**TITLE**

# A METHOD AND RELATED GRAPHIC USER INTERFACE (GUI) DESIGN FOR PRESENTING CARPARK INFORMATION

## FIELD OF THE INVENTION

The present invention relates to a new method and related GUI design for presenting carpark information, such as carpark location, tariff and lots available that are linked to vehicle types, in real time on display screens.

## BACKGROUND OF THE INNOVATION

One of the main functions of a carparking related mobile application is to provide carpark information to users for choosing a carpark that better fit their parking needs.

In order to choose a carpark for parking the vehicle used, users normally consider the following aspects of carpark information:

1) The location of the car park - it shall be a carpark that is located as near as it is acceptable to a target location (the location where the user intends to go);
2) The carpark must have available parking lots/spaces for the vehicle used;
3) The parking charges shall be affordable (normally, the cheapest carpark is better for most users).

The carpark chosen finally by a user is dependant on the information the user can get about the car parks near to the user's travel destination and also on the balancing importance of the aspects 1) and 3) above to the user.

The location of a car park can be presented by carpark/building name, address and geographic coordinates (latitude, longitude).

The data of available parking lots/spaces are related to vehicle types. A carpark may have different numbers of parking lots/spaces available for different vehicle types, such as car/van, motorcycle, lorry/heavy vehicle, containers, handicapped, electric car/van, and etc.

Parking charges are dependant on the vehicle type as well as on the parked time period and the time zone(s). [For example, the parking charges may be different for 2 vehicles of the same vehicle type (e.g. car), parked in a same car park with the same parked time

period (e.g. 30 minutes), but parked in different time zones (e.g. one in day time, another in night time)].

How to present the necessary parking data from so many and complicated carpark information in order to help users to easily find suitable car parks that meet users' different needs?

How could the various parking data of multiple carparks be presented in a single display screen?

Which carpark is the cheapest carpark? The answer is not obvious. It depends on what time a user starts parking, and also on where the parking period crosses time zones. Is it feasible to indicate the cheapest carpark among the car parks displayed on the screen?

Some mobile apps use a list of the name and address of the carparks near to the travel destination, then user has to click on the name of a carpark to see related information of lots available and of parking charge tariff. In this way, user can only see the information for one carpark at a time, it is not easy to do comparison among different carparks to choose a carpark that better fit the user's needs.

Another way of presentation of carpark information used by some mobile apps is to display carpark icons together with the number of car lots available, and user has to click on a carpark icon to see the carpark's other information, such as carpark name,and parking charge rate. However, it is similar to the way of using a carpark list, user can only see the information of one carpark at a time, so that it is difficult to remember and compare the parking information among different carparks.

## OBJECT OF THE INVENTION

The objective of this innovation is to provide a method and related display design to present together the necessary information of the carparks, such as carpark location, tariff and lots available, in real time on a mobile phone screen in a manner for easy reading, understanding and comparing, so that it allows users to quickly make a decision for choosing a carpark that better fit their parking needs.

## SUMMARY OF THE INVENTION

In accordance with one aspect of the present invention the parking information of multiple carparks are presented on a single graphic user interface (GUI) screen comprising:

one vehicle type icon that indicates a selected vehicle type that all the information of the carparks presented on the GUI are linked with the selected vehicle type,

each carpark is presented by a carpark icon together with the following available key parking information around it:

1) the name/short name of the carpark/building;
2) the location of the carpark on the geographic map;
3) the current lots available level for the selected vehicle type in the carpark;
4) the current parking charging rate and the end time of the charging rate for the selected vehicle type in the carpark;
5) the cheapest carpark(s).

Preferably the vehicle type icon is of a round shape with a vehicle type identification symbol inside. The vehicle type icon could also be of other shapes. A vehicle type may be one of the followings: car, motorcycle, lorry, container, electric vehicle, handicap, and etc.

Preferably, the carpark icon is of the shape with a round shape at the upper portion and a cone at lower portion, it could also be of other shapes. The location of a carpark icon on the map of a mobile screen is determined by the geographic coordinates (longitude, latitude) of the carpark.

Preferably, a lots available level of a carpark corresponding to a selected vehicle type is defined by a range of the percentage of the number of lots available over the total number of the lots for the selected vehicle type in the car park. For example, three lots available levels can be defined as (a) Low Level, if the percentage is lower than a% (e.g. a%=10%); (b) Mid Level, if the percentage is bigger than a% and lower than b% (e.g. b%=50%); (c) High Level, if the percentage is higher than b%. Preferably, the value of a% and of b% can be determined by the management of the car park. Preferably the lots available levels are displayed by using different colors to fill the upper portion (the round shape) of the carpark location icon. For example, Red color for Low Level, Orange color for Mid Level, and Green color for High Level.

Preferably, a different color (e.g. Blue color) is used to indicate that there are some lots available for the selected vehicle type in the carpark but there is no percentage data available.

Preferably, another different color (e.g. Black color) is used to indicate the fact that the lots available data of a car park are not available.

Preferably, the current parking charging rate with the end time of the charging rate for the selected vehicle type in a car park is displayed in text format in the position between the car park name/short name and the car park location icon.

Preferably, a cheapest carpark symbol is displayed above the carpark name/short name of the car park(s) that is (are) the cheapest carpark(s) among the carparks displayed on the GUI screen.

Preferably the cheapest carpark can be defined as the carpark of the lowest parking charge for a certain parking time period (e.g. 1 hour) starting from the current time.

