Claims

[Claim 1]

A parking management device comprising:

a communication unit configured to receive probe data including identification information and position information and periodically transmitted by an in-vehicle device, using an antenna having, as a communication region, a region of a parking lot including at least all parking spaces and all entrances/exits;

a calculation unit configured to recognize, based on the probe data received by the communication unit, an entry time of the in-vehicle device into the parking lot and an exit time of the in-vehicle device from the parking lot, and calculate a parking fee based on a time difference between the entry time and the exit time; and

a charging unit configured to charge the parking fee to the in-vehicle device by transmitting and receiving predetermined information to and from the in-vehicle device using the communication unit.

[Claim 2]

The parking management device according to claim 1, further comprising:

a detection unit configured to detect unauthorized parking in the parking lot based on the probe data received by the communication unit,

wherein the charging unit is configured to charge a fine for the unauthorized parking to the in-vehicle device.

[Claim 3]

The parking management device according to claim 1 or claim 2,

wherein the charging unit is configured to charge the fine to the in-vehicle device when the unauthorized parking continues for a predetermined time or longer.

[Claim 4]

The parking management device according to any one of claims 1 to 3, further comprising:

a warning unit configured to transmit, using the communication unit, warning information indicating that the parking is unauthorized to the in-vehicle device for which the unauthorized parking is detected.

[Claim 5]

The parking management device according to any one of claims 1 to 4, further comprising:

a notification unit configured to notify an administrator of the parking lot that the unauthorized parking is detected.

[Claim 6]

The parking management device according to any one of claims 1 to 5,

wherein the unauthorized parking is parking of an hourly parking vehicle in an exclusive parking space for a contract holder.

[Claim 7]

The parking management device according to any one of claims 1 to 6,

wherein the antenna has, as the communication region, the regions of two or more parking lots.

[Claim 8]

The parking management device according to any one of claims 1 to 7,

wherein the probe data includes the identification information, the position information, and vehicle type information, and

the calculation unit is configured to calculate the parking fee based on the time difference and the vehicle type information.

[Claim 9]

A parking management method comprising:

a step of receiving probe data including identification information and position information and periodically transmitted by an in-vehicle device, using an antenna having, as a communication region, a region of a parking lot including at least all parking spaces and all entrances/exits;

a step of recognizing, based on the probe data received by the communication unit, an entry time of the in-vehicle device into the parking lot and an exit time of the in-vehicle device from the parking lot, and calculating a parking fee based on a time difference between the entry time and the exit time; and

a step of charging the parking fee to the in-vehicle device by transmitting and receiving predetermined information to and from the in-vehicle device using the communication unit.