
DIRECT ADAPTIVE
STEERING™
Range
154 miles
Traffic
11:31
CEREMONIAL DR
70°F
Audio OFF
60°F
NAVI
Street Address
Points of Interest
Home
Destination
APPS
AUTO

INFINITI.

YUWUN CHAI

STEERING SYSTEM ENGINEER
INFINITI MOTOR LIMITED

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DIRECT ADAPTIVE STEERING™

- Applying "by-wire" is the future of steering
- Fighter jets, airplanes and ships already have by-wire technology
- First used by NASA on the Digital Fly–By–Wire reach program in the early 1970's
- As it became commonplace in aircraft controls, it will also be the future of automotive steering

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DIRECT ADAPTIVE STEERING™

- In planes, electronic fly-by-wire systems respond quickly to changing aerodynamics
- Require less maintenance
- Saves costs and weight
- System responds much quicker than human pilot
- What is norm in airplanes today will become common in cars as well
- Similar to other groundbreaking inventions, it may require a shift in thinking

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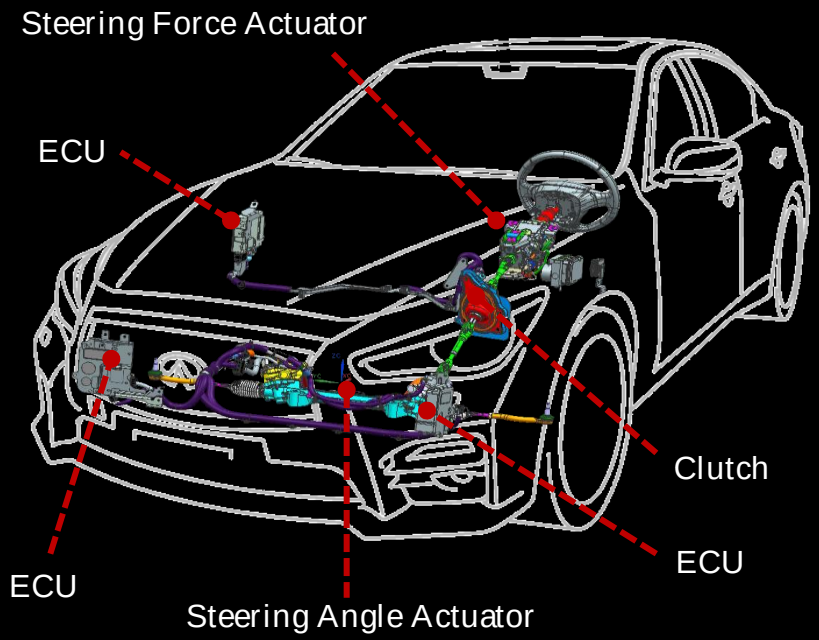
DIRECT ADAPTIVE STEERING™

World's first automotive steering system by-wire technology

- At normal times, the steering wheel clutch remains disengaged
- Steering angle actuator drives the steering rack and controls the tire turning angle
- Steering force actuator generates appropriate steering force feedback to the steering wheel and driver
- Electronic Control Units control the respective motors, with 'mutual monitoring' functions



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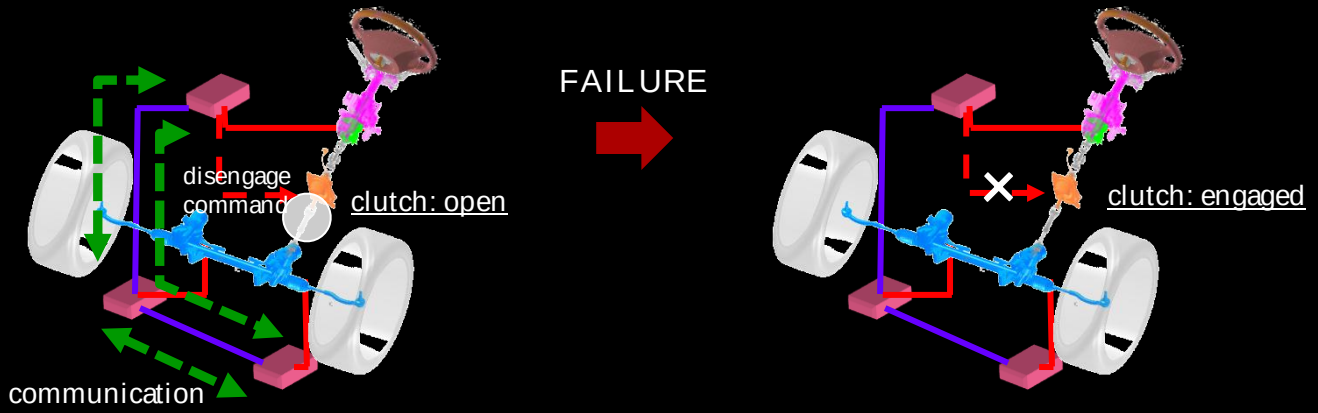
Safety Overview

