CNRS post-doc contract offer – ANR funding

COOLSCAPES ANR Project – The cooled urban space: technical, spatial and cultural perspectives

Context

During the last summer periods, European cities have witnessed the spread of refreshing installations for dwellers of public space, such as cooling canopies, water mirrors, air-conditioned envelopes, etc. How can these new forms of collective cooling shape urban ambiances? Based on this research question, the COOLSCAPES project aims to better understand the physical, use-related and sensory dimensions of these spaces, which we call spatio-climatic devices, in order to better determine their future applications in the adaptation of the population to climate change. Three scientific objectives lead this project: (1) characterising the relationship between spatial configuration and climate parameters in terms of ambiances; (2) characterising the dwellers' uses and perceptions; and (3) analysing the current cooling practices and identifying emerging lines of reflection.

COOLSCAPES is a research project that is funded by the *Agence Nationale de la Recherche* (ANR) within their 2018 generic call in the Young Researchers category. It brings together a pluridisciplinary team associated with the *Ambiances, Architectures, Urbanités* laboratory (UMR 1563 CNRS/ECN/ENSAG/ENSAN). It is coordinated by Ignacio REQUENA, lecturer at the Graduate School of Architecture of Nantes.

Missions

This post-doc contract offer falls within the starting phase of the COOLSCAPES project, which includes the implementation of the characterization method for the spatio-climatic devices (parameters and sensations), as well as the first experimentations on different sites. More concretely, the research deals with the following aspects:

- *In situ* climatic data acquisition for the characterisation of thermal comfort conditions: measures regarding the air temperature, radiation temperature, relative humidity, air velocity and thermal fluxes. We are experimenting on the combined use of static weather stations and mobile measuring devices (miniature weather stations and specific sensors) that are used by the researchers or by outside participants (see Potvin and Demers 2016, Camponovo *et al.* 2016, Tsin *et al.* 2016, Chokhachian *et al.* 2017).
- Microclimatic data matching with position data in space via localisation techniques. To this end, we will refer to existing methods according to the conditions on each study site: inertial navigation systems (Hannink *et al.* 2017), Computer Vision Tracking approach (Nielsen *et al.* 2014) or differential GPS (Antigny *et al.* 2017).
- The design and test of experimentation protocols and the processing of the results aim to cross the previous data and the one collected with investigation methods on thermal sensations – for example, commented walks, semi-structured interviews, questionnaires on subjective perception, cognitive maps (see Masson and Aït-Sidhoum 2011, Lenzholzer *et al.* 2018). This section will be both about the statistic processing of several types of quantitative data (R studio) and their spatialisation and visualization with GIS tools (QGIS), while using qualitative approaches mobilising speech, sensations and measurements (for

example, directory of microclimatic effects, sensory maps, videographical approaches). Similarly, a fine work on the comfort index will contribute to this discussion – for example, UTCI, modified PET, ASV or TSV perceptive scales (Parkinson *et al.* 2016, Potcher *et al.* 2018).
- The analysis of the results from the first experimentations, proposing pluridisciplinary keys to read the different data elements that were collected. This exploratory work will be subject to work seminars with the researchers of the team and outside guests.

To carry out these missions, we are hiring one post-doctoral researcher who will:

- Contribute to the elaboration of the field experimentation protocol and participate to the operational implementation during the contract duration.
- Organise collective work seminars on the method and the crossing of research data.
- Participate in the optimisation of research results via communications in international conferences and scientific articles.

The candidate is invited to propose their own point of view to develop the missions according to their profile and personal interests. Moreover, they will be tasked with the regular updating of the project's state of the art.

Professional environment

Reception facilities and place of work: the *Centre de Recherche Nantais Architectures Urbanités* (CRENAU) is the Nantes team of the *Ambiances, Architectures, Urbanités* laboratory AAU-UMR CNRS 1563. Its facilities are located at the Graduate School of Architecture of Nantes (http://aau.archi.fr/crenau).

Profile of the candidates

This offer is directed at PhD holders with training in engineering, architecture or urban planning, who are acquainted with questions of microclimate and urban thermal comfort.

