

Dynamic Wireless Charging

Where we are and where to go

Jae Lee

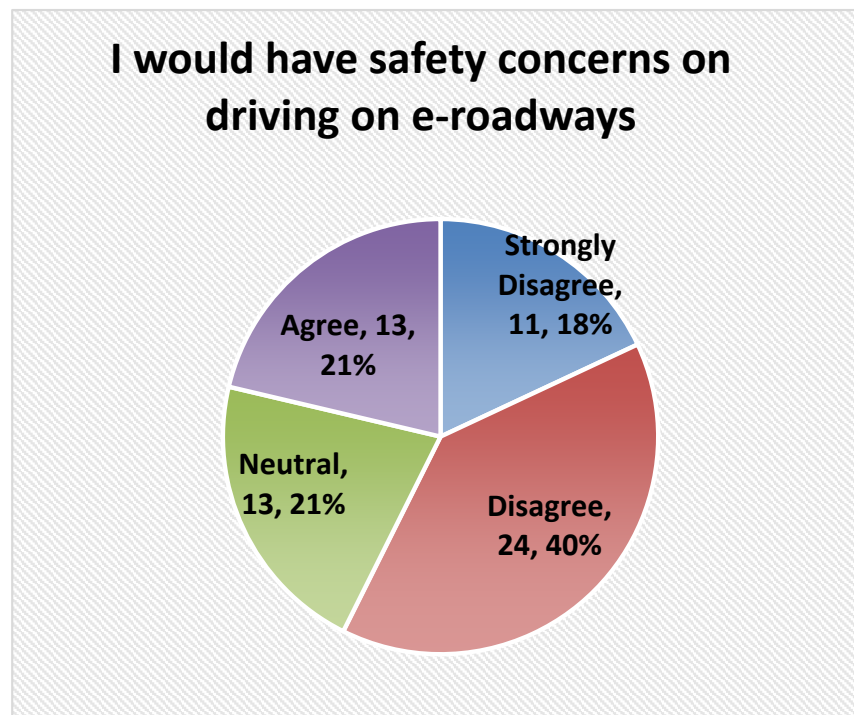
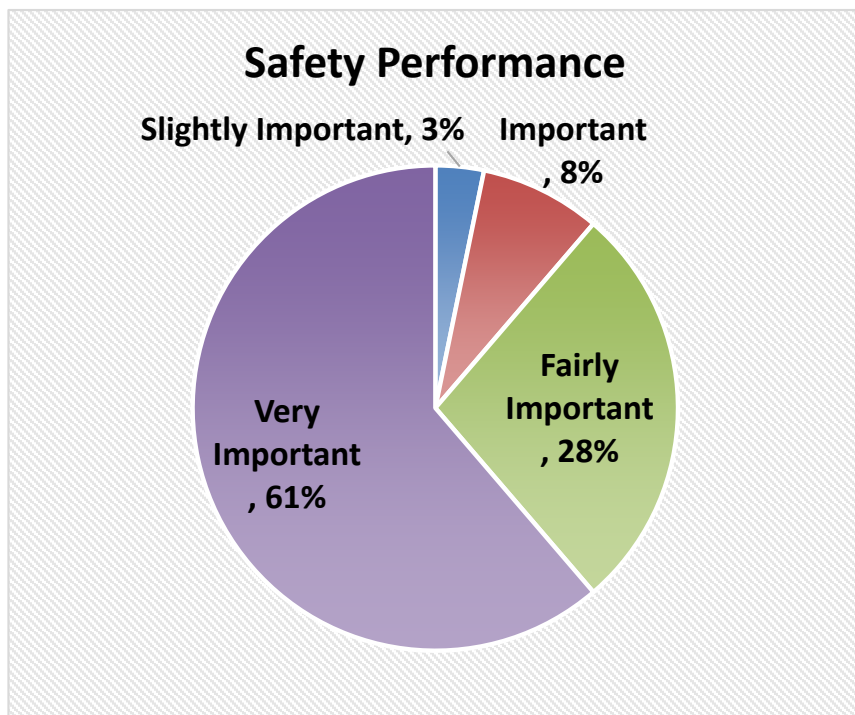
Toyota Research Institute of North America