In accordance with another aspect of the present invention, the more completed information of a selected carpark are presented on another GUI (figure 2) comprising

- the carpark name and address;
- the vehicle type icon(s) for all the types of vehicles allowed to park in the carpark;
- the number of the current available lots and of the total lots for the selected vehicle type in the carpark;
- the completed parking charging tariff for the selected vehicle type, on different days and in different time zones.

**BRIEF DESCRIPTION OF THE GUI FOR AN EMBODIMENT**

The present invention will now be described, by way of example only, with reference to the accompanying figures, in which:

**Figure 1** is the main GUI screen of an embodiment (a car parking related mobile application), it shows the information of carparks to help users to make a quick decision for choosing a carpark that better fit their parking requirement;

**Figure 2** is another GUI screen that shows a more complete information of a selected carpark.

**Description of an Embodiment of the invention**

The information of carparks shown on the main GUI screen of the mobile phone in figure 1, where

(i) the icon (1) is the vehicle type icon, all information of the carparks displayed on the GUI are related to the selected vehicle type. The default selected vehicle type icon is a car icon. When a user clicks on the displayed vehicle type icon, the icon will switch to another vehicle type icon, and the information of the carparks will be changed correspondingly.

(ii) the pin icon (2) is a carpark icon that is used to mark the carpark's location on the map and as well as to indicate the lots available level (LAL) for the selected vehicle type in the carpark by the color of the pin head (Red color indicates Low Level of the lots available (LAL ≤ 10%); Orange color means Mid Level of availability (10% < LAL ≤ 60%); Green color shows the High availability LAL > 60%). Blue color is used to indicate that there are lots available but no lots available level is defined. Black color means that the lots data is not available.

(iii) the text (3) is the bulding/carpark name/short name that is displayed near to and above the carpark icon.

(iv) the current parking charging rate (4) and the end time of the charging rate (5) are displayed below the carpark name and above the carpark icon.

(v) the symbol (6) is used to mark the cheapest carpark(s) among the carparks shown on the map. The cheapest is defined as the lowest parking fee for the first 1 hour of parked time period, starting from the current time.

With the information displayed on the main GUI, users are normally able to quickly choose a carpark that better fit their parking needs.

In case that a user would like to get a more complete information of a selected carpark, the user can click on the carpark icon, the Figure 2 GUI will appear, where

(i) the carpark name (1),

(ii) the address of the carpark (2),

(iii) the icons of the vehicle types (4) allowed to park in the carpark (the icon marked with black color is the selected vehicle type), user can change the selected vehicle type by clicking on the desired vehicle type icon,

(iv) the name of the selected vehicle type (5),

(v) the current lots available level presented in color, the number of the lots available and the total lots for the selected vehicle type (3),

(vi) the parking charging tariff (6) for the selected vehicle type,

(vii) the navigation icon (7).

**Basic Operation Flow**

5 The table below shows the basic operation flow of choosing a carpark based on the information of carparks provided by the mobile application.

| Step | User | Mobile App Display |
|---|---|---|
| **1** | **Input travel destination** | |
| 1.1 | Click search icon in the main GUI, then input building/carpark name or address, or postal code in the field of “search for a location” | List of matched or partial matched buildings/ carparks |
| 1.2 | Click on the building/carpark matched or most matched to your travel destination (target location) | The app program will use a search radius D (e.g. the initial D=1km) to find the carparks around the target location and then to display the carparks’ parking data (2) to (6) on the main GUI (Figure 1).<br>In the case, that there is only 1 carpark found, the program will enlarge the search radius to search again, until multiple carparks are found. |
| **2** | **Choose a carpark that fits user’s parking needs** | |

| Step | User | Mobile App Display |
|---|---|---|
| 2.1 | User can enlarge (or reduce) the displayed area on the map | The number of carparks displayed on the screen will be increased (or decreased) accordingly |
| 2.2 | User can change vehicle type | The information of carparks displayed will be changed accordingly |
| 2.2 | Click on the carpark chosen based on the consideration of location, lots available, and parking charges. | The navigation icon and more complete information of the carpark will be displayed as Figure 2. |
| **3** | **Switch to navigation maps for showing driving way to the chosen carpark** | |
| 3.1 | Click the navigation button (7) to switch to navigation map to get the directions to the chosen carpark | Switches to navigation map to get the directions to the chosen carpark |

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**Claims**

The claims defining the invention are as follows

1. A method and mobile app GUI that displays, on a single graphic screen, multiple car parks' key parking data, which include at least carpark location, carpark's lots availability, and carpark's current parking charging rate.
2. A method and GUI according to claim 1, wherein every carpark's name/short name are also displayed.
3. A method and GUI according to claim 1, wherein the different lot availabilities are presented by different colours marked on the corresponding carpark icon, for example, red for low availability, orange for mid availability, and green for high availability.
4. A method and GUI according to claim 1, wherein the end time of the charging rate is also displayed with the related current charging rate.
5. A method and GUI according to claim 1, wherein the cheapest carpark(s) among the carparks displayed, if any, is(are) indicated by a dedicated marking for the related carpark.
6. A method and GUI according to claim 1 and claim 2, claim 3, claim 4, claim 5, wherein a vehicle type icon is used to indicate that all the parking data displayed on the screen for multiple carparks are for the selected vehicle type. User can click on the icon to change vehicle type, and then all the parking data displayed on the screen will change accordingly.