CLAIMS

1. A method of navigating a vehicle, the vehicle comprising a scanning device and a self-contained navigation system (SCNS) operatively connected to a computer, the method comprising:

operating the scanning device to generate scanning output data representing an area surrounding the vehicle; generating, based on the scanning output data, a local map representing the area surrounding the vehicle relative to its position, the local map comprising data indicative of obstacles within its area, and accumulating newly scanned regions in the direction of motion as the vehicle advances; using the SCNS to update the vehicle's position relative to the local map and navigating the vehicle within the local map to avoid obstacles, wherein navigating within the local map is performed independently of a GPS; and

obtaining, from the GPS, data indicative of a global path leading toward a destination located outside the local map; dynamically updating the global path during vehicle navigation based on local navigation updates derived from the SCNS and the local map, such that the global path is adjusted to avoid obstacles detected locally as the vehicle advances.

2. The method of claim 1, wherein the local map omits from representation areas located opposite to the direction of motion as the vehicle advances.

3. The method of any one of the preceding claims, wherein the self-contained navigation system (SCNS) comprises at least one of: an inertial navigation system (INS); an odometer-based navigation system; a simultaneous localization; and mapping (SLAM) system.

4. The method of any one of the preceding claims, wherein the local map and the global path are updated at different rates, and the system is configured to align between the local map and the global path despite differences in update rates.

5. The method of claim 4, wherein aligning between the local map and the global path comprises adding time tags to the local map updates and the global path updates and performing temporal alignment based on matching the time tags.

6. The method of claim 4 or 5, wherein aligning between the local map and the global path further comprises performing spatial alignment by matching the

vehicle's current position as determined using the SCNS within the local map and as determined using the global navigation system within the global path.

7. The method of any one of claims 4 to 6, further comprising generating a combined map comprising the local map and the global path, dynamically updating the combined map as the vehicle advances, and displaying the combined map on a display device to enable operator monitoring or control.

8. The method of any one of the preceding claims, wherein the vehicle is an unmanned ground vehicle, an unmanned aerial vehicle, or an unmanned marine vehicle.

9. A system for navigating a vehicle, the system comprising: a scanning device configured to generate scanning output data representing an area surrounding the vehicle; a self-contained navigation system (SCNS) configured to provide data indicative of the vehicle's position relative to a previous position; and a processor operatively connected to the scanning device and the SCNS, the processor configured to: generate, based on the scanning output data, a local map representing the area surrounding the vehicle relative to its position, the local map comprising data indicative of obstacles within its area, and accumulate newly scanned regions in the direction of motion as the vehicle advances;; update the vehicle's position relative to the local map based on the SCNS data; generate a local path for leading the vehicle within the local map to avoid obstacles, wherein the local path is generated independently of a GPS; obtain, from the GPS, data indicative of a global path leading toward a destination located outside the boundaries of the local map; and dynamically update the global path during vehicle navigation based on local navigation updates derived from the SCNS and the local map, such that the global path is adjusted to avoid obstacles detected locally as the vehicle advances.

10. The system of claim 9, wherein the processor is further configured to omit from the local map representation of areas located opposite to the direction of motion as the vehicle advances.

11. The system of claim 9 or 10, wherein the SCNS comprises at least one of an inertial navigation system (INS), an odometer-based navigation system, or a simultaneous localization and mapping (SLAM) system.

12. The system of any one of claims 9 to 11, wherein the processor is further configured to align the local map and the global path despite differences in update rates.

13. The system of claim 12, wherein the processor performs temporal alignment by adding time tags to the local map updates and the global path updates and matching the time tags.

14. The system of claim 12 or 13, wherein the processor performs spatial alignment by matching the vehicle's current position as determined using the SCNS within the local map and as determined using the GPS within the global path.

15. The system of any one of claims 12 to 14, wherein the processor is further configured to generate a combined map comprising the local map and the global path, dynamically update the combined map as the vehicle advances, and provide the combined map for display to enable operator monitoring or control.

16. The system of any one of claims 9 to 15, wherein the processor is configured to generate navigation instructions for leading the vehicle according to the global path and local map and a vehicle control sub-system configured to receive the navigation instructions from the processor and autonomously control the vehicle according to the instructions.

17. The system of any one of claims 9 to 15, wherein the processor is configured to generate navigation instructions for leading the vehicle according to the global path and local map and cause the navigation instructions to be displayed on a display device to enable vehicle control by an operator.

18. A non-transitory computer-readable medium storing instructions which, when executed by a processor, cause the processor to perform a method comprising: receiving scanning output data generated by a scanner representing an area surrounding a vehicle; generating, based on the scanning output data, a local map representing the area surrounding the vehicle relative to its position, the local map comprising data indicative of obstacles within its area, and accumulating newly scanned regions in the direction of motion as the vehicle advances; receiving SCNS data and updating the vehicle's position relative to the local map based on the SCNS data; navigating the vehicle within the local map to avoid obstacles, wherein the navigation within the local map is performed independently of a GPS; obtaining, from

the GPS, data indicative of a global path leading toward a destination located outside the boundaries of the local map; and dynamically updating the global path during vehicle navigation based on local navigation updates derived from the SCNS and the local map, such that the global path is adjusted to avoid obstacles detected locally as the vehicle advances.