Bayesian Network and Semidefinite Programming Based Wireless Power Transfer Manufacturing System State Estimation and Regulation

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***Abstract*— In order to supply energy to the smart objects such as electric vehicles and smart phones using wireless power transfer (WPT) framework, the internet of things (IoT) embedded sensors and actuators can play critical roles for sensing, monitoring and regulating the WPT system states. Specifically, the smart sensors are used to transmit sensing state information to the control center, where the state estimation program runs to know the operating and health conditions of WPT system. This study proposes a Bayesian network based WPT system state estimation algorithm. This scheme can estimate the WPT system states in a distributed way using the Bayesian tree structure. Afterwards, the semidefinite programming based optimal feedback control scheme is proposed to regulate the system states. Simulations results show that the proposed approach provides significant performance improvement compared with the existing scheme.**

***Keyword*—Bayesian network, controller, internet of things, sensors, semidefinite programming, system state estimation, wireless power transfer systems.**

Dr. Masud Rana research interests are in the theoretical and algorithmic studies in signal processing and optimizations, statistical learning and inferences for high dimensional data, distributed optimizations and adaptive algorithms, as well as their applications in communications, networked systems and smart grid.

Prof. Narendra B. Dahotre of materials science and engineering, established the Laboratory of Laser Aided Additive and Subtractive Manufacturing (LAASM) at the University of North Texas (Denton, Texas). The state-of-the-art research facility houses multiple high-power infrared laser systems. These lasers are specifically designed and configured for efficient, reliable, cost-effective, precise, and efficient additive and subtractive manufacturing processes for advanced materials, including metals, ceramics, composites, etc.