CLAIMS

What is claimed is:

1. A drive-by-wire steering system on a vehicle requiring counter-steering comprising:

a driver input mechanism;

a control system;

a sensor to receive driver input from the driver input mechanism and send the input to the control system;

an engagement mechanism separating the driver input mechanism from controlling the vehicle;

at least one actuator;

a wheel; and

a mechanical linkage controllable via the engagement mechanism in order for the control system to articulate a steering mechanism.

2. The drive-by-wire steering system of claim 1, wherein upon a failure of an electrical system of the vehicle, the engagement mechanism engages the mechanical linkage so the driver input mechanism may implement a mechanical fail-safe to continue to steer the vehicle without having to counter-steer.

3. The drive-by-wire steering system of claim 1, further comprising a haptic system that signals to the driver a control effort and road conditions by responsive torque generated from a haptic motor.

4.. A method for steering controls of a vehicle:

receiving user steering inputs via a sensor;

receiving vehicle state data via sensors;

receiving external data via sensors;

translating the user steering inputs;

combining at least some of the user steering input, vehicle state data, or external data; and

generating command signals to at least one of steering actuators, flywheels in gyroscopic stabilization system, or a combination of the two; wherein said command signals actuate a road wheel direction of the vehicle directly in accordance with the user steering inputs.

5. A control system comprising:

a processor;

a memory module;

a control algorithm stored in the memory module and executed via the processor to:

receive data from a plurality of sensors indicating driver input, orientation of a frame of a vehicle, orientation of a front wheel of the vehicle with respect to the frame, orientations and rotational speeds of a plurality of flywheels included in a gyroscope unit coupled to the frame, and speed of the frame,

determine a current vehicle state based, at least in part, on the received data,

adjust an output torque of the gyroscope unit by adjusting a rotational velocity of a tilt of at least one of the flywheels from an axis of rotation normal to an axis of rotation of the front wheel of the vehicle based, at least in part, on the current vehicle state including increasing the rotational velocity of the tilt of the at least one of the flywheels to increase the output torque of the gyroscope unit, and minimizing the rotational velocity of the tilt in response to determining the current vehicle state to use the output torque of the gyroscope unit for a prolonged period of time, and

adjust the direction of the front wheel via electric command to counter-steer for the driver while the clutch separates the mechanical linkage from the driver input mechanism to the road wheel and the user experience the driver as in a car.

6. The control algorithm of claim 5, further to use at least one of the adjustments to reestablish stabilization or turn the vehicle as.

7. A redundant mechanical steering system of a vehicle comprising:

a driver input mechanism;

at least one road wheel;

an engagement mechanism that mechanically engages the driver input mechanism to a steering control and the at least one road wheel of the vehicle; and

a mechanical gearbox/planetary mechanism/levers component including gears, planetary mechanism, levers components, or hydraulic pumps and piston;

wherein the redundant mechanical steering system is a natural default upon an electric failure of the vehicle.

8. The system of claim 7, wherein the system may also be engaged upon driver command;

9. The system of claim 7, wherein, upon an electrical failure or driver command, the engagement mechanism is to reestablish the mechanical linkage throughout the driver input mechanism to the road wheel and engage the mechanical gearbox employing a combination of any of the gears, the planetary mechanisms, lever components or hydraulic pumps and piston to allow continual intuitive steering for the driver.

Claims

1. A drive-by-wire steering system on a vehicle, comprising:

a road wheel having a direction capable of adjustment;

a road wheel actuator coupled to the road wheel via a mechanical linkage to adjust the direction of the road wheel and thereby steer the vehicle;

a driver input mechanism to receive driver input for steering the vehicle;

an engagement-disengagement mechanism to mechanically couple and decouple the driver input mechanism to/from the road wheel, via the mechanical linkage, the driver input mechanism to adjust the direction of the road wheel, via the mechanical linkage, based on the driver input, when the driver input mechanism is mechanically coupled by the engagement-disengagement mechanism to the road wheel, via the mechanical linkage;

an electronic steering control system; and

a steering sensor to receive the driver input from the driver input mechanism and send the driver input to the electronic steering control system, the electronic steering control system to control the road wheel actuator to adjust the direction of the road wheel, based on the driver input, when the driver input mechanism is mechanically decoupled by the engagement-disengagement mechanism from the road vehicle.

2. The drive-by-wire steering system of claim 1, wherein the engagement-disengagement mechanism to mechanically couple the driver input mechanism to the road wheel upon a failure of the electronic steering control system.

3. The drive-by-wire steering system of claim 1, further comprising a haptic feedback system coupled to the driver input mechanism, the haptic system to generate torque and feedback to indicate driver effort and road conditions to a driver.

4. A method for controlling a vehicle:

receiving user input from a steering mechanism, via a first sensor;

receiving vehicle state data via a second sensor;

receiving external data via a third sensor;

receiving and analyzing at a control processor coupled to the first, second and third sensor, the user input, vehicle state data, and external data; and

generating command signals to a steering actuator to actuate a road wheel direction of the vehicle in accordance with the user input.

5. A control system comprising:

a processor;

a memory module;

a control algorithm stored in the memory module and executed via the processor to:

receive data from a plurality of sensors indicating driver input, orientation of a frame of a vehicle, orientation of a front wheel of the vehicle with respect to the frame, orientations and rotational speeds of a plurality of flywheels included in a gyroscope unit coupled to the frame, and a speed of the vehicle;

determine a current vehicle state based, at least in part, on the received data;

adjust an output torque of the gyroscope unit by adjusting a rotational velocity of a tilt of at least one of the flywheels from an axis of rotation normal to an axis of rotation

of the front wheel of the vehicle based, at least in part, on the current vehicle state, wherein adjusting the rotational velocity of the tilt of at least one of the flywheels comprises increasing the rotational velocity of the tilt of the at least one of the flywheels to increase the output torque of the gyroscope unit, and wherein adjusting the rotational velocity of the tilt of at least one of the flywheels comprises minimizing the rotational velocity of the tilt of the at least one of the flywheels to use the output torque of the gyroscope unit for a prolonged period of time; and

adjust a direction of a wheel of the vehicle via electric command based, at least in part, on the current vehicle state.

6. The control algorithm of claim 5, further executed via the processor to adjust the output torque of the gyroscope unit by adjusting the rotational velocity of the tilt of at least one of the flywheels from the axis of rotation normal to the axis of rotation of the front wheel of the vehicle based, at least in part, on the current vehicle state to stabilize or steer the vehicle.