

WHAT IS CLAIMED IS:

1. A computer-implemented method of taking a vehicle out-of-service, comprising:
 - obtaining, by one or more computing devices on-board an autonomous vehicle, data indicative of one or more parameters associated with the autonomous vehicle, wherein the autonomous vehicle is configured to provide a vehicle service to one or more users of the vehicle service;
 - determining, by the one or more computing devices, an existence of a fault associated with the autonomous vehicle based at least in part on the one or more parameters associated with the autonomous vehicle;
 - determining, by the one or more computing devices, one or more actions to be performed by the autonomous vehicle based at least in part on the existence of the fault; and
 - performing, by the one or more computing devices, one or more of the actions to take the autonomous vehicle out-of-service based at least in part on the fault.
2. The computer-implemented method of claim 1, wherein the autonomous vehicle is associated with a status that indicates whether the autonomous vehicle is available or unavailable to provide the vehicle service, wherein at least one of the actions comprises adjusting the status associated with the autonomous vehicle, and wherein performing, by the one or more computing devices, one or more of the actions to take the vehicle out-of-service comprises:
 - adjusting, by the one or more computing devices, the status associated with the autonomous vehicle to indicate that the autonomous vehicle is unavailable to provide the vehicle service.
3. The computer-implemented method of claim 2, wherein adjusting, by the one or more computing devices, the status associated with the autonomous vehicle to indicate that the autonomous vehicle is not available to provide the vehicle service comprises:
 - providing, by the one or more computing devices to one or more remote computing devices that are remote from the autonomous vehicle, data indicating that the autonomous vehicle is unavailable to provide the vehicle service.

4. The computer-implemented method of claim 3, wherein performing, by the one or more computing devices, one or more of the actions to take the autonomous vehicle out-of-service based at least in part on the fault comprises removing, by the one or more computing devices, the autonomous vehicle from a service queue associated with the vehicle.

5. The computer-implemented method of claim 2, wherein the autonomous vehicle does not accept requests for the vehicle service when the status associated with the vehicle indicates that the autonomous vehicle is unavailable to provide the vehicle service.

6. The computer-implemented method of claim 1, wherein determining, by the one or more computing devices, the one or more actions comprises:

determining, by the one or more computing devices, a level of severity of the fault based at least in part on one or more characteristics of the fault;

determining, by the one or more computing devices, an operational state of the autonomous vehicle based at least in part on the level of severity of the fault, wherein the operational state is indicative of whether the autonomous vehicle is in condition to provide the vehicle service; and

determining, by the one or more computing devices, the one or more actions based at least in part on the operational state of the autonomous vehicle.

7. The computer-implemented method of claim 6, wherein the operational state indicates that the autonomous vehicle is in condition to provide the vehicle service to one or more current users of the autonomous vehicle, and wherein the autonomous vehicle is configured to complete the vehicle service provided to the one or more current users before the vehicle is out-of-service.

8. The computer-implemented method of claim 6, wherein the operational state indicates that the vehicle is not in condition to provide the vehicle services.

9. The computer-implemented method of claim 8, wherein the autonomous vehicle is configured to cease providing the vehicle service to the one or more current users.

10. The computer-implemented method of claim 1, wherein at least one of the actions comprises travelling to and arriving at a maintenance location, and wherein the method further comprises:

providing, by the one or more computing devices, one or more control command signals to one or more systems on-board the autonomous vehicle to cause the autonomous vehicle to travel to and arrive at the maintenance location.

11. The computer-implemented method of claim 10, wherein determining, by the one or more computing devices, the existence of the fault associated with the autonomous vehicle based at least in part on the one or more parameters associated with the autonomous vehicle comprises:

comparing, by the one or more computing devices, at least one of the parameters associated with the autonomous vehicle to a threshold.

12. The computer-implemented method of claim 11, further comprising:

obtaining, by the one or more computing devices, data indicative of the maintenance location, wherein the data indicative of the maintenance location is indicative of at least a geographic location of the maintenance location;

determining, by the one or more computing devices, a travel route to the maintenance location based at least in part on the geographic location of the maintenance location;

obtaining, by the one or more computing devices, data indicative of one or more travel factors associated with the travel route; and

determining, by the one or more computing devices, the threshold based at least in part on the travel route and the one or more travel factors, wherein the threshold is indicative of a requisite level of the at least one parameter required for the autonomous vehicle to traverse the travel route and to arrive at the geographic location of the maintenance location.