- Multiple ECU configuration – similar to aircraft
- Three ECUs constantly monitor each other and the system status with immediately switches to the backup mode should failure occur



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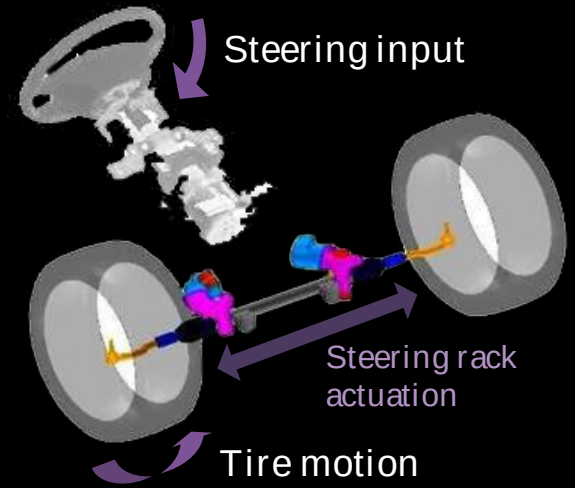
DIRECT ADAPTIVE STEERING™

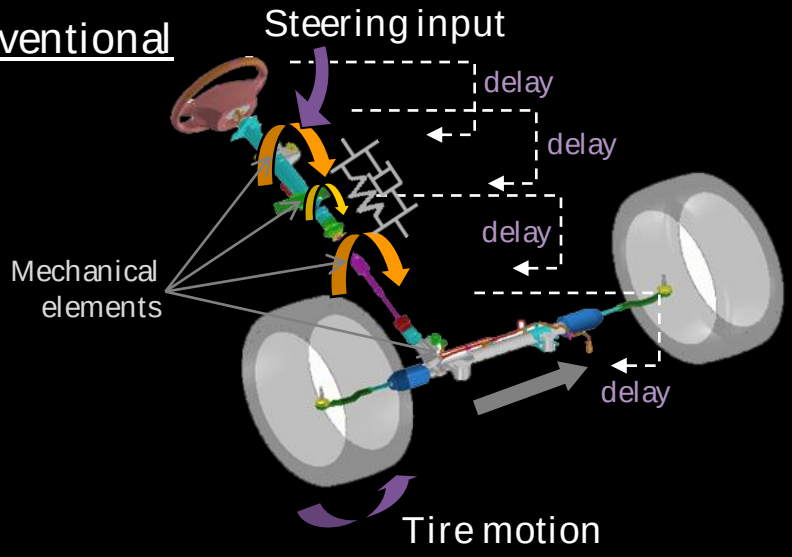
Accurate and Improved Response

- Direct digital feed from steering wheel to the steering rack
- No rubber bushes in the system meaning reduction in ‘play’ in the system – no in-built ‘suspension’

Direct Adaptive Steering



Conventional



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DIRECT ADAPTIVE STEERING™

Improved Response

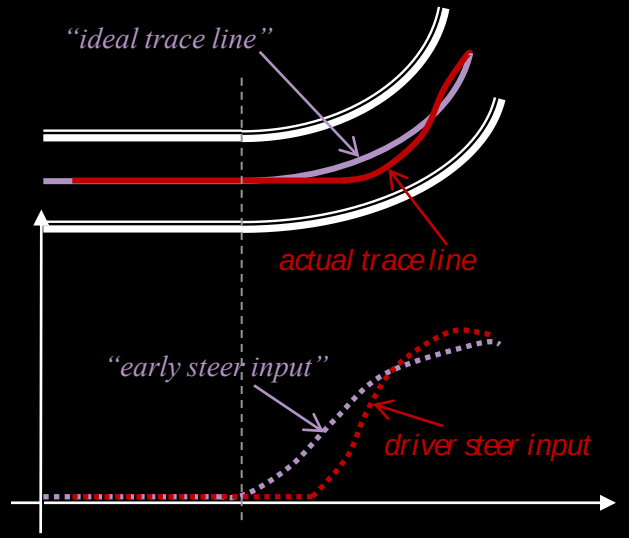
- With conventional steering, drivers need to give early input in approaching curves
- With Direct Adaptive Steering, early input is reduced, allowing more intuitive steering

