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Abstract: Cyber-Physical System (CPS) research addresses the close interactions and feedback loop between the cyber components such as sensing systems and the physical components such as energy and mechanical systems. As an exemplary CPS, smart grid system has gained significant popularity due to the massive deployment of advanced metering infrastructure which enables a transformative shift of the classical grid into a more efficient and reliable grid. Despite its importance, such a CPS is vulnerable to various cyberattacks such as energy theft and pricing hack. In this talk, I will describe recent advances in cyberthreat analysis and defense technology development for a smart grid CPS. I will first show that due to the interdependence between utility pricing and customer energy load, an attacker could cyber-tamper smart meters for electricity bill and energy load manipulations. I will then discuss some advanced theoretic and algorithmic techniques to defend against those attacks, including partially observable Markov decision process (POMDP) based detection and cross entropy optimization based Feeder Remote Terminal Unit (FRTU) deployment. I will conclude the talk with some of the ongoing research in this direction.