Presented at CERV

Feb/6/2023

Discussion Topic 1 – Safety

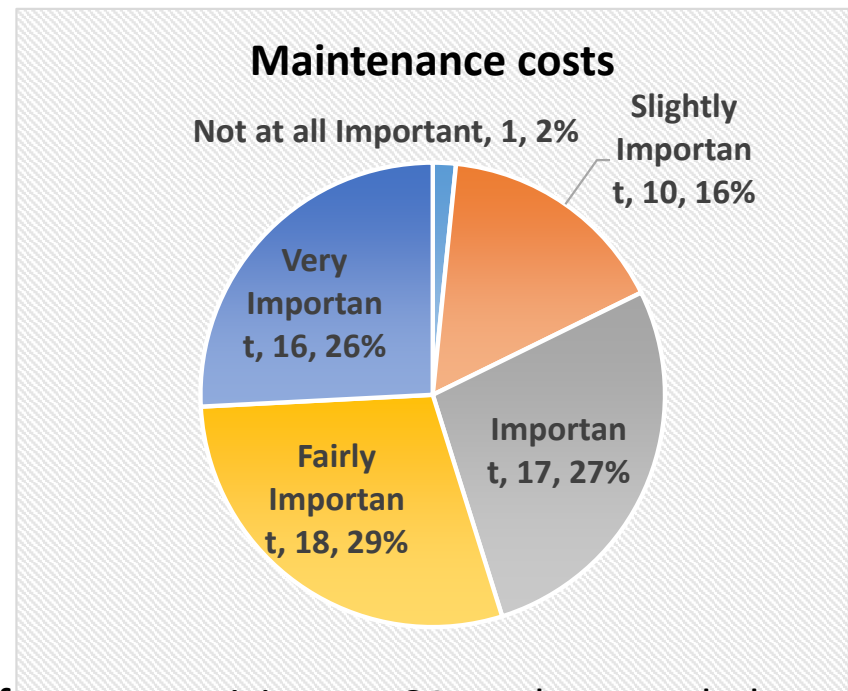
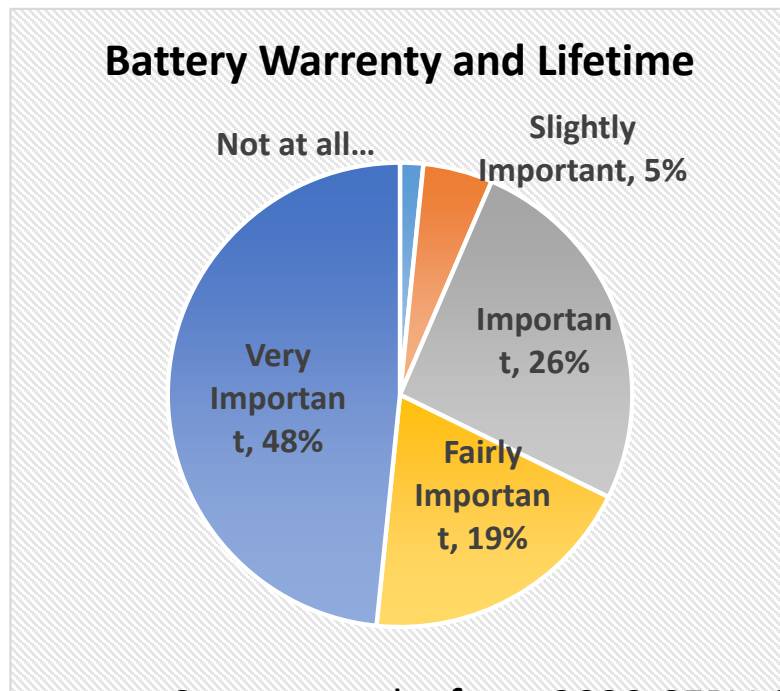
- EMI/EMC emission associated with foreign object, misalignment, Tx-Rx pad overlapping timing, vehicle type, road configuration...
- Measurement and evaluation: testing, simulation...
- Technical status & approach: - Active, passive shielding
- Coil topology optimization
- Harmonics control
- Regulatory status: J2954, ICNIRP, IEEE...
- Public awareness



Survey results from 2020 CERV Conference participants, 64 total responded

Discussion Topic 2 – Battery Reliability

- Charge-discharge with DWPT (charging frequency, On-Off cycle, battery types, interaction with battery management system)
- Technical approaches to mitigate the issue
 - Precision control (e.g. PWM), Active rectifier
 - Additional filter (vs EMC, system complexity)
- Testing and verification of SOH, SOC... with long driving cycle, lessons learned from HV-Regen recharging control
- Post-deployment monitoring



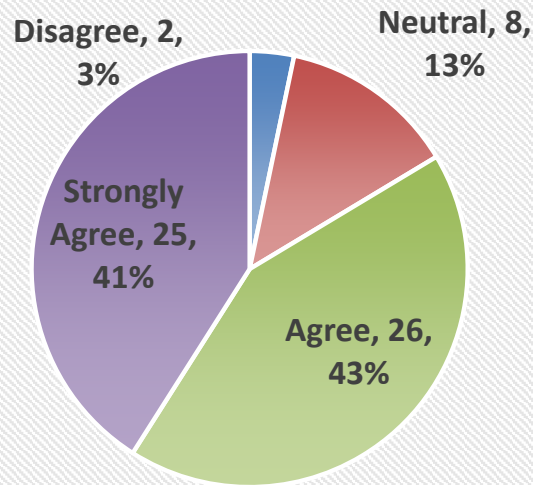
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Discussion Topic 3 – Eco-business Model

