CLAIMS

1- A method for localizing a robot in a localization plane associated with a bi-dimentional reference with two axis x and y comprising the following steps :

- determining (200) by odometry an estimation of the coordinates x1 and y1 of the robot in the localization plane as well as an estimation of its orientation $\theta 1$ relatively to a reference direction;
- determining (202) an estimation $\theta 2$ of the orientation of the robot by using a virtual compass which identifies at least two pairs of points of interest, first points of each pair being identified in a reference panorama and second point of each pair being identified in a query panorama, this step being initialized with $\theta 1$;
- determining (204) an estimation $\theta 3$ of the orientation of the robot by correlating parts of the reference panorama with parts of the query panorama and by identifying when that correlation is maximized, this step being initialized with one of the previous estimations of the orientation;
- determining (206) an estimation x4, y4 of the robot position in the localization ~~place~~plane by using an Iterative Closest Points technique, this step being initialized with x1 and y1, the iterative Closest Points techniques using a 3D point cloud as an input and preliminary hypotheses in orientation;
- determining the standard deviations σ_x1, $\sigma_$~~x2~~y1, $\sigma_\theta 1$ $\sigma_\theta 2$, $\sigma_\theta 3$, σ_x4, σ_y4 of the aforementioned estimations ;
- determining (220) Gaussian probability distributions G(x1), G(y1), $G(\theta 1)$, $G(\theta 2)$, $G(\theta 3)$, G(x4) and G(y4) of each available estimation using said standard deviations;

- determining (221) three global distributions GLOB(x), GLOB(y) and GLOB(θ) respectively for the coordinates along the x and y axis and for the orientation θ of the robot by combining said Gaussian probability distributions and determining a global estimation xg, yg of the coordinates of the robot in the localization plane as well as an global estimation θg of its orientation by applying the method of maximum likelihood to the global distributions.

2- The method according to claim 1, wherein the estimations provided by a given step are used by a subsequent step only if considered as reliable (201, 203, 205, 207).

3- The method according to claim 2, wherein an estimation is considered as reliable when its standard deviation is lower than a predefined threshold.

~~4- The method according to one of the previous claims, wherein the probability distributions G(x1), G(y1), G(θ1), G(θ2), G(θ3), G(x4) and G(y4) are Gaussian probability distributions.~~

~~5~~ 4- The method according to one of the previous claims, wherein the global probability distributions are derived as follow :

$$GLOB(x) = G(x1) \overset{*}{_} G(x4)$$

$$GLOB(y) = G(y1) \overset{*}{_} G(y4)$$

$$GLOB(\theta) = G(\theta 1) \overset{*}{_} G(\theta 2) \overset{*}{_} G(\theta 3)$$

~~6~~ 5. The method according to one of the previous claims, wherein θ3 value is estimated (204) based on an image template matching which is performed over two pyramids of images, a first pyramid of images (401) being generated from a single reference image (420) by downscaling it using several scaling steps, the second pyramid of images (400) being generated from a single query image (410) by downscaling it using several scaling steps.

~~7~~ 6. A humanoid robot (510) comprising at least:

- 2D RGB camera in order to construct a query panorama comprising at least one reference image;
- ~~At least one extractor of image;~~
- Processing capabilities adapted to implement the method for localizing said robot according to one of the preceding claims based on said query panorama.

~~8. The humanoid robot according to claim 7 comprising a 2D RGB camera in order to construct a query panorama comprising at least one reference image.~~

~~9~~ 7. The humanoid robot according to one of claims ~~7~~6 ~~or 8~~, wherein a 3D sensor is used to compute point clouds in order to implement the Iterative Closest Point Technique (206).

~~10~~ 8. A computer program product, stored on a computer readable medium comprising code means for causing a computer to implement the method of any one of the claims 1 to ~~6~~5.