Traditional steering

- When approaching a bend, driver will need to give an "early steer input" (predictive steering) or otherwise, the vehicle will not turn smoothly

With Direct Adaptive Steering™

- By elimination of the inherent steering-vehicle delay (i.e. quicker response), early steer input requirement is reduced, the driver will be able to steer the vehicle more intuitively



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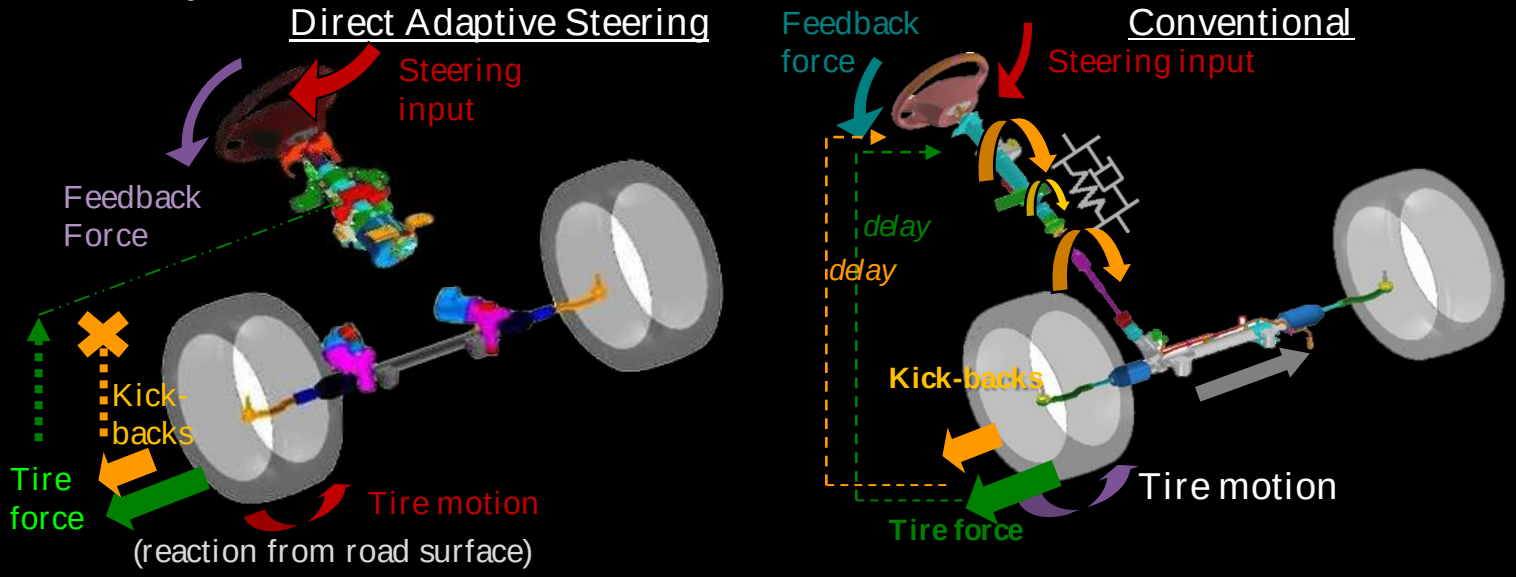
DIRECT ADAPTIVE STEERING™

Improved Feel

- System provides informative and steady feedback force to the steering wheel, with no delay