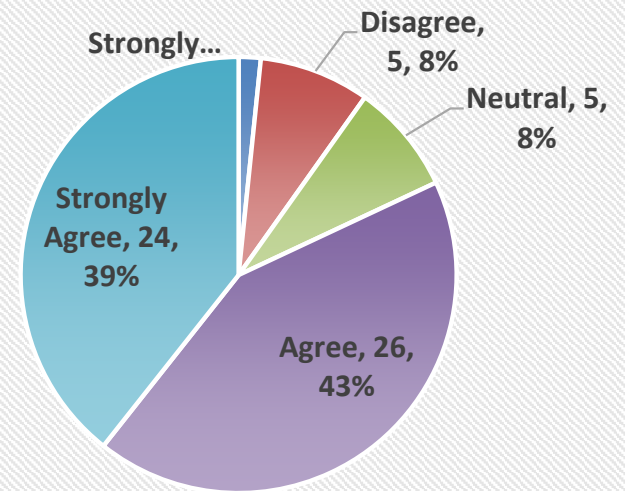
- New business models for customer, tech developer, OEM, energy company
- How to promote the new market with e.g. climate issue, traffic mitigation, smart city infrastructure, specific business models (fleet, trash, school bus, in-campus shuttle...)
- Need brainstorm, teamwork!

Please Join Survey During CERV 2023

e-roadway would be more environmental friendly



e-Roadways offer more advantages to society



Survey results from 2020 CERV Conference participants, 64 total responded

Power Control in Dynamic Wireless Power Transfer for Hybrid Vehicles

– Experimental Verification on High-speed Rotary Bench –

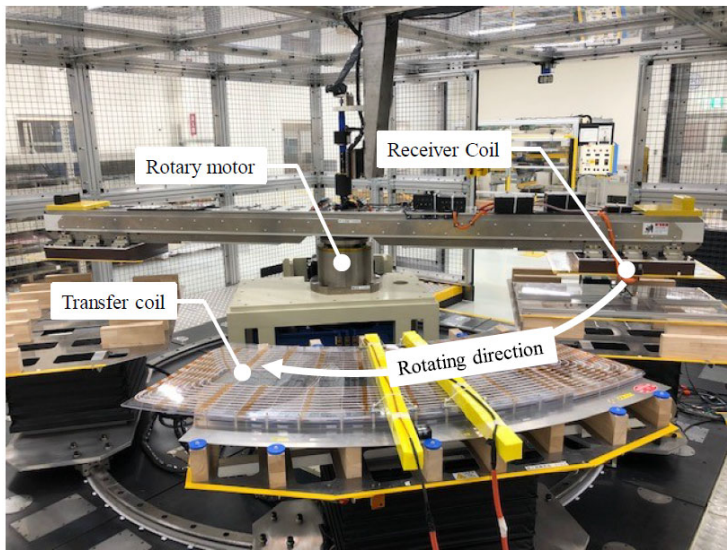
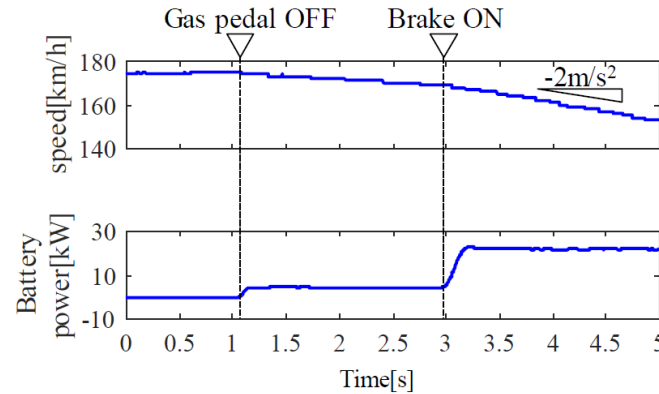
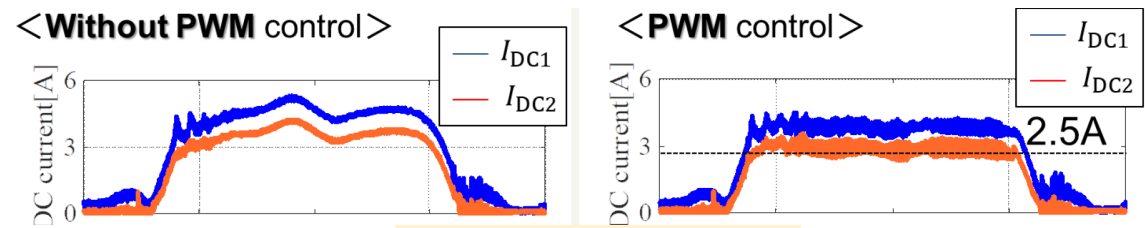
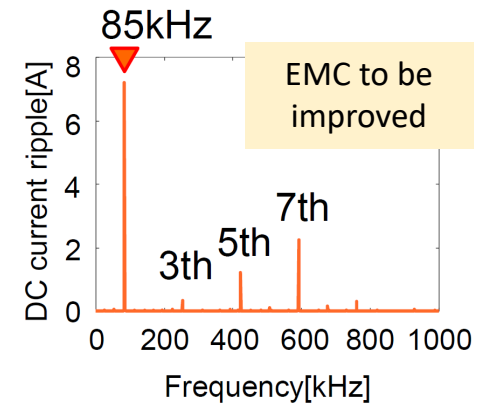


