Recent technological evolutions, including cloud computing, mobile computing, and the social networks, are turning computing ubiquitously distributed. Around 50 billions of devices are estimated to be interconnected at the horizon of 2020, yet building large planetary-scale, efficient and robust distributed systems and communication infrastructures is notoriously challenging. Interconnecting planet-wide IoT devices will raise new challenges: social mobility, heterogenous in-memory and computing capabilities, different large-scale application goals: real-time data flows, QoS, secure/safe worst-case.

Two major publications in the field proposed for the PhD:

**Description of the research work proposed for a PhD**

**Title**: Mobile-adaptive, Self-repairing In-memory Overlay System and Network for Efficient Planetary-Scale Interconnection of the Internet of Everything

**Subject**: The work of the PhD student will mostly revolve around the algorithmic design and the architecture implementation of embedded systems, system of systems, overlay networks and distributed computing deployment. She or he will propose and implement mechanisms for cross-overlay interoperability and for taking into account node heterogeneity and node mobility. Finally, she or he will have a fundamental role in the development and deployment of the prototype implementation and its evaluation. The programming systems envisioned are event-based middleware such as Vert.x, and the communication layer envisioned are efficient in-memory publish/subscribe ones such as Hazelcast. The distributed computing platform envisioned are real-time data flow ones such as S4, Storm. The algorithmic techniques envisioned are gossip-based protocols, self-repairing overlays, and peer-to-peer networks in general. Most of the development will be done using high-level languages such as Java. Experience with mobile and/or tiny devices development, while not mandatory, is a plus, as the test platform will be composed of a collection of tiny and low-power devices spread across multiple geographical locations.

**Keywords**: Distributed Systems, Event-Based Communication, Algorithmic, Planetary-Scale Computing

**Expected collaborations**: Shanghai Jiao Tong University, Fudan University, Tsinghua University

**Background required from the applicant**: Computer Science: Programming - proven skills, Operating System - good background, Network - good background, Cloud Computing - optional, Embedded Systems - optional; Mathematics: Optimization and algorithmic - good background, Information Theory - knowledgeable; Language: English - fluent

Existence of a PDF file detailing the proposal (“yes” or “no”): no

(see guidelines on the website www-csc.utt.fr)