Claims:

1. A navigation system for integrating a plurality of positioning receivers to obtain a final position of a positioning device comprising the plurality of positioning receivers, the navigation system comprising:

an operation and control module; and

a unifying module,

said operation and control module being configured to receive a location data from each of said plurality of positioning receivers;

said unifying module, in response to receiving said location data of said plurality of positioning receivers from said operation and control module, is configured to:

normalise said location data of each of said plurality of positioning receivers;

determine an accuracy for each of said plurality of positioning receivers based on said location data of each of said plurality of positioning receivers with the following expression,

$$Acc\left(X_{\vec{x},p}^{i}\right) = \sigma_{\vec{x}}^{i}$$

where $p = 1, 2, 3$, $\vec{x} = (x_1, x_2, x_3)$ is the latitude, longitude and altitude of a point, $X_{\vec{x}}^{i} = (X_{\vec{x},1}^{i}, X_{\vec{x},2}^{i}, X_{\vec{x},3}^{i})$ is the latitude, longitude and altitude by the i^{th} positioning receiver and $\sigma_{\vec{x}}^{i}$ is the accuracy for respective positioning receivers, $Acc\left(X_{\vec{x},p}^{i}\right)$;

apply a normal distribution for each of said location data with the following expression to represent the location data in Gaussian distribution,

$$X_{\vec{x},p} \sim N\left(x_{\vec{x},p}, \sqrt{\sum_{i=1}^{n} \frac{\hat{\alpha}_{\vec{x}}^{i}}{\hat{\theta}^{2}}}\right)$$

where $x_{\vec{x},1,}x_{\vec{x},2,}x_{\vec{x},3,}$ are the calculated mean latitude, longitude and altitude, and $\sqrt{\sum_{i=1}^{n}\frac{\hat{\alpha}_{\vec{x}}^{i}}{\hat{\theta}^{2}}}$ is the width of the distribution for respective latitude, longitude and altitude,

determine said final position based on said accuracy of each of said location data with the following expression,

$$\sum_{i=1}^{n}\frac{\hat{\alpha}_{\vec{x}}^{i}}{\hat{\theta}^{2}} \leq \sigma_{\vec{x}}^{i,2}$$

for $i = 1, 2, \ldots, r$, $\hat{\alpha}_{\vec{x}}^{i} = \frac{1}{\sigma_{\vec{x}}^{i,2}}$, $\hat{\theta}^{2} = \sum_{i=1}^{n}\hat{\alpha}_{\vec{x}}^{i}$; and

transmit said final location to said operation and control module;

said operation and control module is configured to display said final position on a display of said navigation system in response to receiving said final location from said unifying module.

2. The navigation system according to claim 1 wherein said operation and control module is further configured to:

receive a subsequent location data from each of said plurality of positioning receivers;

comparing said location data with said subsequent location data;

determining said navigation system is stationary in response to said location data and said subsequent location data having a displacement equal to or less than a pre-determined value; and

determining said navigation system is not stationary in response to said location data and said subsequent location data having a displacement more than said pre-determined value.

3. The navigation system according to claim 2 wherein said operation and control module is configured to display said final position on said display of said navigation system in response to determining said navigation system is stationary.

4. The navigation system according to claim 2 further comprising an adaptive module and a predictive module, wherein said operation and control module is configured to transmit said final location to said adaptive module and said predictive module in response to said navigation system being determined to not stationary.

5. The navigation system according to claim 4 wherein said predictive module determines a first estimated next location based on motion estimation.

6. The navigation system according to claim 5 wherein said predictive module determines a second estimated next location based on behaviour modelling.

7. The navigation system according to claim 6 wherein said adaptive module determines a third estimated next location based on terrain and environment condition.

8. The navigation system according to claim 7 wherein said predictive module transmits said first and second estimated next locations to said unifying module and said adaptive module transmits said third estimated next locations to said unifying module.

