WORK/ENERGY/POWER

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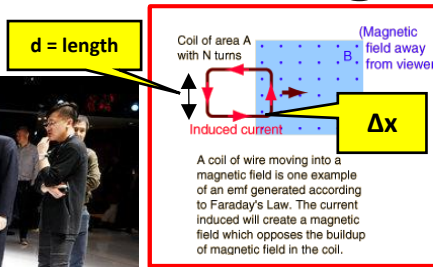
For Electric Cars Without a Plug, Thank Tesla (the Scientist)

An Audi A8 model on display last month in China. The hybrid version of the A8 will offer a wireless charging system among its many premium features.



INTRODUCTION: **Force = [charge][velicity of coil][magnetic field] = q v B where thus B =F/(q v) , *E* =emf = voltage generated., Area = A = Δx d , ΔΦ = Δ(BA) = B ΔA , let N =1 , v = Δx/Δt**

QUESTION: **Show that emf[voltage generated = F d/q = Work/unit charge**

HINTS & ANSWER: **After placement of symbols into E = ΔΦ/Δt you should end up with E = F Δx d/(q [Δx/Δt] Δt = F d/ q = work/[unit charge].**

COMMENT: Thus it IS possible to have a coil(s) in a moving car moving through a magnetic field(possibly embedded in road surface) to generate a voltage which couls be stored in a battery in car. Could be 90% efficient as article states below.

By Stephen Williams

At its introduction last summer in Barcelona, Spain, the 2019 Audi A8 quattro became the poster child of automotive high tech: matrix L.E.D.s that shine from the headliner with the wave of a hand, advanced autonomous driver assistance sensors, active electromechanical suspension. And on the floor under one of the models, a gray metal pad.

Onlookers watched as the pad rose slightly, nearly touching a coil under the front axle. Forget the cables and cut the cords: This was how the prototype of the A8 L e-tron hybrid would send energy to its block of 104 battery cells.

Give thanks to **Tesla — Nikola, the inventor, not the car company — who more than a century ago used electromagnetic energy to transfer power over an "air gap" between two coils. Wireless, or inductive, charging is the next frontier for hybrid and electric vehicles** that one day will charge in much the way your new toothbrush or cellphone does. And farther down the road is the **tantalizing possibility that cars in motion will be charged "dynamically," on the street, *by* the street.**

But **(((induction charging)))** is at least three years away from mass-market automotive application, said Jesse Schneider, who heads a wireless task force for the Society of Automotive Engineers. And, like most technological advances in this industry, a wireless power transfer standard — now in late-stage discussions by the S.A.E. — will need to be approved as safe and secure by the federal government. Mr. Schneider said he believed that wireless charging would help break down barriers for electronic vehicles by making it as simple as pulling into your usual parking spot and walking away. "There are 14 automakers and suppliers on my team, and we have a huge effort underway to come up with one standard methodology," he said.

Prof. Shanhui Fan and a team of students at Stanford are working on wireless energy transfer to moving objects. So far, they have been able to power a moving light bulb.The limited real-world systems that employ wireless charging require precisely parking a receptor-equipped vehicle over a charging platform. Audi claims a **charging efficiency of more than 90 percent**, meaning that less than 10 percent of the power sent to the charger is lost in the process of topping off the battery. Fully charged, the car — which is not due in the United States until next year — is expected to be able to travel about 30 miles on electricity alone, Audi said.