Offer #2026-10559

Post-Doctoral Research Visit F/M Crowd dynamics data acquisition and processing for large-scale dataset construction

Contract type : Fixed-term contract

Level of qualifications required : PhD or equivalent

Fonction : Post-Doctoral Research Visit

About the research centre or Inria department

The Inria Centre at Rennes University is one of Inria's nine centres and has more than thirty research teams. The Inria Centre is a major and recognized player in the field of digital sciences. It is at the heart of a rich R&D and innovation ecosystem: highly innovative PMEs, large industrial groups, competitiveness clusters, research and higher education players, laboratories of excellence, technological research institute, etc.

Context

The **VirtUs team** at the Inria Centre at the University of Rennes is internationally recognized for its work in crowd simulation and the study of collective human behaviour. This postdoctoral position is part of the **FOUL-X project (Programme Inria Quadrant)**, which aims to develop a new generation of crowd simulators capable of capturing the specific dynamics of crowds in real-world public spaces.

A key challenge in crowd simulation is the lack of datasets documenting the variety of crowd dynamics observed in different environments. Existing datasets are sparse and rarely capture the diversity of behaviours that emerge from different populations, activities, and spatial configurations. FOUL-X addresses this gap by designing and conducting field acquisition campaigns across multiple sites in France, with the goal of building an open, large-scale dataset of crowd dynamics.

This postdoc focuses on the **data acquisition** pipeline: from video capture in the field to the extraction of individual trajectories, and the characterization of crowd dynamics through dedicated metrics. The work will contribute directly to making the FOUL-X dataset available to the broader scientific community.

Assignment

Assignments: With the help of the VirtUs team and under the supervision of Julien Pettré, the recruited person will be tasked with building a unique, open dataset documenting the diversity of crowd dynamics observed in real-world public spaces. This dataset will constitute a landmark contribution to the field, providing the scientific community with data capturing crowd behaviours across a variety of sites, populations, and spatial configurations — something that does not currently exist at this scale and diversity.

For a better knowledge of the proposed research subject: A state of the art, bibliography and scientific references are available on the VirtUs team website: https://www.inria.fr/en/virtus

Collaboration: The recruited person will work in close connection with a PhD student of the VirtUs team, who develops the video-based pedestrian tracking pipeline used to extract individual trajectories from field recordings, and with the second postdoctoral researcher of the FOUL-X project, who is responsible for the data-driven modelling activities. This triangular collaboration ensures that the dataset is built in direct response to both the technical constraints of the tracking pipeline and the scientific requirements of the modelling work.

Responsibilities: The person recruited is responsible for the design and execution of field acquisition campaigns across multiple sites in France, the validation and structuring of the resulting trajectory dataset, and the development of metrics to characterise and compare the diversity of observed crowd dynamics. The recruited person will take initiatives to maximise the scientific value of the dataset and ensure its open dissemination to the community.

Steering/Management: The person recruited will be in charge of coordinating field missions — including logistical, technical, and ethical aspects of data capture — and will lead the effort to make the FOUL-X dataset publicly available in a reusable and well-documented form

Main activities

Phase 1 — Pipeline setup and campaign preparation (months 1–6)

- Evaluate and validate the video-based trajectory extraction pipeline developed by the PhD student of the team, with respect to crowd density, resolution constraints, and GDPR compliance requirements
- Define the minimal data resolution required to extract complete and accurate individual trajectories while ensuring data anonymisation
- Contribute to the identification and selection of acquisition sites, targeting a diversity of crowd dynamics (populations, spatial configurations, activities)
- Participate in the preparation of the ethical framework and site agreements for field data collection

Phase 2 — Field acquisition and dataset construction (months 7–18)

- Lead and coordinate field acquisition campaigns across 4 to 6 sites in France, including on-site deployment of video capture equipment
- Supervise the processing of raw video data into structured trajectory datasets using the tracking pipeline
- Iteratively validate the quality, completeness and robustness of extracted trajectories
- Structure and document the dataset for internal use and future open dissemination
- Contribute to the first scientific dissemination of results (e.g. PED 2027 conference)

Phase 3 — Dataset characterisation and metrics (months 19–24)