9. The navigation system according to claim 8, wherein said unifying module is configured to perform the following steps in response to receiving said subsequent location data of said plurality of positioning receivers from said operation and control module, said

first and second estimated next location from said predictive module, and said third estimated location from said adaptive module:

normalising said location data of each of said plurality of positioning receivers, said first and second estimated next locations from said predictive module, and said third estimated location from said adaptive module;

determining an accuracy for each of said plurality of positioning receivers based on said location data of each of said plurality of positioning receivers, an accuracy for each of said first, second and third estimated next locations with the following expression,

$$Acc\left(X_{\vec{x},p}^{i}\right) = \sigma_{\vec{x}}^{i}$$

where $p = 1, 2, 3$, $\vec{x} = (x_1, x_2, x_3)$ is the latitude, longitude and altitude of a point, $X_{\vec{x}}^{i} = (X_{\vec{x},1}^{i}, X_{\vec{x},2}^{i}, X_{\vec{x},3}^{i})$ is the latitude, longitude and altitude by the i^{th} positioning receiver, first, second or third estimated location and $\sigma_{\vec{x}}^{i}$ is the accuracy for respective positioning receivers, $Acc\left(X_{\vec{x},p}^{i}\right)$;

applying a normal distribution for each of said subsequent location data, said first, second and third estimated locations with the following expression to represent each of said subsequent location data, said first, second and third estimated locations in Gaussian distribution,

$$X_{\vec{x},p} \sim N\left(x_{\vec{x},p}, \sqrt{\sum_{i=1}^{n} \frac{\hat{\alpha}_{\vec{x}}^{i}}{\hat{\theta}^{2}}}\right)$$

where ,$x_{\vec{x},1}, x_{\vec{x},2}, x_{\vec{x},3,}$ are the calculated mean latitude, longitude and altitude, and $\sqrt{\sum_{i=1}^{n} \frac{\hat{\alpha}_{\vec{x}}^{i}}{\hat{\theta}^{2}}}$ is the width of the distribution for respective latitude, longitude and altitude,

determining an updated final position based on said accuracy of each of said location data, said first, second and third estimated locations with the following expression,

$$\sum_{i=1}^{n} \frac{\hat{\alpha}_{\vec{x}}^{i}}{\hat{\theta}^{2}} \leq \sigma_{\vec{x}}^{i,2}$$

for $i = 1, 2, \ldots, r$, $\hat{\alpha}_{\vec{x}}^{i} = \frac{1}{\sigma_{\vec{x}}^{i,2}}$, $\hat{\theta}^{2} = \sum_{i=1}^{n} \hat{\alpha}_{\vec{x}}^{i}$; and

transmitting said updated final location to said operation and control module; and

said operation and control module configured to display said updated final position on said display of said navigation system in response to receiving said updated final location from said unifying module.

10. A method for integrating a plurality of positioning receivers to obtain a final position on a navigation system comprising a processor performing the steps of:

receiving a location data from each of said plurality of positioning receivers;

normalising said location data of each of said plurality of positioning receivers;

determining an accuracy for each of said plurality of positioning receivers based on said location data of each of said plurality of positioning receivers with the following expression,

$$Acc\left(X_{\vec{x},p}^{i}\right) = \sigma_{\vec{x}}^{i}$$

where $p = 1, 2, 3$, $\vec{x} = (x_1, x_2, x_3)$ is the latitude, longitude and altitude of a point, $X_{\vec{x}}^{i} = (X_{\vec{x},1}^{i}, X_{\vec{x},2}^{i}, X_{\vec{x},3}^{i})$ is the latitude, longitude and altitude by the i^{th} positioning receiver and $\sigma_{\vec{x}}^{i}$ is the accuracy for respective positioning receivers, $Acc\left(X_{\vec{x},p}^{i}\right)$;

applying a normal distribution for each of said location data with the following expression to represent said location data in Gaussian distribution,

$$X_{\vec{x},p} \sim N\left(x_{\vec{x},p}, \sqrt{\sum_{i=1}^{n} \frac{\hat{\alpha}_{\vec{x}}^{i}}{\hat{\theta}^{2}}}\right)$$

where ,$x_{\vec{x},1,}x_{\vec{x},2,}x_{\vec{x},3,}$ are the calculated mean latitude, longitude and altitude, and $\sqrt{\sum_{i=1}^{n}\frac{\hat{\alpha}_{\vec{x}}^{i}}{\hat{\theta}^{2}}}$ is the width of the distribution for respective latitude, longitude and altitude,

determining said final position based on said accuracy of each of said location data with the following expression,

$$\sum_{i=1}^{n}\frac{\hat{\alpha}_{\vec{x}}^{i}}{\hat{\theta}^{2}} \leq \sigma_{\vec{x}}^{i,2}$$

for $i = 1, 2, \dots, r$, $\hat{\alpha}_{\vec{x}}^{i} = \frac{1}{\sigma_{\vec{x}}^{i,2}}$, $\hat{\theta}^{2} = \sum_{i=1}^{n}\hat{\alpha}_{\vec{x}}^{i}$, wherein the determining said final position uses lagrange multiplier to minimize error of the final position relative to the received location data to obtain accuracy of location data; and

displaying said final position on a display of said navigation system.

