The aim of the project is to provide tools and methods in order to improve and to monitor top elite swimmers of the French team for the 2024 Paris Olympics and Paralympics games (<http://www.sports.gouv.fr/presse/article/appel-a-projets-sport-de-tres-haute-performance>). The current post-doc or research engineer position concerns Work Package n°3 of the project, which investigates how stroke rate and speed influence motor coordination and energetic cost.

Description of the work

The objective of the present work is to capture motion of top elite swimmers by using water proofs 3D inertial measurement units (IMU) (<https://www.cometasystems.com/products/wavetrack-inertial-system>) in order (1) to identify automatically the key points defining stroke phases and then to compute the inter-coordination in the four swimming techniques (for an example in front crawl, see Dadashi et al., 2013: doi: 10.1080/02640414.2013.778420), and (2) to assess propulsion effectiveness: e.g. intra-cyclic velocity (Dadashi et al., 2012: doi: 10.3390/s121012927) perturbations or smoothness (Ganzevles et al., 2019: doi : 10.1080/14763141.2019.1650102). The final aim is to model the coordination dynamics and its effectiveness when swimming speed and stroke rate are manipulated, in order to extend previous works (Bideault et al., 2013: doi.org/10.1016/j.jsams.2012.08.001 and Carmigniani et al., 2020 : doi.org/10.1098/rspa.2020.0071).

Job profile:

The candidate is requested to have a PhD or/and an engineer certificate in Signal Processing and skills in Machine Learning. An important knowledge of Matlab and Python is primordial. This position requests knowledge and methodologies in signal processing, and machine learning using IMU and applied to human movement analysis.

The work will be done in Rouen and supervised by Ludovic Seifert & Brice Guignard from the University of Rouen Normandy, by Romain Hérault from the INSA of Rouen and Jérémie Boulanger from the University of Lille.

To apply or for further information please contact:

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