13. A computing system for taking a vehicle out-of-service, the system comprising:
- one or more processors on-board an autonomous vehicle; and
 - one or more memory devices on-board the autonomous vehicle, the one or more memory devices storing instructions that when executed by the one or more processors cause the one or more processors to perform operations, the operations comprising:
 - obtaining data indicative of one or more parameters associated with the autonomous vehicle, wherein the autonomous vehicle is configured to provide a vehicle service to one or more users of the vehicle service, and wherein the autonomous vehicle is associated with a status that indicates whether the autonomous vehicle is available or unavailable to provide the vehicle service;
 - determining an existence of a fault associated with the autonomous vehicle based at least in part on a comparison of the one or more parameters associated with the autonomous vehicle to one or more thresholds;
 - determining one or more actions to be performed by the autonomous vehicle based at least in part on the existence of the fault, wherein at least one of the actions comprises adjusting the status associated with the autonomous vehicle; and
 - adjusting the status associated with the autonomous vehicle to indicate that the autonomous vehicle is unavailable to provide the vehicle service based at least in part on the fault.
14. The computing system of claim 13, wherein adjusting the status associated with the autonomous vehicle to indicate that the autonomous vehicle is unavailable to provide the vehicle service comprises:
- providing, to one or more remote computing devices that are remote from the autonomous vehicle, data indicating that the autonomous vehicle is to be removed from a service queue associated with the vehicle service.
15. The computing system of claim 13, wherein at least one of the actions comprises travelling to and arriving at a maintenance location, and wherein the operations further comprise:

providing one or more control command signals to one or more systems on-board the autonomous vehicle to cause the autonomous vehicle to travel to and arrive at the maintenance location.

16. The computing system of claim 15, wherein at least one of the parameters is indicative of an amount of available data storage on-board the autonomous vehicle.

17. The computing system of claim 16, wherein at least one threshold is indicative of a threshold amount of available data storage, and wherein the threshold amount of available data storage is based at least in part on an amount of data storage required for the autonomous vehicle to travel to and arrive at the maintenance location.

18. An autonomous vehicle comprising:
one or more systems on-board the autonomous vehicle;
one or more processors on-board the autonomous vehicle; and
one or more memory devices on-board the autonomous vehicle, the one or more memory devices storing instructions that when executed by the one or more processors cause the one or more processors to perform operations, the operations comprising:
obtaining data indicative of one or more parameters associated with the autonomous vehicle, wherein at least a portion of the data is provided by one or more of the systems on-board the autonomous vehicle,
wherein the autonomous vehicle is included in a plurality of vehicles associated with a service provider, and
wherein the autonomous vehicle is configured to provide a vehicle service of the service provider to one or more users;
determining an existence of a fault associated with the autonomous vehicle based at least in part on the one or more parameters associated with the autonomous vehicle;
and
performing one or more actions to take the vehicle out-of-service based at least in part on the fault, such that the autonomous vehicle is unavailable to provide the vehicle service.

19. The autonomous vehicle of claim 18, wherein a computing device associated with the service provider does not provide the autonomous vehicle with one or more requests for the vehicle service when the autonomous vehicle is out-of-service.

20. The autonomous vehicle of claim 18, wherein one or more of the systems on-board the autonomous vehicle comprise one or more image capture devices configured to acquire image data to be used for operation of the autonomous vehicle in an autonomous mode, and wherein the fault is associated with storing the image data.

21. A computer-implemented method of stopping the motion of a vehicle, comprising:

obtaining, by one or more computing devices on-board an autonomous vehicle, data indicative of one or more parameters associated with the autonomous vehicle, wherein the autonomous vehicle is configured to provide a vehicle service to one or more users of the vehicle service;

determining, by the one or more computing devices, an existence of a fault associated with the autonomous vehicle based at least in part on the one or more parameters associated with the autonomous vehicle;

determining, by the one or more computing devices, one or more actions to be performed by the autonomous vehicle based at least in part on the existence of the fault, wherein at least one of the actions comprises stopping a motion of the autonomous vehicle; and

providing, by the one or more computing devices, one or more control command signals to one or more of the systems on-board the autonomous vehicle to facilitate stopping the motion of the autonomous vehicle in response to the existence of the fault.

22. The computer-implemented method of claim 21, wherein to facilitate stopping the motion of the vehicle one or more of the on-board systems are to determine at least one of a stopped position, a rate of deceleration, and a deceleration time delay for the autonomous vehicle based at least in part on the fault and one or more travelling conditions associated with the autonomous vehicle, and

wherein to facilitate stopping the motion of the autonomous vehicle the one or more systems on-board the autonomous vehicle cause a deceleration of the autonomous vehicle.

23. The computer-implemented method of claim 22, wherein the stopped position is in a current driving lane of the autonomous vehicle.

24. The computer-implemented method of claim 22, wherein the stopped position is out of a current driving lane of the autonomous vehicle.

