ENHANCED TRANSIT LOCATION SYSTEMS AND METHODS

CROSS REFERENCE TO RELATED APPLICATIONS

(01) The present application claims priority to U.S. Provisional Patent Application No. 62/897,860, filed September 9, 2019, entitled “ENHANCED TRANSIT LOCATION SYSTEMS AND METHODS,” the disclosure thereof incorporated by reference herein in its entirety.

FIELD

(02) The present disclosure relates generally to transportation intelligence, and more specifically to systems and methods for enhanced identification of transit location.

SUMMARY

(02a) According to a first aspect of the present invention, there is provided a system, comprising: a vehicle radio locatable on a vehicle traveling along a vehicle pathway; one or more hardware processors; and one or more non-transitory machine-readable storage media encoded with instructions executable by the one or more hardware processors to perform a method comprising: transmitting, by the vehicle radio, ping signals; receiving, into the vehicle radio, anchor identification signals transmitted by one or more wayside radios located along the vehicle pathway in response to the ping signals, wherein a given anchor identification signal represents a relative distance between the vehicle radio and one of the one or more wayside radios that transmitted the given anchor identification signal; and determining a location of the vehicle along the vehicle pathway based on the relative distances in the received anchor identification signals.

(02b) According to a second aspect of the present invention, there is provided one or more non-transitory machine-readable storage media encoded with instructions

executable by one or more hardware processors of a system, the one or more machine-readable storage media comprising instructions executable by the one or more hardware processors to cause the system to perform a method comprising: transmitting, by a vehicle radio located on a vehicle traveling along a vehicle pathway, ping signals; receiving, into the vehicle radio, anchor identification signals transmitted by one or more wayside radios located along the vehicle pathway in response to the ping signals, wherein a given anchor identification signal represents a relative distance between the vehicle radio and one of the one or more wayside radios that transmitted the given anchor identification signal; and determining a location of the vehicle along the vehicle pathway based on the relative distances in the received anchor identification signals.

(02c) According to a third aspect of the present invention, there is provided a method comprising: transmitting, by a vehicle radio located on a vehicle traveling along a vehicle pathway, ping signals; receiving, into the vehicle radio, anchor identification signals transmitted by one or more wayside radios located along the vehicle pathway in response to the ping signals, wherein a given anchor identification signal represents a relative distance between the vehicle radio and one of the one or more wayside radios that transmitted the given anchor identification signal; and determining a location of the vehicle along the vehicle pathway based on the relative distances in the received anchor identification signals.

(03) Embodiments of the present disclosure provide systems and methods for tracking information relating to transportation vehicles. For example, some embodiments of the disclosure provide a system for enhanced location and data collection from vehicles

traveling along a vehicle pathway. The system may include a communications mesh architecture of vehicle tags and anchors affixed to segments of a vehicle pathway. For example, the vehicle may be a light rail train, a commuter train, a freight train, an automobile, an airplane, a ship, a space vehicle, a ski lift, a gondola, or other forms of transportation as known in the art. The transportation pathway may be any pathway along which the respective vehicle moves, such as a train track, a road, a canal or shipping lane, a runway, an airway, or other vehicle pathways as known in the art. By providing a communications mesh architecture, the

CLAIMS

What is claimed is:

1. A system, comprising:

a vehicle radio locatable on a vehicle traveling along a vehicle pathway;

one or more hardware processors; and

one or more non-transitory machine-readable storage media encoded with instructions executable by the one or more hardware processors to perform a method comprising:

transmitting, by the vehicle radio, ping signals;

receiving, into the vehicle radio, anchor identification signals transmitted by one or more wayside radios located along the vehicle pathway in response to the ping signals, wherein a given anchor identification signal represents a relative distance between the vehicle radio and one of the one or more wayside radios that transmitted the given anchor identification signal; and

determining a location of the vehicle along the vehicle pathway based on the relative distances in the received anchor identification signals.

2. The system of claim 1, the system comprising the one or more wayside radios, the method further comprising:

transmitting the location from the vehicle radio to a first one of the one or more wayside radios; and

relaying the location along the vehicle pathway from the first one of the one or more wayside radios along one or more second ones of the one or more wayside radios.

