

## Internship offer

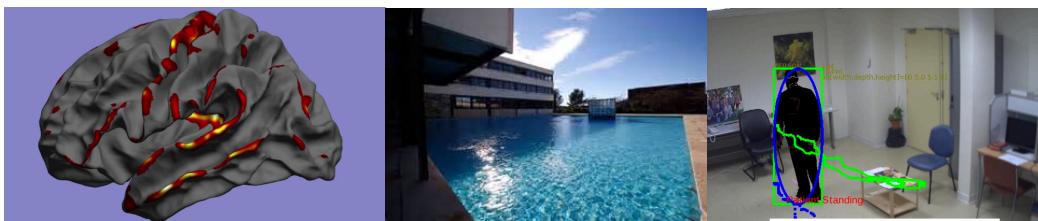
### BRAHMS

### Linking BRain imaging to Automated Healthcare Monitoring through Statistical learning -

#### Project Description:

The correct identification of neurodegenerative disorders is extremely challenging, since many brain pathologies are associated to common behavioral and cognitive impairment, as well as to similar anatomical patterns of abnormality. This issue results in misdiagnosis that ultimately leads to ineffective treatment and care.

The problem consists in the current poor understanding of the link between brain imaging phenotype and subtle behavioral variation underlying neurological disorders. The challenge is intimately related to the low sensitivity and high variability of routine neuropsychological assessment, which does not provide quantitative and robust measures. In order to correctly identify brain pathologies it is thus of paramount importance to develop computational methods linking brain imaging to automated measures of cognition and behavior in patients.



This project aims at developing novel statistical learning methods for the joint analysis of heterogeneous data, such as structural and functional brain images, and measures from spatio-temporal and audio sensors quantifying patients' behavior and cognition.

#### Hosting groups:

[Asclepios](#) team (Inria Sophia Antipolis) - [CoBTeK](#) team (Institute Claude Pompidou, Nice). The groups are located in the tech Park of Sophia Antipolis and in Nice, in the French Riviera. The internship is within the context of an excellence project on digital healthcare for neurological and psychiatric disorders (MNC3). The aim

of this multidisciplinary and multi-centric project is to jointly analyze neuroimaging, behavioral/cognition, and biological data for better diagnosis and treatment of brain disorders. The work will involve regular visits to the *Institut Claude Pompidou* in Nice. The internship is aimed to prepare the candidate for a possible *subsequent PhD project* within MNC3.

**Main activities:**

- Feature extraction from brain imaging data (anatomical and functional magnetic resonance images), by using supervised methods based on anatomical parcellation of the brain areas.
- Feature extraction and analysis from non-imaging data, such as video/audio sensors, and actigraphy. During the project different feature extraction methods will be investigated (such as supervised or unsupervised approaches to space-time filtering).
- Contributing to the integration and joint analysis of these heterogeneous biomedical data. The aim is 1) the identification of discriminative traits of different neurological and psychiatric disorders, and 2) the development of novel quantitative methods for assessing the severity of the disease

**During the internship the candidate will:**

- Acquire skills in the advanced processing of medical images and sensors data;
- Collect/investigate datasets containing several modalities, such as brain images, videos of ADLs, actigraphy data;
- Develop learning methods for the analysis of heterogeneous biomedical data;
- Gather competencies on the use of novel health-care technologies in brain disorders;
- Participate to the clinical activity within a CHU group, interact with the clinicians as well as with the clinical research assistants;
- Interact with INRIA students and researchers, and participate to scientific life of the teams.

**Required competences:**

Competences in statistical learning and mathematical modeling are essential, as well as knowledge in medical imaging, signal and image processing (Master 2 level). Solid programming and IT skills are necessary (Python and C++, bash scripting, version control systems), along with strong communication abilities.

**Contact:**

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**References:**

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