25. The computer-implemented method of claim 21, wherein determining, by the one or more computing devices, one or more actions to be performed by one or more systems on-board the autonomous vehicle comprises:

determining, by the one or more computing devices, a level of severity of the fault based at least in part on one or more characteristics of the fault; and

determining, by the one or more computing devices, one or more of the actions based at least in part on the level of severity of the fault.

26. The computer-implemented method of claim 25, wherein a rate of deceleration of the autonomous vehicle is based at least in part on the level of severity associated with the fault.

27. The computer-implemented method of claim 21, wherein at least one of the actions comprises taking the vehicle out-of-service, and wherein the method further comprises:

performing, by the one or more computing devices, one or more of the actions to take the autonomous vehicle out-of-service, such that the autonomous vehicle is unavailable to provide the vehicle service.

28. The computer-implemented method of claim 21, wherein one or more of the actions include informing one or more of the users of the fault, and wherein the method further comprises:

providing, by the one or more computing devices, data indicative of the existence of the fault for display via one or more display devices.

29. The computer-implemented method of claim 21, wherein one or more of the actions include requesting a different vehicle to provide the vehicle service to the one or more users, and wherein the method further comprises:

providing, by the one or more computing devices to one or more remote computing devices associated with a service provider, data indicative of a request for the different vehicle to provide the vehicle service to the one or more users.

30. The computer-implemented method of claim 21, wherein the one or more parameters comprise data indicative of a user input associated with the fault.

31. A computing system for stopping the motion of a vehicle, comprising:
one or more processors on-board an autonomous vehicle; and
one or more memory devices on-board the autonomous vehicle, the one or more memory devices storing instructions that when executed by the one or more processors cause the one or more processors to perform operations, the operations comprising:

obtaining data indicative of one or more parameters associated with the autonomous vehicle, wherein the autonomous vehicle is configured to provide a vehicle service to one or more users of the vehicle service;

determining an existence of a fault associated with the autonomous vehicle based at least in part on the one or more parameters associated with the autonomous vehicle;

determining one or more actions to be performed by the autonomous vehicle based at least in part on the fault, wherein at least one of the actions comprises stopping a motion of the autonomous vehicle; and

providing one or more control command signals to one or more of the systems on-board the autonomous vehicle to facilitate stopping the motion of the autonomous vehicle in response to the existence of the fault.

32. The computing system of claim 31, wherein determining the one or more actions to be performed by the autonomous vehicle based at least in part on the fault comprises:

determining a level of severity associated with the fault; and
determining the one or more actions based at least in part on the level of severity associated with the fault.

33. The computing system of claim 31, wherein the operations further comprise:
providing, to one or more remote computing devices that are remote from the autonomous vehicle, data indicative of a request for maintenance of the vehicle.

34. The computing system of claim 31, wherein the one or more parameters comprise data indicative of a user input associated with the fault, and wherein the operations further comprise:

providing, to one or more remote computing devices that are remote from the autonomous vehicle, data indicative of a request for a confirmation of the existence of the fault.

35. The system of claim 31, wherein the operations further comprise:
providing data indicative of one or more characteristics of the fault for display via one or more display devices.

36. An autonomous vehicle comprising:
one or more systems on-board the autonomous vehicle;
one or more processors on-board the autonomous vehicle; and
one or more memory devices on-board the autonomous vehicle, the one or more memory devices storing instructions that when executed by the one or more processors cause the one or more processors to perform operations, the operations comprising:

obtaining data indicative of one or more parameters associated with the autonomous vehicle, wherein at least a portion of the data indicative of the one or more parameters is provided via one or more of the systems on-board the autonomous vehicle, and wherein the autonomous vehicle is configured to provide a vehicle service to one or more users of the vehicle service;

determining an existence of a fault associated with the autonomous vehicle based at least in part on the one or more parameters associated with the autonomous vehicle;

determining one or more actions to be performed by the autonomous vehicle based at least in part on the fault; and

providing, to one or more of the systems on-board the autonomous vehicle, one or more control command signals to perform one or more of the actions to facilitate stopping a motion of the autonomous vehicle in response to the existence of the fault.

37. The autonomous vehicle of claim 36, wherein one or more of the on-board systems are configured to determine a stopped position for the vehicle based at least in part on the fault.

38. The autonomous vehicle of claim 36, wherein one or more of the parameters are indicative of a user input indicative of the request to stop the vehicle.

39. The autonomous vehicle of claim 38, further comprising one or more display devices, and wherein the operations further comprise:

providing for display via the one or more display devices data indicative of the request to stop the vehicle.

40. The autonomous vehicle of claim 39, further comprising one or more audio output devices, and wherein the operations further comprise:

providing, to one or more remote computing devices that are remote from the autonomous vehicle, data indicative of a request for a human operator to communicate with a current user of the autonomous vehicle via at least one of the display devices and the audio output devices.