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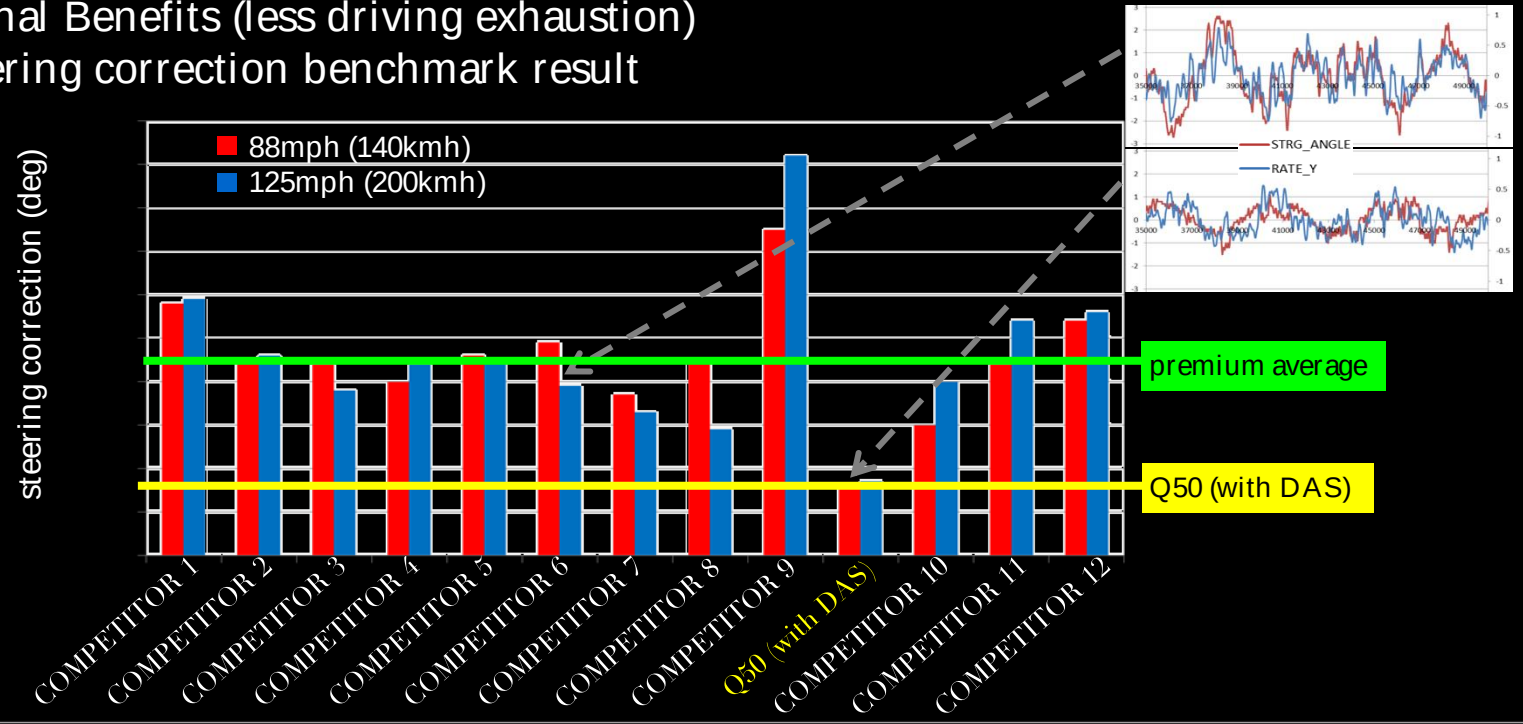
DIRECT ADAPTIVE STEERING™

Additional Benefits (less driving exhaustion)