Fig.9 High-speed DWPT rotary bench



Impact on battery from regen motor in HV



Improved current control

- Impulse charging can damage battery
- Indoor rotational test 1.5m radius
- High speed (upto 40km/h) test with PWM
- Battery current vs efficiency was monitored with the implementation of PWM control on Rx₅

Home > Developing a dynamic wireless power transfer system that supplies electricity to the car while driving

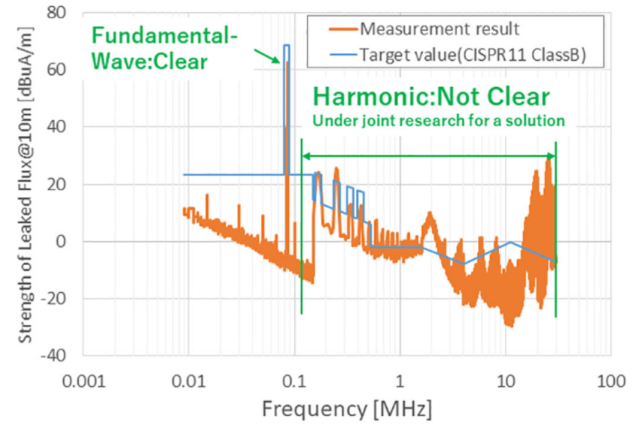
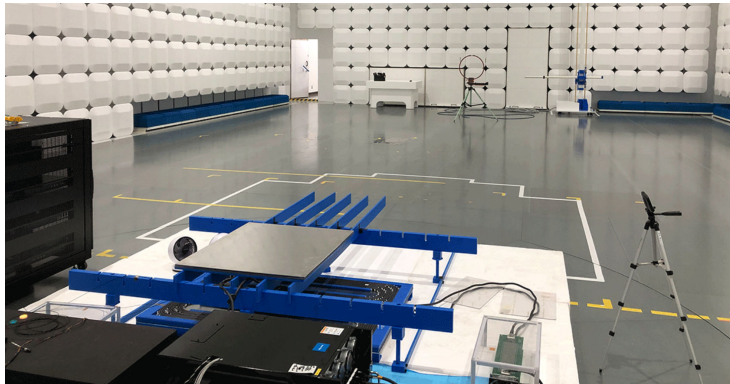
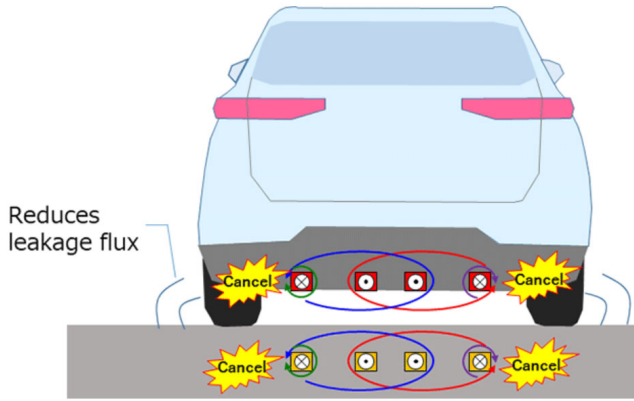


December 24, 2021

Developing a dynamic wireless power transfer system that supplies electricity to the car while driving

— More freedom to drive electrified cars —

(Illustration only. Image does not represent an actual production vehicle.)



https://www.toyota-global.com/innovation/partner_robot/news/202112_01.html

Result : Achieved the standard value of the fundamental wave

Thanks,