Specific skills:

- Command of the physical and perceptual context of phenomena regarding urban microclimatology and thermal comfort.
- Technical knowledge in *in situ* instrumentation and programming.
- Interest in working within a plurisciplinary team.
- Proficiency in oral and written English (presentations, interviews and publications).

Contract terms

- Required level: PhD required
- Type of contract: Fixed-term contract, 18 months
- Ideal starting date: April 1st, 2019
- Percentage: 100%
- Compensation: Gross monthly salary of 2555,39€
- Employer: CNRS

Application process

In accordance with the CNRS commitment to the European Human Resources Strategy for Researchers (HRS4R), the candidates must apply on the application platform of the CNRS *Portail Emploi* (emploi.cnrs.fr), to the exclusion of any other process.

The application will include:

- A cover letter (5 000 to 10 000 signs) highlighting the fact that the candidate's profile and contributions are adequate to the COOLSCAPES ANR project.
- Concise resume (max. 1 page) + detailed academic and scientific resume.

Deadline for application: February 22th, 2019

The pre-selected candidates will be interviewed, either face-to-face or digital, at the begining of March 2019. The results of the recruitment process will be published mid-March 2019.

Bibliography

Camponovo, R., Gallinelli, P. et Guillot, V. (2016). CityFeel - An innovative protocol and instrument to better understand urban microclimate. In : Actes du colloque *Forschen für den Bau im Kontext von Energie und Umwelt*. Genève.

Chokhachian, A., Santucci, D. et Auer, T. (2017). A Human-Centered Approach to Enhance Urban Resilience, Implications and Application to Improve Outdoor Comfort in Dense Urban Spaces. *Buildings*, 7(4), 113. DOI : 10.3390/buildings7040113

Hannink, J., Ollenschläger, M., Kluge, F., Roth, N., Klucken, J. et Eskofier, B. M. (2017). Benchmarking Foot Trajectory Estimation Methods for Mobile Gait Analysis. *Sensors*, 17(9). DOI : 10.3390/s17091940

Lenzholzer, S., Klemm, W. et Vasilikou, C. (2018). Qualitative methods to explore thermo-spatial perception in outdoor urban spaces. *Urban Climate*, 23, 231-249. DOI : 10.1016/j.uclim.2016.10.003

Masson, D. et Aït-Sidhoum, N. (2011). Filming Air. The Method of Climatic « Dérive ». In : N. Tixier (dir.), *L'ambiance est dans l'air. La dimension atmosphérique des ambiances architecturales et urbaines dans les approches environnementales*. Grenoble : CRESSON.

Antigny, N., Servières, M. et Renaudin, V. (2017). Pedestrian Track Estimation with Handheld Monocular Camera and Inertial-Magnetic Sensor for Urban Augmented Reality. In : Actes du colloque *International Conference on Indoor Positioning and Indoor Navigation*. Sapporo, Japon.

Nielsen, S. Z., Gade, R., Moeslund, T. B. et Skov-Petersen, H. (2014). Taking the temperature of pedestrian movement in public spaces. *Transportation Research Procedia*, 2, 660-668.

Parkinson, T., de Dear, R. et Candido, C. (2016). Thermal pleasure in built environments: alliesthesia in different thermoregulatory zones. *Building Research & Information*, 44(1), 20-33. DOI : 10.1080/09613218.2015.1059653

Potchter, O., Cohen, P., Lin, T.-P. et Matzarakis, A. (2018). Outdoor human thermal perception in various climates: A comprehensive review of approaches, methods and quantification. *Science of The Total Environment*, 631, 390-406. DOI : 10.1016/j.scitotenv.2018.02.276

Potvin, A. et Demers, C. (2016). Ambiences in the City: Longitudinal surveys in the dynamic representation of built environments to observe, measure and speculate. Strolling in Panama City, Panama. In : N. Tixier et N. Remy (dir.), *Ambiances, tomorrow. Proceedings of 3rd International Congress on Ambiances*. Septembre 2016, Volos, Greece, International Ambiances Network.

Tsin, P. K., Knudby, A., Krayenhoff, E. S., Ho, H. C., Brauer, M. et Henderson, S. B. (2016). Microscale mobile monitoring of urban air temperature. *Urban Climate*, 18, 58-72. DOI : 10.1016/j.uclim.2016.10.001