Postdoc position with Stéphane Canu at INSA (Rouen, Normandy) Trajectory generation, long-term memory and management of blockages by learning

Description: This Post-doc is in the Clara research project[1] on autonomous drone navigation without GPS and in unstructured environments.
Duration: 12 months renewable (open in September 2020, negotiable).
Co-supervision: Pascal Vasseur and Stéphane Canu LITIS (Rouen) Philippe Martinet and Guillaume Allibert Chorale (Sophia Antipolis).

The CLARA project aims to extend the autonomy of aerial robots in hostile environments where GPS and cartography are not a priori available (e.g. forest navigation). We propose to tackle the challenge of autonomous navigation of an UAV within a forest with the added objective of 3D mapping. We then distinguish three scientific hurdles to solve:

- The control of the drone in a complex and unknown environment;
- The perception and representation of a complex and unstructured environment for obstacle avoidance and the study of traversability;
- 3D reconstruction and localization of a flying robot in an environment where objects are not very discriminate / differentiable.

To respond to the identified scientific constraints and obstacles, we will assume that the drone does not have a map of the environment. Consequently, it has to rebuild a simple map of the environment while moving autonomously towards a predefined position.

The purpose of the post doc is to define the drone supervision module. More precisely, it will be a question of developing a global control strategy that makes it possible to get out of a deadlock zone thanks to the partial mapping of the environment. It will be a matter of traversing this partially observed graph with uncertainties to extract a feasible trajectory as compatible as possible with the objectives of the drone. Particular attention should be paid to the robustness of the solutions proposed. It will also be a question of evaluating the contributions of learning, deep learning and reinforcement learning to this problem.

Contacts:

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Qualifications and prerequisites: Doctoral degree (PhD), proficiency in Python, skills in decision models in robotics / reinforcement learning / deep learning. Decision problem for navigation in partially observable environments.

Compensation & Benefits: We are offering a competitive salary (∼35K euro per year) and the opportunity to work closely with high-profile members of the project consortia, in Normandy, very close to Paris. The initial appointment will be for one year, renewable. The employer will be the University of Rouen-Normandy.

[1] `https://anr.fr/Project-ANR-18-CE33-0004`

Application: Please include in your application within one pdf-file:

- Cover letter outlining (i) how you meet the requirements for the position, (ii) which techniques/methods you would like to be involved in, (iii) relevant details of your past research projects, and (iv) an explanation of how your previous experience lends itself to your research program. (750 words)
- Curriculum vitae (including publication record: journal papers, conference contributions, etc.)
- Names and email addresses of three professional references (e.g. current or previous research advisors)
- Transcript of Records
- TOEFL scores or other evidence of English and/or French proficiency

Application deadline: 15/09/2020. Send it electronically to: stephane.canu@insa-rouen.fr

For more information do not hesitate to contact us