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Classifying and Clustering the Web of Things

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by

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To Jesus, my Lord and Saviour, who walked this walk with me.

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ABSTRACT

The *Web of Things* is emerging as a promising solution for realizing ubiquitous applications, where real-world things and people seamlessly connect and communicate. The challenges of integrating real-world things into the virtual environment of the Web have been the subject of much research recently. Such environments present a major challenge i.e. to retrieve combined environmental services and relevant information through prevalent means. Research in this direction is significantly challenging because of the growing number of heterogeneous things connected to the Web and the potential ubiquitous applications that would positively influence society, business, and industry. The substantial numbers of proprietary applications that integrate real-world things reveal the requirement for an open and scalable framework for including the plethora of things in a systematic and structured manner. Adequate solutions to manage the ever increasing number of things are paramount to induce flexibility, robustness, and usability in future ubiquitous applications.

In this dissertation, we propose a novel semantic structure to represent things on the Web. We classify things into an ontological structure based on required capabilities to participate in the Web. We introduce the *Ambient Space framework* to manage things in a scalable manner and use it to model the creation of *communities of things*. We describe the process of analyzing thing's semantic structure to cluster them into communities. We also discuss how things join these communities inherently to establish relationships with people on contemporary social networks. Finally, we present case-studies centered on environment sustainability which show applications where a number of things are managed using our framework in autonomous, heterogeneous, and dynamic environments. Our evaluations reveal the benefits of such applications, compared to conventional solutions, in support of sustainable environments.

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Mathew S.S., Atif Y., Sheng Q. and Maamar Z., "The Web of Things - Challenges and Enabling Technologies", In Internet of Things and Inter-cooperative Computational Technologies for Collective Intelligence (N. Bessis, F. Xhafa, D. Varvarigou, R. Hill, and M. Li, eds.), Vol. 460 of Studies in Computational Intelligence, pp. 1-23. Springer Berlin Heidelberg. 2013.

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