Engineering Management, Information, and Systems

NETWORK DESIGN FOR IN-MOTION WIRELESS CHARGING OF ELECTRIC VEHICLES: MODELS AND ALGORITHMS

Ph.D. Dissertation Defense

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12:00 pm – 2:00 pm

Room 210, Junkins Engineering Building

Abstract

It is widely acknowledged that the relatively short driving range of electric vehicles (EV) and the long battery charging times collectively lead to a phenomenon known as “range anxiety” of EV drivers. This phenomenon remains to be the major factor that hampers EV adoption. To overcome the range anxiety, wireless charging of electric vehicles has been proposed as a promising and safe solution. This cutting-edge technology has made strides in the past few years within the domains of EV and charging infrastructure research and has recently made multiple appearances at several prestigious motor shows around the globe.

In this research, we study the optimal deployment of wireless charging infrastructure in urban transportation networks. We investigate how to best locate the charging infrastructure, and allocate power capacity, to serve the charging demands of EVs at the minimum investment cost. We further investigate the two-way interaction between of the traffic condition on the infrastructure deployment plan. Multiple optimization models and algorithms are proposed and tested to generate cost-effective deployment plans, with different objectives, in an effort to facilitate the implementation of the emerging technology. To support product design of this technology, we provide insights on how different key characteristics of the product can impact the implementation cost.

Biography

Mamdouh Mubarak is a Ph.D. candidate with a major in Operations Research at Lyle school of engineering. He joined SMU in 2012 as a Fulbright scholar and earned a Master’s degree in engineering management before joining the Doctoral program. His research focuses on network design applications. He received multiple awards during his studies at SMU including the Global Grand Challenges Summit graduate award, the Frederick E. Terman Award, and the Outstanding Graduate Student award. Mamdouh grew up in Damascus, Syria, where he earned his Bachelor degree in mechanical engineering and served for two years as a project engineer before coming to the U.S. to pursue his graduate studies.

Everyone invited and welcome!