- Steering correction benchmark result



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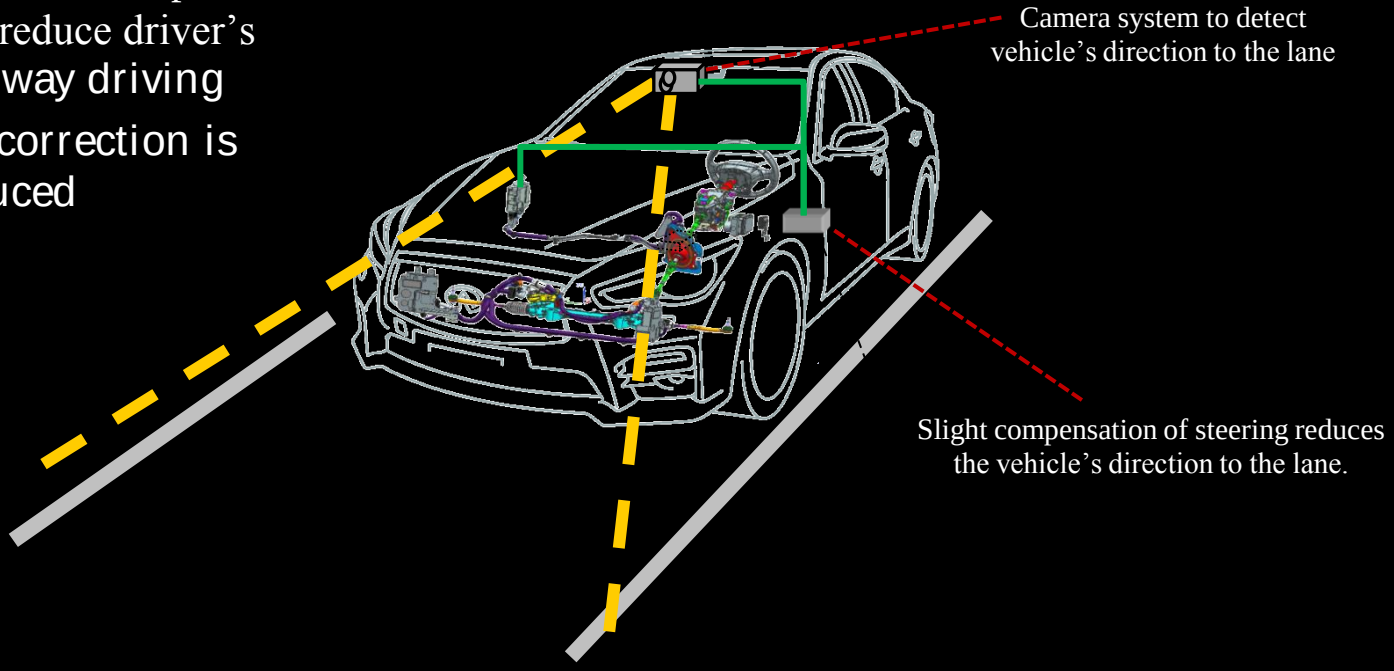
ACTIVE LANE CONTROL™

- Additional feature to further provide a secure feeling and reduce driver's fatigue with highway driving
- Driver's steering correction is significantly reduced



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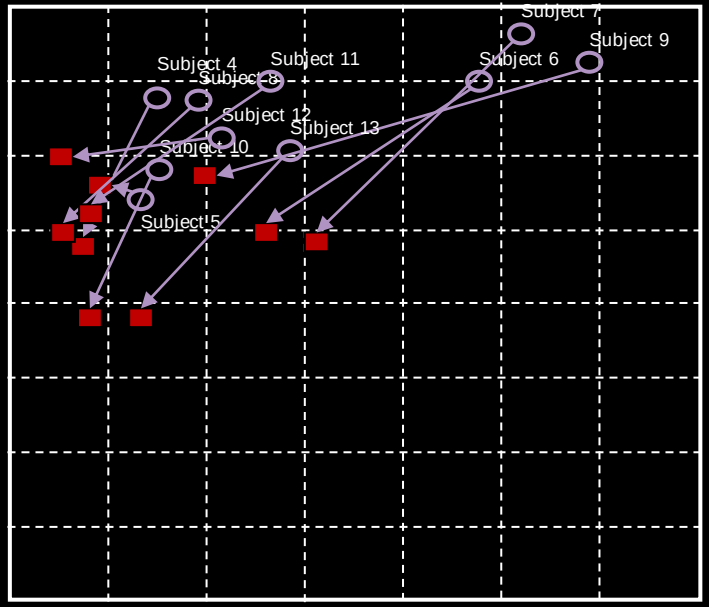
ACTIVE LANE CONTROL



Additional Benefits

- Drivers need less steering effort
- Driving overall is less tiring

Individual Changes

- Without system
- With system

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DIRECT ADAPTIVE STEERING™

Summary

- Less Tiring
  - Reduced vibration and steering input
  - Easier to keep vehicle in center of lane
- More Precise
  - Where you steer is where you go
- Faster
  - Electronic signal is faster than mechanical
- Personal
  - Driver can choose steering settings based on preferences and conditions

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