the event that the controller receives data indicative of a plurality of substantially simultaneous entry or exit requests received from multiple mobile communication devices, the method includes the controller using the one or more connected wireless devices indicated by at least one of the entry request or exit request to at least partially determine which entry or exit request from the plurality of substantially simultaneous entry or exit requests to process.

[0046] In certain embodiments, the mobile communication device is configured to determine, using the received signal strengths of the at least some of the transmitter signals, a positional offset of the mobile device within the detection area, wherein at least one of the entry or exit request is indicative of a positional offset of the mobile device within the detection area, wherein in the event that the controller receives data indicative of a plurality of substantially simultaneous entry or exit requests received from multiple mobile communication devices, the method includes the controller using the positional offset indicated by at least one of the entry request or exit request to at least partially determine which entry or exit request from the plurality of substantially simultaneous entry or exit requests to process.

[0047] In a third aspect there is provided a system including:

a plurality of transmitters, each transmitter having associated therewith a reflector antenna configured to substantially reflect signal transmission toward a detection area; and

a non-transitory computer readable medium including a computer program executable by a mobile device associated with an entity, wherein execution of the computer program configures the mobile device to:

receive transmitter signals from at least two transmitters from the plurality of transmitters; and

determine that the mobile device is located within the detection area based on received signal strengths of the at least some of the transmitter signals.

[0048] Other aspects and embodiments will be appreciated throughout the detailed description.

Brief Description of the Figures

[0049] Example embodiments should become apparent from the following description, which is given by way of example only, of at least one preferred but non-limiting embodiment, described in connection with the accompanying figures.

device 310 to determine whether the mobile communication device is located in a left or right lane. Therefore, in some circumstances only half the transmitters 1610 may need to be installed for a particular entry or exit area where multiple lanes are provided. Furthermore, this arrangement of the transmitters may be necessary in circumstances where there may be physical constraints for installing transmitters 1610 between neighbouring vehicular lanes. As shown in Figure 36, the mobile communication device 310 would not be detected as being located in either the left or right detection areas 1630A, 1630B. However, in Figure 37 as the vehicle associated with the mobile communication device 310 approaches the entry point, the mobile communication device using the above described signal processing technique determines that it is located within the left detection area 1630A.

[00236] Referring to Figures 38 and 39 there is shown a flow chart representing a method 3900 of performing the signal processing discussed in relation to Figures 36 and 37. Method 3800 will be described initially with reference to the transmitter arrangement of Figures 36 and Figure 37 operating at entry points and then later operating at exit points. This transmitter arrangement can be used in relation to the system described in relation to Figure 17A. It will be appreciated that the terms "left" and "right" are being used throughout the description of these examples for the purposes of clarity, thus the examples are not limited to specific left and right configurations and the terms "first" and "second" can be interchanged for the terms "left" and "right" respectively throughout these examples for a more general example.

[00237] In particular, step 3802 of the method 3800 is performed in the same manner of as step 1752.

[00238] As the user approaches an entry point of the vehicular parking facility, step 3804 of the method 3800 is performed in the same manner as step 1754.

[00239] At step 3806, the method 3800 includes the mobile communication device 310 determining a mean value indicative of the received signal strength based on the received entry transmitter signals. In one particular form, the mean value may be a harmonic mean value. Other mean values can be determined.

[00240] At step 3808, the method 3800 includes the mobile communication device 310 determining a mean value indicative of the received signal strength for signals received

16A and 16B compared to the transmitter arrangement discussed in relation to Figures 36 and 37. As can be seen, the transmitter arrangement of Figures 36 and 37 has a minimum error rate of 0.13% (i.e. 99.87% success rate) which is a higher error rate than the transmitter arrangement of Figures 16A and 16B (0.02% resulting in a 99.98% success rate). However, given that the error rate is still extremely small, the benefits in installing half (or approximately half depending upon the physical arrangement) the transmitters needed to detect whether a vehicle is located in a left lane or right lane may be considered more advantageous despite the slightly higher error rate.

[00269] It will be appreciated that if there are a large number of neighbouring entry or exit points, the above described alternate transmitter arrangement can be used, where a set of transmitters 1610 transmit across two neighbouring lanes. Therefore, there may be a plurality of sets of transmitters in such a configuration.

[00270] As discussed above, the mobile communication device 310 can receive configuration data from the server processing system 340. The server processing system 340 may be a cloud server. The configuration data can include data regarding the configuration of one or more communication systems 306 associated with one or more restricted areas. In particular, the configuration data can include unique device identities (such as a universally unique identifier, MAC addresses, etc) for each entry and exit communication device and the associated identity of the restricted area (i.e. identity of the parking facility or the like), calibration data such as transmission characteristics of each entry and exit communication device and the side of a vehicle path each communication device is located. The computer program 308 can configure the mobile communication device 310 to obtain updated configuration data from time to time. The configuration data may be pushed to or pulled by the mobile communication device 310 from the cloud server 340. Therefore, in the event that a particular communication system 306 is reconfigured thereby altering the various transmission characteristics of the particular communication system 306 for a restricted area, the configuration data can be altered at the cloud server 340, wherein each mobile communication device 310 obtains the altered configuration data in a timely manner (e.g. within 6 hours).

[00271] The systems described are advantageous as the mobile communication device 310 transmits the entry/exit request using a short range wireless communication network to

CLAIMS

1. A system including:

a plurality of transmitters, each transmitter having associated therewith a reflector antenna configured to substantially reflect signal transmission toward a detection area; and

a mobile device configured to:

receive transmitter signals from at least two transmitters from the plurality of transmitters; and

determine that the mobile device is located within the detection area based on received signal strengths of the at least some of the transmitter signals.

