Abstract:
The Internet of Things (IoT) is poised to transform lighting, a cornerstone of urban
livability, into a city-wide, data-enabled smart infrastructure. To this end, we propose the Lighting-Enabled Smart City Applications and Ecosystems (LENSCAPEs) framework. As an embodiment of LENSCAPEs, we present Light-on-Demand, a mesh-based lighting network that resulted in 92% energy savings in a recent deployment at an army base in the United States.
City-wide lighting networks, augmented with sensors, are an example of complex cyber-physical systems that generate vast amounts of data. Generating value from this data involves rendering services via data analytics. In the second half of the talk, we discuss data-driven computational modeling and analysis of complex systems. Specifically, we present a parameter estimation technique for input-controlled Markov chains, such as ion-channel models of cardiac cells. A sum-of-squares technique, BFComp, is presented to compute Bisimulation Functions (BFs), which establish input-to-output stability of control systems, thereby guaranteeing their approximate bisimulation equivalence. We also present a compositional proof technique, based on small-gain theorems on BFs, for model-order reduction of feedback-composed dynamical systems.

Brief Bio of Speaker:
Abhishek Murthy is a Member Research Staff in the Lighting Solutions and Services department of Philips Research North America. He works on modeling and analysis of lighting-related cyber-physical systems for smart cities. Abhishek received his PhD in 2014 from Stony Brook University's Computer Science department, where he worked on an automated framework for computing compositional proofs of Input-to-Output stability of feedback-based dynamical systems.