

## Scientific Project Proposal for International Exchange Student

---

**Topic:** Indoor localization using smartphone's inertial measurement units (IMU)

**Supervisor:** Dr. Karim Abed-Meraim ([karim.abed-meraim@univ-orleans.fr](mailto:karim.abed-meraim@univ-orleans.fr)) supported by his PhD student Mr. Guanglie Ouyang ([guanglie.ouyang@outlook.com](mailto:guanglie.ouyang@outlook.com))

**Laboratory:** PRISME/ Université d'Orléans

**Internship period:** From January 15th till May 2019

**Abstract:** Indoor navigation is an important enabling technology for applications such as finding a class room or an office in a given building or safety access during an emergency. While GPS or base station signals are commonly used for navigation in an outdoor environment, robust and accurate indoor positioning remains a challenging problem that can be handled by different approaches [1] including the use of inertial sensors to track a user by continuously estimating displacement from a known original location. Practical indoor localization system which relies on smartphone sensors only exist in the literature, e.g. [2].

The project objectives are as follows:

- Allowing the student to get familiar with the indoor localization problem and its challenges
- To have an overall view on the existing methods for mobile localization and tracking
- To conduct a comparative study (with MATLAB programming) on the performance of different dead-reckoning methods
- Potentially, to test some 'signal processing' techniques for the improvement of the localization accuracy and robustness.

**Required skills:** MATLAB programming & basics of statistical signal processing

### Bibliography

[1] Bang Wang, Qiuyun Chen, Laurence T. Yang, and Han-Chieh Chao, "Indoor Smartphone Localization via Fingerprint Crowdsourcing: Challenges and Approaches", IEEE Wireless Communications, June 2016.

[2] Fan Li, Chunshui Zhao, Guanzhong Ding, Jian Gong, Chenxing Liu, Feng Zhao, 'A Reliable and Accurate Indoor Localization Method Using Phone Inertial Sensors', UbiComp, Pittsburgh, USA, Sep. 2012.

