[CLAIMS]

1. A one-to-many-surface parking lot management system for managing a parking lot having a plurality of parking surfaces arranged configuring a plurality of columns, the system comprising:

an omnidirectional camera installed on a ceiling of the parking lot between two adjacent columns among the plurality of columns and provided with a fisheye lens to photograph a surveillance image of all directions;

a sensing sensor associated with the omnidirectional camera and installed to be adjacent to a first parking surface, which is part of the plurality of parking surfaces, to sense a vehicle positioned on the first parking surface using ultrasonic waves and create a sensing signal corresponding to a result of the sensing;

a cable connected to the omnidirectional camera to transmit the surveillance image and connected to the sensing sensor to transmit the sensing signal;

a management server connected to the cable to receive the surveillance image and the sensing signal; and

a full-empty parking indicator, installed to unite with the omnidirectional camera, for outputting a preset indication related to whether or not a vehicle is parked on the plurality of parking surfaces,

wherein the management server further comprises:

a vehicle sensing module for determining whether or not a vehicle is parked on the plurality of parking surfaces;

a security module provided with a memory for storing the surveillance image; and

a display unit for outputting the surveillance image,

wherein the vehicle sensing module further includes:

an area setting unit for setting an area of the parking surfaces photographed in the surveillance image;

a feature extraction unit for extracting a feature vector from the area of the parking surfaces, set by the area setting unit, using a vehicle recognition algorithm; and

a detection unit for determining whether or not a vehicle is parked in the area of the parking surfaces using the feature vector,

wherein the management server controls output of the full-empty parking indicator according to the determination of the vehicle sensing module,

wherein some of parking surfaces arranged in a first column and some of parking surfaces arranged in a second column are photographed in the surveillance image, and the first column and the second column are two adjacent columns where the omnidirectional camera is installed,

wherein five to seven parking surfaces among the parking surfaces arranged in the first column are photographed in the surveillance image, and five to seven parking surfaces among the parking surfaces arranged in the second column are photographed in the surveillance image,

wherein the first parking surface includes a second parking surface arranged at a photographing blind spot of the

omnidirectional camera and a third parking surface arranged at a position where the vehicle sensing module may not determine whether or not a vehicle is parked according to changes of environmental factors including luminance,

wherein one of the followings such as SIFT (Scale-Invariant Feature Transform), SURF (Speeded Up Robust Features), HOG (Histogram of Oriented Gradients), Haar-like features and Gabor filters is used for the vehicle recognition algorithm,

wherein the vehicle sensing module determines whether or not a vehicle is parked on the first parking surface using the sensing signal and determines whether or not a vehicle is parked on any parking surfaces other than the first parking surface among the plurality of the parking surfaces using the surveillance image, and

wherein the vehicle sensing module determines whether or not a vehicle is parked on the third parking surface by additionally using the surveillance image, when the vehicle sensing module can determine whether or not a vehicle is parked on the third parking surface using the surveillance image, and wherein the vehicle sensing module determines again whether or not a vehicle is parked on the third parking surface using the surveillance image and the sensing signal transmitted after the lapse of a preset time, when the result of the determination on the third parking surface on the basis of the surveillance image is not identical with the one of the determination on the third parking surface on the basis of the sensing signal.