** This is my Ph.D. research work under the supervision of Prof. Sumi Helal and we are still working on it to date.

Abstract:

The Internet of Things (IoT) is about billions of physical and cyber devices -known as things- that add informative and interactive flavors to our life, with a potential impact not only on how we live but also on how we work. The recent advances in communication technologies, processing power, and sensing capabilities enable these things to collect and analyze context data. These smart things can also interconnect, interact and cooperate with other things and powerful cloud platforms through thing-to-thing and thing-to-cloud communication paradigms respectively, converting our working and living spaces into smart spaces. The success of the IoT's promising vision will greatly depend on how its main ingredient -the thing- is architected and prepared to engage. The IoT's heterogeneous and fragmented nature introduces the need for additional effort to homogenize these things and to create powerful IoT applications. At the same time, for the realization of innovative IoT scenarios, the application development environment should not be based only on the services provided by these things to the smart space but also on the relationships that may logically and functionally tie these services, to create a social network of smart things. Such services and relationships are the building blocks for meaningful and domain-related IoT applications. However, the recently proposed ideas for the social IoT only consider a limited set of relationships to build applications.

In this talk, I will present the IoT Device Description Language (IoT-DDL), a machine- and human-readable descriptive language to create a thing in the smart space, and the Atlas thing architecture, an engine that provides new operating layers, services and capabilities a thing must have to engage in IoT applications and scenarios. I will also introduce the inter-thing relationships programming framework as the basis for a social IoT distributed programming ecosystem with a set of concrete relationships to build a wider class of domain related IoT applications. I will demonstrate part of the functionalities of the IoT-DDL, the architecture and the framework through proof-of-concept scenarios that engage real IoT devices. I will also discuss the broader impacts of this research, as well as the future directions of my research.