3. The system of claim 2, the method further comprising:

transmitting the location from one of the one or more second ones of the one or more wayside radios to a control center.

4. The system of claim 1, the method further comprising:

determining a location of a worker along the vehicle pathway; and

notifying the worker when the vehicle is approaching the worker.

5. The system of claim 1, the method further comprising:

determining a location of a worker along the vehicle pathway; and

controlling the vehicle when the vehicle is approaching the worker.

6. The system of claim 1, wherein the vehicle comprises a plurality of cars each comprising a respective vehicle radio, the method further comprising:

establishing a communication network among the respective vehicle radios.

7. The system of claim 1, wherein the vehicle comprises a plurality of cars each comprising a respective vehicle radio, the method further comprising:

counting a number of vehicle radios passing one of the one or more wayside radios; and

determining a number of the cars in the vehicle based on the counting.

8. One or more non-transitory machine-readable storage media encoded with instructions executable by one or more hardware processors of a system, the one or more machine-readable storage media comprising instructions executable by the one or more hardware processors to cause the system to perform a method comprising:

transmitting, by a vehicle radio located on a vehicle traveling along a vehicle pathway, ping signals;

receiving, into the vehicle radio, anchor identification signals transmitted by one or more wayside radios located along the vehicle pathway in response to the ping signals, wherein a given anchor identification signal represents a relative distance between the vehicle radio and one of the one or more wayside radios that transmitted the given anchor identification signal; and

determining a location of the vehicle along the vehicle pathway based on the relative distances in the received anchor identification signals.

9. The one or more non-transitory machine-readable storage media of claim 8, the method further comprising:

transmitting the location from the vehicle radio to a first one of the one or more wayside radios; and

relaying the location along the vehicle pathway from the first one of the one or more wayside radios along one or more second ones of the one or more wayside radios.

10. The one or more non-transitory machine-readable storage media of claim 9, the method further comprising:

transmitting the location from one of the one or more second ones of the one or more wayside radios to a control center.

11. The one or more non-transitory machine-readable storage media of claim 8, the method further comprising:

determining a location of a worker along the vehicle pathway; and

notifying the worker when the vehicle is approaching the worker.

12. The one or more non-transitory machine-readable storage media of claim 8, the method further comprising:

determining a location of a worker along the vehicle pathway; and

controlling the vehicle when the vehicle is approaching the worker.

13. The one or more non-transitory machine-readable storage media of claim 8, wherein the vehicle comprises a plurality of cars each comprising a respective vehicle radio, the method further comprising:

establishing a communication network among the respective vehicle radios.

14. The one or more non-transitory machine-readable storage media of claim 8, wherein the vehicle comprises a plurality of cars each comprising a respective vehicle radio, the method further comprising:

counting a number of vehicle radios passing one of the one or more wayside radios; and determining a number of the cars in the vehicle based on the counting.

15. A method comprising:

transmitting, by a vehicle radio located on a vehicle traveling along a vehicle pathway, ping signals;

receiving, into the vehicle radio, anchor identification signals transmitted by one or more wayside radios located along the vehicle pathway in response to the ping signals, wherein a given anchor identification signal represents a relative distance between the vehicle radio and one of the one or more wayside radios that transmitted the given anchor identification signal; and

determining a location of the vehicle along the vehicle pathway based on the relative distances in the received anchor identification signals.

16. The method of claim 15, further comprising:

transmitting the location from the vehicle to a first one of the one or more wayside radios; and

relaying the location along the vehicle pathway from the first one of the one or more wayside radios along one or more second ones of the one or more wayside radios.

17. The method of claim 16, further comprising:

transmitting the location from one of the one or more second ones of the one or more wayside radios to a control center.

18. The method of claim 15, further comprising:

determining a location of a worker along the vehicle pathway; and

notifying the worker when the vehicle is approaching the worker.

19. The method of claim 15, further comprising:

determining a location of a worker along the vehicle pathway; and

controlling the vehicle when the vehicle is approaching the worker.

20. The method of claim 15, wherein the vehicle comprises a plurality of cars each comprising a respective vehicle radio, the method further comprising:

establishing a communication network among the respective vehicle radios.