(hereinafter, referred to as trunk delivery service). The trunk delivery service is provided in the following way. Key information that allows the trunk of a vehicle to be unlocked for a limited time is delivered to a mobile terminal of a delivery person of a delivery company.

[0004] However, for example, if various services become available only by registering information for identifying a vehicle, such as a vehicle index number (VIN), with service providers, a third party, that is, a service provider, could learn registered information for identifying a vehicle when a regular user of the vehicle uses a service. For this reason, information for identifying a vehicle is possibly abused by a third party in bad faith, and another service is registered by the third party in bad faith without permission or a vehicle is used by the third party in bad faith without permission through a service registered without permission.

[0005] Embodiments of the invention provide a key information management device, a key information management method, and a non-transitory computer-readable recording medium on which a key information management program is recorded, which are able to prevent registration with a service using a vehicle by a third party in bad faith without permission and usage of a vehicle by a third party in bad faith without permission through a service registered without permission.

[0006] A first aspect of the invention provides a key information management device. The key information management device includes an information processing device. The information processing device is configured to deliver key information to a mobile terminal in order that the mobile terminal transmits a predetermined transmission signal toward a vehicle. The key information is information for unlocking the vehicle, starting the vehicle, or unlocking and starting the vehicle. The information processing device is configured to register permission for a user of the vehicle to use a predetermined service using the vehicle. The permission is permission to cause the information processing device to deliver the key information to a mobile terminal of a third party concerned with the predetermined service, other than the user of the vehicle, in response to an external device concerned with the predetermined service transmitting a predetermined request signal to the key information management device. The information processing device is configured to register the permission further in association with unique information corresponding to an owner user of the vehicle.

[0014] A second aspect of the invention may be implemented by a key information management method that is executed by a key information management device. The key information management method includes: delivering key information to a mobile terminal in order that the mobile terminal transmits a predetermined transmission signal toward a vehicle, the key information being information for unlocking the vehicle, starting the vehicle, or unlocking and starting the vehicle; and registering permission for a user of the vehicle to use a predetermined service using the vehicle, the permission being permission to deliver the key information to a mobile terminal of a third party concerned with the predetermined service, other than the user of the vehicle, in response to an external device concerned with the predetermined service transmitting a predetermined request signal to the key information management device. The permission is registered further in association with unique information corresponding to an owner user of the vehicle

[0015] A third aspect of the invention may be implemented by a non-transitory computer-readable recording medium on which a key information management program is recorded. The key information management program causes an information processing device to execute instructions for: delivering key information to a mobile terminal in order that the mobile terminal transmits a predetermined transmission signal toward a vehicle, the key information being information for unlocking the vehicle, starting the vehicle, or unlocking and starting the vehicle; and registering permission for a user of the vehicle to use a predetermined service using the vehicle, the permission being permission to deliver the key information to a mobile terminal of a third party concerned with the predetermined service, other than the user of the vehicle, in response to an external device concerned with the predetermined service transmitting a predetermined request signal to the information processing device. The permission is registered further in association with unique information corresponding to an owner user of the vehicle.

[0016] According to the above-described aspects, it is possible to provide a key information management device, a key information management method, and a non-transitory computer-readable recording medium on which a key information management program is recorded, which are able to prevent registration with a service using a vehicle by a third party in bad faith without permission and usage of a vehicle by a third party in bad faith without permission through a service registered without permission.

BRIEF DESCRIPTION OF THE DRAWINGS

CLAIMS

1. A key information management device comprising:

an information processing device configured to

i) deliver key information to a mobile terminal in order that the mobile terminal transmits a predetermined transmission signal toward a vehicle, the key information being information for unlocking the vehicle, starting the vehicle, or unlocking and starting the vehicle, and

ii) register permission for a user of the vehicle to use a predetermined service using the vehicle, the permission being permission to cause the information processing device to deliver the key information to a mobile terminal of a third party concerned with the predetermined service, other than the user of the vehicle, in response to an external device concerned with the predetermined service transmitting a predetermined request signal to the key information management device,

wherein the information processing device is configured to register the permission further in association with unique information corresponding to an owner user of the vehicle.

2. The key information management device according to claim 1, wherein:

the information processing device is configured to transmit information related to the predetermined service to the mobile terminal having the unique information corresponding to the owner user in response to a request from the mobile terminal having the unique information corresponding to the owner user; and

the predetermined service corresponds to the permission associated with the unique information corresponding to the owner user.

3. The key information management device according to claim 2, wherein:

the information processing device is configured to store the permission for each user of the vehicle in association with the unique information corresponding to the owner user;

the information processing device is configured to transmit information related to a user of the vehicle, other than the owner user, to the mobile terminal having the unique information

corresponding to the owner user in response to a request from the mobile terminal having the unique information corresponding to the owner user; and

the user of the vehicle, other than the owner user, corresponds to the permission associated with the unique information corresponding to the owner user.

4. The key information management device according to any one of claims 1 to 3, further comprising a communication device configured to bidirectionally carry out communication with each of the vehicle, the mobile terminal, and the external device through a predetermined communication network.

5. The key information management device according to any one of claims 1 to 4, wherein the key information further includes information for locking the vehicle.

6. A key information management method that is executed by a key information management device, the key information management method comprising:

delivering key information to a mobile terminal in order that the mobile terminal transmits a predetermined transmission signal toward a vehicle, the key information being information for unlocking the vehicle, starting the vehicle, or unlocking and starting the vehicle; and

registering permission for a user of the vehicle to use a predetermined service using the vehicle, the permission being permission to deliver the key information to a mobile terminal of a third party concerned with the predetermined service, other than the user of the vehicle, in response to an external device concerned with the predetermined service transmitting a predetermined request signal to the key information management device,

wherein the permission is registered further in association with unique information corresponding to an owner user of the vehicle.

7. A non-transitory computer-readable recording medium comprising a key information management program recorded on the recording medium, the key information management program causing an information processing device to execute instructions for:

delivering key information to a mobile terminal in order that the mobile terminal transmits a predetermined transmission signal toward a vehicle, the key information being information for unlocking the vehicle, starting the vehicle, or unlocking and starting the vehicle; and

registering permission for a user of the vehicle to use a predetermined service using the vehicle, the permission being permission to deliver the key information to a mobile terminal of a third party concerned with the predetermined service, other than the user of the vehicle, in response to an external device concerned with the predetermined service transmitting a predetermined request signal to the information processing device,

wherein the permission is registered further in association with unique information corresponding to an owner user of the vehicle.