2. The system according to claim 1, wherein each reflector antenna is a corner reflector antenna.

3. The system according to claim 2, wherein the respective reflecting walls of each reflector antenna are walls of a bollard housing the respective transmitter.

4. The system according to claim 3, wherein a dipole driven element of each transmitter is spaced from the corner reflector antenna by a spacing bracket mounted within the respective bollard.

5. The system according to claim 3 or 4, wherein each bollard includes a cutout section to enable transmission of the respective transmitter signal by the respective transmitter.

6. The system according to any one of claims 1 to 5, wherein the plurality of transmitters consists of:

two transmitters, wherein the plurality of transmitters are spaced apart from each other and the reflector antennas of the transmitters face substantially toward each other to thereby define the detection area in at least some of the area therebetween;

three transmitters, wherein the plurality of transmitters are spaced apart from each other in a triangular configuration and the reflector antennas of the plurality of transmitters face substantially toward each other to thereby define the detection area in at least some of the area therebetween; or

four transmitters, wherein the plurality of transmitters are spaced apart from each other in a quadrilateral configuration and the reflector antennas of the plurality of transmitters face substantially toward each other to thereby define the detection area in at least some of the area therebetween.

7. The system according to any one of claims 1 to 6, wherein the plurality of transmitters are Bluetooth devices.

8. The system according to any one of claims 1 to 7, wherein the determination that the mobile device is located within the detection area is based on a mean value of the received signal strengths.

9. The system according to claim 8, wherein the mean value is one of:

a harmonic mean value; and

a geometric mean value.

10. The system according to claim 8 or 9, wherein the mobile device is configured to determine a mask value using the received signal strengths for the least some of the transmitters, wherein the mobile device uses the mean value and the mask value to determine if the mobile device is located in one of a plurality of detection areas associated with the plurality of transmitters.

11. The system according to any one of claims 8 or 9, wherein the mobile device is configured to:

determine a first mask value based on a discrepancy between a first mean value of the received signal strength for signals received from a first pair of the transmitters of the plurality of transmitters and a second mean value of the received signal strength for signals received from a second pair of the transmitters of the plurality of transmitters;

determine a second mask value based on a discrepancy between the second mean value the first mean value;

determine if the mobile device is located in a first detection area in the event that one or more first criteria are satisfied based on masking the mean value using the first mask value; and

determine if the mobile device is located in a second detection area in the event that one or more second criteria are satisfied based on masking the mean value using the second mask value.

12. The system according to claim 8 or 9, wherein the mobile device is configured to determine that the mobile device is located within the detection area in response to the mobile device determining that the mean value of the received signal strengths is greater than or equal to a signal strength threshold over a threshold period of time.

13. The system according to claim 8 or 9, wherein the mobile device is configured to determine that the mobile device is located within the detection area in response to the mobile device determining that the mean value of the received signal strengths is greater than or equal to a first signal strength threshold over a threshold period of time starting when the mean value of the received signal strengths is greater than a second signal strength threshold, wherein the second signal strength threshold is greater than the first signal strength threshold.

14. The system according to claim 1 to 13, wherein the mobile device is configured to transfer data indicative of the determination that the mobile device is within the detection area to a monitoring system.

15. The system according to claim 14, wherein the monitoring system includes a controller with an associated communication device, wherein the data indicative of the

determination is an access request generated and transferred by the mobile device which is received by the controller via the communication device, wherein the controller is configured to facilitate, based on the request, instructing an access control system to allow the entity to travel through an entry or exit point.

16. The system according to claim 15, wherein the entry or exit points are associated with a vehicular parking facility.

17. The system according to claim 15 or 16, wherein at least one of the entry request and the exit request generated by the mobile communication device is indicative of one or more wireless devices which the mobile communication device is currently connected thereto, wherein in the event that the controller receives data indicative of a plurality of substantially simultaneous entry or exit requests received from multiple mobile communication devices, the one or more connected wireless devices indicated by at least one of the entry request or exit request is used to at least partially determine which entry or exit request from the plurality of substantially simultaneous entry or exit requests to process.

18. The system according to any one of claims 15 to 17, wherein the mobile communication device is configured to determine, using the received signal strengths of the at least some of the transmitter signals, a positional offset of the mobile device within the detection area, wherein at least one of the entry or exit request is indicative of a positional offset of the mobile device within the detection area, wherein in the event that the controller receives data indicative of a plurality of substantially simultaneous entry or exit requests received from multiple mobile communication devices, the positional offset indicated by at least one of the entry request or exit request is used to at least partially determine which entry or exit request from the plurality of substantially simultaneous entry or exit requests to process.

19. A method including:

transmitting, from a plurality of transmitters, transmitter signals, wherein each transmitter has associated therewith a reflector antenna configured to substantially reflect signal transmission toward a detection area; and

determine, at a mobile device, that the mobile device is located within the detection area based on received signal strengths of at least two transmitter signals of the plurality of transmitter signals.

20. A system including:

a plurality of transmitters, each transmitter having associated therewith a reflector antenna configured to substantially reflect signal transmission toward a detection area; and

a non-transitory computer readable medium including a computer program executable by a mobile device, wherein execution of the computer program configures the mobile device to:

receive transmitter signals from at least two transmitters from the plurality of transmitters; and

determine that the mobile device is located within the detection area based on received signal strengths of the at least some of the transmitter signals.