11. The method according to claim 10 further comprising:

receiving a subsequent location data from each of said plurality of positioning receivers;

comparing said location data with said subsequent location data;

determining said navigation system is stationary in response to said location data and said subsequent location data having a displacement equal to or less than a pre-determined value; and

determining said navigation system is not stationary in response to said location data and said subsequent location data having a displacement more than said pre-determined value.

12. The method according to claim 11 further comprising:

repeating the step of displaying said final position on a display of said navigation system in response to determining said navigation system is stationary.

13. The method according to claim 11 further comprising:

determining a first estimated next location based on motion estimation in response to said navigation system is not stationary, said motion estimation comprises the following steps:

retrieving the speed of travel of the navigation system; and

estimating said first estimated next location based on said speed of travel and said final position.

14. The method according to claim 13 further comprising:

determining a second estimated next location based on behaviour modelling in response to said navigation system is not stationary, said behaviour modelling comprises the following steps:

retrieving a plurality of repetitive routes stored on a data storage of said navigation system;

comparing each of said plurality repetitive routes retrieved with said final position;

determining one of said plurality of repetitive routes in response to said one of said repetitive routes overlaps with said final position; and

estimating said second estimated next location based on said determined repetitive route.

15. The method according to claim 14 further comprising:

normalising said subsequent location data of each of said plurality of positioning receivers, said first and second estimated next locations;

determining an accuracy for each of said plurality of positioning receivers based on said location data of each of said plurality of positioning receivers, an accuracy for each of said first and second estimated next locations with the following expression,

$$Acc\left(X_{\vec{x},p}^{i}\right) = \sigma_{\vec{x}}^{i}$$

where $p = 1, 2, 3$, $\vec{x} = (x_1, x_2, x_3)$ is the latitude, longitude and altitude of a point, $X_{\vec{x}}^{i} = (X_{\vec{x},1}^{i}, X_{\vec{x},2}^{i}, X_{\vec{x},3}^{i})$ is the latitude, longitude and altitude by the i^{th} positioning receiver, first, or second estimated location and $\sigma_{\vec{x}}^{i}$ is the accuracy for respective positioning receivers, $Acc\left(X_{\vec{x},p}^{i}\right)$;

applying a normal distribution for each of said subsequent location data, said first and second estimated locations with the following expression to represent each of said subsequent location data, said first and second estimated locations in Gaussian distribution,

$$X_{\vec{x},p} \sim N\left(x_{\vec{x},p}, \sqrt{\sum_{i=1}^{n} \frac{\hat{\alpha}_{\vec{x}}^{i}}{\hat{\theta}^{2}}}\right)$$

where ,$x_{\vec{x},1}, x_{\vec{x},2}, x_{\vec{x},3},$ are the calculated mean latitude, longitude and altitude, and $\sqrt{\sum_{i=1}^{n} \frac{\hat{\alpha}_{\vec{x}}^{i}}{\hat{\theta}^{2}}}$ is the width of the distribution for respective latitude, longitude and altitude,

determining an updated final position based on said accuracy of each of said location data, said first and second estimated locations with the following expression,

$$\sum_{i=1}^{n} \frac{\hat{\alpha}_{\vec{x}}^{i}}{\hat{\theta}^{2}} \leq \sigma_{\vec{x}}^{i,2}$$

for $i = 1, 2, \ldots, r$, $\hat{\alpha}_{\vec{x}}^{i} = \frac{1}{\sigma_{\vec{x}}^{i,2}}$, $\hat{\theta}^{2} = \sum_{i=1}^{n} \hat{\alpha}_{\vec{x}}^{i}$; and

displaying said updated final location on said display of said navigation system.