CLAIMS:

1. An accident avoidance method implementable in a portable device, the method comprising:

using a camera on a portable device utilised by a user, capturing a street view image at every predetermined time interval;

identifying an object of interest based on the street view image;

based on the street view image, ascertaining at least one relative position parameter of the object of interest with respect to the user;

predicting a potential accident based on a breach of a predetermined danger threshold by the at least one relative position parameter; ~~and~~

notifying the user of the predicted potential accident~~.~~;

ascertaining a suggestion for avoiding the potential accident based on at least one parameter used for prediction of the potential accident; and

notifying the user of the suggestion.

2. The method of claim 1, wherein the at least one relative position parameter includes ~~at least one of~~ a relative distance between the object of interest and the user, and a relative angle between the object of interest and a direction of a lens of the camera~~.~~;

~~3. The~~ wherein the method ~~of claim 2,~~ further comprises~~ing~~:

ascertaining ~~at least one of~~ a motion speed, a motion direction, and a motion acceleration of the user based on data obtained through a plurality of sensors provided in the portable device; and

wherein predicting a potential accident is further based on a breach of the danger threshold by the ~~at least one of the~~ motion speed, the motion direction and the motion acceleration of the user.

3. The method of claim 1, further comprising:

wherein the at least one relative position parameter includes a relative distance between the object of interest and the user, and a relative angle between the object of interest and a direction of a lens of the camera;

wherein the method further comprises:

ascertaining a motion speed, motion direction and motion acceleration of the object of interest based on at least two street view images successively captured by the camera from which the object of interest is identified;

wherein predicting a potential accident is further based on the relative distance, the relative angle, and the motion speed, motion direction and motion acceleration of the object of interest.

4. The method of claim 2 or claim 3, wherein the relative distance is ascertained based on the following equations:

$$D = d_0 + d_1$$

where $d_0 = H \div \tan(\theta/2)$ where $d_1 = \alpha \times d_i$

wherein D refers to the relevant distance, d_0 refers to a distance between a user ground point and a ground point of a vertical field of view of the camera; H refers to a height of the portable device relative to the ground; θ refers to a vertical field of view of the camera provided in the portable device; d_1 refers to a distance from the ground point of a vertical field of view of the camera to an object ground point; α is a pre-determined proportional relationship between a real distance and a pixel distance; d_i refers to a pixel distance corresponding to d_1.

5. The method of claim 2 or claim 3, wherein the relative angle is ascertained based on the following equations:

$$\psi = \arctan(L^r/(d_0 + d_1))$$

$$\text{where } L^r = d_1 \times \tan(\emptyset)$$

$$\begin{cases} \emptyset^I = \arctan((x\text{-}w/2)/(h\text{-}y\text{-}height)) & x > w/2 \\ \emptyset^I = \arctan((w/2\text{-}x)/(h\text{-}y\text{-}height)) & x < w/2 \end{cases}$$

wherein ψ refers to the relative angle, L^r refers to a first distance between the object of interest and a motion direction of the user; $d_0 + d_1$ refers to a second distance between the object of interest and the user, wherein d_1 is ascertained based on a pre-determined proportional relationship in a camera-captured image, d_0 is ascertained based on a height of the portable device relative to the ground and a vertical field of view of the camera provided in the portable device;

Ø refers to a real angle between the user and the object of interest, which is ascertained based on a predetermined proportional relationship between a real angle and a pixel angle; $Ø^{I}$ refers to the pixel angle in an image captured by the camera; w, h respectively refer to image resolution parameters, height refers to the pixel height of the object of interest in the image; pixel coordinates of the object of interest in the image are denoted by (x, y+height).

