Development of Wireless Dynamic Electric Vehicles

V. Prasanth

DTU Chemistry, Technical University of Denmark

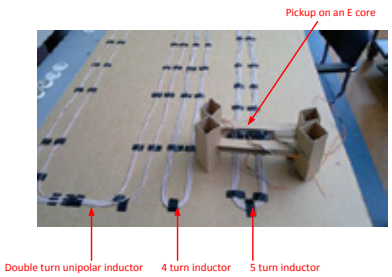
INTRODUCTION

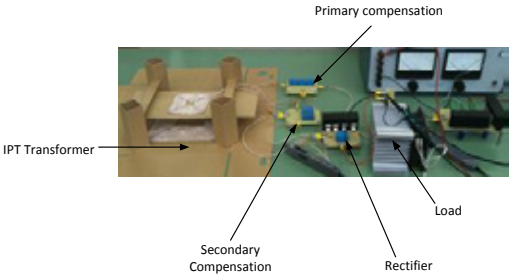
Reduction or elimination of the large battery in EVs is an important step towards the acceptance of EVs. To that end, wireless inductive power transfer can charge both stationary and moving vehicles through electromagnetic induction. Development of stationary and dynamic powering of EVs can yield excellent range extension and can reduce the price of EVs by 30-40% due to the reduction in battery pack requirements.

MOTIVATION

1. Reserves of Li for ***Li-ion batteries*** are largely concentrated in ***South America***, about ***80%*** of global reserves, this can be a source of potential political problems.
2. ***Regenerative braking*** can be implemented which increases the energy efficiency of the car by recovering up to ***30%*** of the energy lost due to braking.
3. Renewable energy if utilized at the points of production would directly reduce the ***transmission losses*** associated with the transport of electricity over large distances (as high as ***7%*** in Denmark in 2011) and improves energy efficiency.
4. Vehicles can be used as ***local energy storage*** so as to minimize variability of Renewable Sources and the generated power could be fed back to the grid during peak electricity demand. This is the function of Plug-in EVs and can help in demand side management by peak shaving of load demand.

EXPERIMENTAL SETUP





RESULTS

Higher frequency operation yields better efficiency of power transfer (100-500 kHz). Overall system efficiency as high as 80% for dynamic powering and 90% for stationary charging possible with SiC.