(54) Title: DIAGNOSIS AND REPAIR FOR AUTONOMOUS VEHICLES

(57) Abstract: A system and method of controlling a vehicle (101) is provided. In one aspect, the system and method determines the amount of wear on a component (180) of the vehicle (101) and, based on the amount of wear and information derived from the environment (209) surrounding the vehicle (101) (e.g., another vehicle in the path of the vehicle or a requirement to stop at a particular location (510)), maneuvers the vehicle (101) to mitigate further wear on the component (180).

**FIGURE 8**

- Determine location of vehicle
- Determine location of geographic location, specific traffic rules
- Is vehicle component #1 damaged? (No, maneuver vehicle in accordance with normal operations; Yes, select alternative maneuver in minimize damage to component #1 by issuing instruction to component #2 at time required to satisfy traffic rule)
- Autonomously maneuver vehicle to repair facility

(60) Drawings:

[Diagram of vehicle path and component wear analysis]

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1. A method of maneuvering a vehicle comprising:
   - detecting a characteristic of an environment surrounding the vehicle;
   - detecting an amount of wear to a component of the vehicle, wherein increases in wear are affected by different maneuvers; and
   - selecting, with a processor, between a first maneuver and a second maneuver based on the detected characteristic of the environment and the detected amount of wear; and
   - moving the vehicle in accordance with the selected maneuver.

2. The method of claim 1 wherein the first maneuver is selected when there is no wear to the component of the vehicle and thus second maneuver occurs when wear is detected.

3. The method of claim 1 wherein detecting a characteristic of the environment comprises detecting an object external to the vehicle and maneuvering in response to the object.

4. The method of claim 3 wherein the object is a stop sign.

5. The method of claim 1 wherein detecting a characteristic of the environment comprises determining a traffic requirement.

6. The method of claim 1 wherein the vehicle is moved autonomously in accordance with the selected maneuver in response to instructions from the processor.
7. The method of claim 1 wherein the component comprises brakes and the wear comprises brake wear.

8. The method of claim 1 further comprising moving the vehicle autonomously to a repair facility after the performance of the maneuver.

9. A system comprising:
   a processor;
   a first sensor in communication with the processor and configured to detect presence of wear to a component of a vehicle;
   a second sensor in communication with the processor and configured to detect: presence of an object external to the vehicle, where the presence of the object requires a change in a motion of the vehicle; and
   a memory containing instructions accessible by the processor, the instructions comprising changing the motion of the vehicle relative to the external object based on an output received from the first sensor and an output received from the second sensor.

10. The system of claim 9 wherein the component is a brake.

11. The system of claim 9 wherein the component is a tire.

12. The system of claim 9 wherein the instructions further comprise selecting between a first and second motion depending on whether wear to the component is detected.
13. The system of claim 12 wherein a difference between the first motion and the second motion is rate of change in speed.

14. A method of controlling a vehicle comprising:
   determining wear on a component of the vehicle;
   determining a geographic position of the vehicle;
   determining traffic requirements in a path of the vehicle;
   selecting, with a processor, between a first and second maneuver based on the determined wear and the determined geographic position, wherein at least one difference between the first and second maneuver is selected from the group consisting of rate of acceleration, rate of deceleration and direction; and
   moving the vehicle in accordance with the selected maneuver.

15. The method of claim 14, wherein the geographic position of the vehicle is determined based on traffic requirements at geographic locations and detecting the position of the vehicle.

16. The method of claim 14 wherein the wear on a component of the vehicle comprises brake wear.

17. The method of claim 14 wherein determining the wear comprises estimating the wear based on the length of time since the component was last repaired.

18. The method of claim 14 further comprising, after moving the vehicle in accordance with the selected maneuver,
determining whether passengers are present in the vehicle, and moving the vehicle to a repair facility under the control of the processor when passengers are not present in the vehicle.

IS. A vehicle comprising:
   a control component controlling a movement of the vehicle;
   an environment sensor detecting environment external to the vehicle;
   a component sensor detecting wear of a component of the vehicle, where such wear changes based on operation of the vehicle;
   a processor in communication with the control component, environment sensor and component sensor; and
   instructions accessible by the processor, the instructions causing the processor to: receive an output from the environment sensor, receive an output from the component sensor, select one of a first command and a second command to be provided to the control component based on the output from the environment sensor and the output from the component sensor, and provide the selected command to the control component.

20. A system of controlling a movement of a vehicle comprising:
   a processor;
   a memory accessible by the processor; and
   instructions contained in the memory and executable by the processor,
   wherein the instructions comprise:
   determining a geographic location of the vehicle relative to a location-dependant vehicle movement restriction,
determining whether a first component of the vehicle is damaged,

providing a first instruction to a second component of the vehicle to move the vehicle so as to comply with the location-dependent movement restriction when the first component is determined to be not damaged, and

providing a second instruction to the second component to move the vehicle so as to comply with the location-dependent movement restriction when the first component is determined to be damaged, wherein the movement instructed by the second instruction is different than the movement instructed by the first instruction.