~~4. The method of claim 2 or claim 3, wherein the relative distance is ascertained based on a height of the portable device relative to the ground, a vertical field of view of the camera, a pixel distance of the object of interest in the street view image and a predetermined proportional relationship between real distance and pixel distance.~~

~~5. The method of claim 2 or claim 3, wherein the relative angle is ascertained based on a first vertical distance and a second vertical distance between the object of interest and the user,~~

~~wherein the first vertical distance is ascertained based on a height of the portable device relative to the ground, a vertical field of view of the camera, a pixel distance of the object of interest in the street view image and a predetermined proportional relationship between real distance and pixel distance,~~

~~wherein the second vertical distance is ascertained based on a corresponding pixel distance and a predetermined proportional relationship between pixel distance and real distance, or based on the corresponding~~

~~pixel distance, pixel coordinates of the object of interest and a proportional relationship between real angle and pixel angle.~~

~~6. The method of claim 2 any one of claims 2 to 5, further comprising:~~

~~ascertaining a motion speed, motion direction and motion acceleration of the object of interest based on at least two street view images successively captured by the camera from which the object of interest is identified;~~

~~wherein predicting a potential accident is further based on at least one of the relative distance, the relative angle, and at least one of the motion speed, motion direction and motion acceleration of the object of interest.~~

~~7. The method of any one of the preceding claims, further comprising:~~

~~ascertaining a suggestion for avoiding the potential accident based on at least one parameter used for prediction of the potential accident; and~~

~~notifying the user of the suggestion.~~

~~8~~6. The method of any one of the preceding claims, wherein notifying the user of the potential accident includes providing at least one of a visual notification, ~~a~~an audio notification and a kinaesthetic notification.

~~9~~7. The method of any one of the preceding claims, further comprising:

before notifying the user of the predicted potential accident, ascertaining whether the user is aware of the object of interest by ascertaining a face direction of the user with respect to the object of interest based on a facial

image of the user as captured by a foreground camera provided in the portable device, and the at least one relative position parameter of the object of interest with respect to the user, and notifying the user of the predicted potential accident only if the user is ascertained not aware of the object of interest.

8. The method of claim 7, wherein the step of ascertaining whether the user is aware of the object of interest further comprises: ascertaining whether the user is aware of the object of interest based on a pre-stored user's visual acuity.

~~10~~9. The method of any one of the preceding claims, wherein the portable device is a mobile computing and/or communication device, or a mobility aid device.

~~11~~10. An accident avoidance system implementable in a portable device, the system comprising:

a camera configured to capture a street view image at every predetermined time interval;

an object recognition module configured to identify an object of interest based on the street view image;

an accident prediction module configured to determine at least one relative position parameter of the object of interest with respect to the user

based on the street view image; and predict a potential accident based on a breach of a predetermined danger threshold by the at least one relative position parameter; and

a notification module configured to notify the user of the predicted potential accident~~.~~;

wherein the accident prediction module is further configured to ascertain a suggestion for avoiding the predicted potential accident based on at least one parameter used for prediction of the potential accident; and

the notification module is further configured to notify the user of the suggestion.

~~12~~11. The system of claim ~~11~~10, wherein the accident prediction module is configured to ascertain ~~at least one of~~ a relative distance between the object of interest and the user and

a relative angle between the object of interest and a direction of a lens of the camera; and predict a potential accident based on the ascertained at least one of the relative distance and the relative angle~~.~~;

~~13. The~~ wherein the system ~~of claim 12,~~ further ~~comprising~~comprises:

a user status analysing module configured to ascertain ~~at least one of~~ a motion speed, a motion direction and a motion acceleration of the user based on data obtained through a plurality of sensors provided in the portable device;

wherein the accident prediction module is further configured to predict a potential accident based on the ascertained ~~at least one of the~~ motion speed, the motion direction and the motion acceleration of the user.

12. The system of claim 10, wherein the accident prediction module is further configured to ascertain a relative distance between the object of interest and the user and a relative angle between the object of interest and a direction of a lens of the camera; and predict a potential accident based on the ascertained at least one of the relative distance and the relative angle;

wherein the accident prediction module is further configured to ascertain a motion speed, a motion direction and a motion acceleration of the object of interest based on at least two street view images successively captured by the camera from which the object of interest is identified; and

predict a potential accident based on the relative distance, the relative angle, and the motion speed, motion direction and motion acceleration of the object of interest.

13. The system of claim 11 or claim 12, wherein the accident prediction module is further configured to ascertain the relative distance based on the following equations:

$$D = d_0 + d_1$$

where $d_0 = H \div \tan(\theta / 2)$

where $d_1 = \alpha \times d_i$

wherein D refers to the relevant distance, d_0 refers to a distance between a user ground point and a ground point of a vertical field of view of the camera; H refers to a height of the portable device relative to the ground; θ refers to the vertical field of view of the camera provided in the portable device; d_1 refers to a distance from the ground point of a vertical field of view of the camera to an object ground point; α is a pre-determined proportional relationship between a real distance and a pixel distance; d_i refers to a pixel distance corresponding to d_1.

