NOTICE OF THESIS PROPOSAL PRESENTATION

Geodesy and Geomatics Engineering

Doctor of Philosophy

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Friday, July 6, 2018 @ 10:00 am
Head Hall – Room E-11

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Developing an Analytics Everywhere Framework for the Internet of Things

ABSTRACT

The fast-growing of the Internet of Things (IoT) technology that enables the traditional objects to be transformed into smart things can enhance the quality of life and support new domain-specific applications. Along with these emerging prospects, the current research work on IoT is also unveiling new research challenges. First, IoT environments generate unprecedented amounts of data that are difficult to handle using traditional analytics workflows. Second, IoT data streams normally exhibit high sampling rates with out-of-order arrival problems, communication loss, and they might be noisy, incomplete, and unreliable. Moreover, there are research challenges related to how efficiently manage IoT data streams considering computing power, storage capability, communication capability, and energy limitations of IoT environments while generating meaningful insights and higher-level information in a timely way. Designing the appropriate analytical workflows to comply with these complex IoT challenges and generate new insights from IoT data streams are the main research goals of this thesis. To achieve that, an *"analytical everywhere"* framework is proposed to collect and analyze IoT data streams through distributed resources located at the edge, fog and cloud computing. Cloud computing is aimed to provide on-demand and scalable storage, as well as supporting analytical tasks that can scale-up to a global scale. However, one of the main drawbacks is that it will not be possible to transport all the IoT data streams to the cloud, run the analytics and provide new insights in near-real time. Therefore, the proposed analytical framework also moves the analytical tasks to the edge network because it is located closer to the IoT devices and can support real-time analytical tasks at a local scale. However, the edge nodes are lightweight with low processing and storage capabilities. The proposed analytics everywhere ecosystem deals with this dilemma between the edge and cloud paradigm limitations by proposing fog computing as an intermediary resource that can seamlessly integrate analytical tasks from the edge nodes to the cloud. The *"analytics everywhere"* framework is expected to combine edge, fog, and cloud resources to run streaming analytical tasks at local, regional and global scales, in such a way that the drawbacks of an analytic task can be complemented by the advantages of other analytics.

Faculty Members and Graduate Students are invited to attend the presentation