- Develop quantitative metrics to characterise and compare the diversity of crowd dynamics across acquisition sites
- Contribute to the analysis of differences between crowd behaviours at multiple spatial and temporal scales
- Finalise the open release of the FOUL-X dataset on a dedicated public platform
- Contribute to a major publication presenting the dataset and its characterisation

Skills

Technical skills (required):

- Video-based data processing and object tracking methods
- Programming in Python
- Experience with real-world data acquisition and processing pipelines

Technical skills (a plus):

- Familiarity with pedestrian trajectory analysis
- Knowledge of GDPR and ethical frameworks for data collection in public spaces
- Experience with open dataset publication and documentation

Languages:

- English (required for scientific dissemination)
- French (a plus for interactions with acquisition sites)

Relational skills:

- Strong organisational and coordination skills
- Ability to work in a collaborative and interdisciplinary environment
- Autonomy and initiative in managing field campaigns

Benefits package

- Subsidized meals
- Partial reimbursement of public transport costs

- Leave: 7 weeks of annual leave + 10 extra days off due to RTT (statutory reduction in working hours) + possibility of exceptional leave (sick children, moving home, etc.)
- Possibility of teleworking (after 6 months of employment) and flexible organization of working hours
- Professional equipment available (videoconferencing, loan of computer equipment, etc.)
- Social, cultural and sports events and activities
- Access to vocational training
- Social security coverage

Remuneration

Monthly gross salary amounting to 2788 euros

General Information

- **Theme/Domain :** Vision, perception and multimedia interpretation
  Statistics (Big data) (BAP E)
- **Town/city :** Rennes
- **Inria Center :** Centre Inria de l'Université de Rennes
- **Starting date :** 2026-10-01
- **Duration of contract :** 2 years, 3 months
- **Deadline to apply :** 2026-12-31

Contacts

- **Inria Team :** VIRTUS
- **Recruiter :**
  Pettre Julien / julien.pettre@inria.fr

About Inria

Inria, the French national institute for research in digital science and technology, supports the French government in national research and innovation strategies in the digital field, acting as Digital Programs Agency. Inria leads over 300 research and innovation projects with its 3,500 scientists, engineers, and support staff, in partnership with universities and the digital ecosystem (businesses, entrepreneurs, and public stakeholders). Together, we explore strategic fields such as artificial intelligence, cybersecurity, quantum computing, cloud technologies, digital transformation in healthcare, digital twins, and digital technologies for defence. We develop practical solutions such as software, tech startups, partnerships with national companies, and cutting-edge training programmes. Our goal is to drive scientific, technological, and industrial excellence to ensure France’s digital sovereignty.

The keys to success

The ideal candidate has a genuine taste for field work and for the challenge of bringing scientific rigour to real-world data collection. They feel at ease operating at the interface between technical work and scientific thinking, in particular around the question of what data is needed to capture and characterise the diversity of crowd behaviours.

We welcome candidates from computer vision, image processing, or applied mathematics, but also from physics or cognitive science, provided they have developed hands-on experience with real-world data and quantitative analysis of collective behaviours.

The position requires someone organised, autonomous, and comfortable taking ownership of a complex, multi-site data collection effort. A collaborative mindset is equally essential, as the quality of the dataset will directly depend on close interactions with the tracking pipeline developer and the modelling postdoc. Curiosity about human behaviour and a sensitivity to the ethical dimensions of data collection in public spaces are qualities we particularly value.

Warning : you must enter your e-mail address in order to save your application to Inria. Applications must be submitted online on the Inria website. Processing of applications sent from other channels is not guaranteed.

Instruction to apply

Please submit online : your resume, cover letter and letters of recommendation eventually

Defence Security :
This position is likely to be situated in a restricted area (ZRR), as defined in Decree No. 2011-1425 relating to the protection of national scientific and technical potential (PPST).Authorisation to enter an area is granted by the director of the unit, following a favourable Ministerial decision, as defined in the decree of 3 July 2012 relating to the PPST. An unfavourable Ministerial decision in respect of a position situated in a ZRR would result in the cancellation of the appointment.

Recruitment Policy :
As part of its diversity policy, all Inria positions are accessible to people with disabilities.