14. The system of claim 11 or claim 12, wherein the accident prediction module is further configured to ascertain the relative angle based on the following equations:

$$\psi = \arctan(L^r/(d_0 + d_1))$$

$$\text{where } L^r = d_1 \times \tan(\emptyset)$$

$$\begin{aligned} \emptyset^I &= \arctan((x-w/2)/(h-y-height)) \quad x>w/2 \\ \emptyset^I &= \arctan((w/2-x)/(h-y-height)) \quad x<w/2 \end{aligned}$$

wherein ψ refers to the relative angle, L^r refers to a first distance between the object of interest and a motion direction of the user; $d_0 + d_1$ refers to a second distance between the object of interest and the user, wherein d_1 is ascertained based on a pre-determined proportional relationship in a camera-captured image, d_0 is ascertained based on a height of the portable device relative to the

ground and a vertical field of view of the camera provided in the portable device; $\emptyset$ refers to a real angle between the user and the object of interest, which is ascertained based on a predetermined proportional relationship between a real angle and a pixel angle; $\emptyset^{I}$ refers to the pixel angle in an image captured by the camera; w, h respectively refer to image resolution parameters, height refers to the pixel height of the object of interest in the image; pixel coordinates of the object of interest in the image are denoted by (x, y+height).

~~14. The system of claim 12 or claim 13, wherein the accident prediction module is configured to ascertain the relative distance based on a height of the portable device relative to the ground, a vertical field of view of the camera, a pixel distance of the object of interest in the street view image and a predetermined proportional relationship between real distance and pixel distance.~~

~~15. The system of claim 12 or claim 13, wherein the accident prediction module is configured to ascertain the relative angle based on a first vertical distance and a second vertical distance between the object of interest and the user,~~

~~wherein the first vertical distance is ascertained based on a height of the portable device relative to the ground, a vertical field of view of the camera, a pixel distance of the object of interest in the street view image and a predetermined proportional relationship between real distance and pixel distance,~~

~~wherein the second vertical distance is ascertained based on a corresponding pixel distance and a predetermined proportional relationship between pixel distance and real distance, or based on the corresponding pixel distance, pixel coordinates of the object of interest and a proportional relationship between real angle and pixel angle.~~

~~16. The system of any one of claims 12 to 15, wherein the accident prediction module is further configured to~~

~~ascertain at least one of a motion speed, motion direction and motion acceleration of the object of interest based on at least two street view images successively captured by the camera from which the object of interest is identified; and~~

~~predict a potential accident based on at least one of the relative distance and the relative angle, and at least one of the motion speed, motion direction and motion acceleration of the object of interest.~~

~~17. The system of any one of claims 11 to 16, the accident prediction module is further configured to ascertain a suggestion for avoiding the predicted potential accident based on at least one parameter used for prediction of the potential accident; and~~

~~the notification module is further configured to notify the user of the suggestion.~~

~~18~~15. The system of any one of claims ~~11~~10 to ~~16~~14, wherein the notification module is configured to notify the user of the predicted potential accident by

providing at least one of a visual notification, an audio notification and a kinaesthetic notification.

~~19~~16. The system of any one of claims ~~11~~ 10 to ~~16~~14, further comprising:

a face recognition module configured to estimate a face direction of the user relative to the portable device based on a facial image as captured by a foreground camera provided in the portable device,

wherein the accident prediction module is further configured to ascertain whether the user is aware of the object of interest based on the estimated face direction of the user relative to the portable device, and the at least one relative position parameter of the object of interest with respect to the user,

the notification module is further configured to notify the user of the predicted potential accident only if the user is ascertained not aware of the object of interest.

17. The system of claim 16, wherein the accident prediction module is further configured to ascertain whether the user is aware of the object of interest based on a pre-stored user's visual acuity.

~~20~~18. The system of any one of claims ~~11~~ 10 to ~~16~~17, wherein the portable device is a mobile computing and/or communication device, or a mobility aid device.

~~21~~19. A portable device comprising an accident avoidance system of any one of claims ~~11~~ 10 to ~~20~~17.