

## Driving assist system for ultra-compact EVs—fundamental consideration of muscle burden owing to differences in the drivers' physiques

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### ABSTRACT

With recent advances in technologies such as those of semiconductors and actuators, easy-to-control compact actuators have been actively applied in various fields such as factory automation and precision machining. In the automobile industry, major manufacturers and venture companies are also concentrating on electric vehicle development. Ultra-compact mobility vehicles, which exhibit an excellent environmental performance and are highly convenient for short-distance movement, are becoming popular. However, owing to cabin space limitations, it is difficult to mount systems such as power steering for assisting steering operations, and such systems are currently not installed in most ultra-compact mobility vehicles. Our research group focused on a steer-by-wire system that does not require a physical connection between the steering wheel and the wheels. Using this system, the steering wheel can be installed without any constraints, and the cabin layout can be easily changed. The reaction torque applied to the steering wheel can be expected to provide an optimum steering feel to each driver by controlling the reaction-force-generating actuator output. Drivers with different heights and arm lengths were then grouped, and arm model calculation and electromyogram measurements obtained during steering operations were used to examine the muscle burden experienced during driving owing to differences in the drivers' physiques.

### KEYWORDS:

muscle burden; ultra-compact electric vehicle; steer-by-wire system; reaction torque; physique