

CLAIMS

1. A method for offloading one or more scalable robotic tasks in a mobile robotics
5 framework, wherein the method comprising:

receiving one or more scalable robotic tasks at a mobile robot of a cluster of
mobile robots, wherein the one or more scalable robotic tasks include building a map
of an unknown environment by using the mobile robot, navigating the environment
using the map and localizing the mobile robot on the map;

10 estimating the map of an unknown environment by using the mobile robot,
wherein at the same time the mobile robot localizes itself on the map;

analyzing, the one or more scalable robotic tasks for offloading to one or
more external resources based on computation, communication load and energy usage
of each scalable robotic task, wherein the analysis module priorities the one or more
15 scalable robotic tasks to minimize the execution time of the one or more scalable
robotic tasks of the mobile robot; and

offloading the one or more scalable robotic tasks to one or more external
resources based on the analysis, wherein the one or more external resources
comprising a mobile cloud and an edge of a network, and wherein offloading the one
20 or more scalable robotic tasks to the one or more external resources comprises
partitioning of simultaneous localization and mapping (SLAM) execution between the
mobile robot and the one or more external resources.

2. The method claimed in claim 1, wherein the simultaneous localization and mapping (SLAM) is partitioned to meet latency requirements, to achieve accurate robot localization and to build a map of the unknown environment.

3. The method claimed in claim 1, further comprising:

executing computation of the one or more offloaded scalable robotic tasks at one or more external resources comprising steps of:

sending the one or more scalable robotic tasks from the mobile robot to the edge and from the edge to the back-end cloud infrastructure;

sharing one or more location updates from the back-end cloud to the edge and from the edge to the robot; and

re-sending the one or more scalable robotic tasks after resampling from each of the external resources to the mobile robot.

4. A system for offloading one or more scalable robotic tasks in a mobile robotics framework, wherein the system comprising:

a cluster of mobile robots which are configured to connect with a back-end cloud infrastructure, wherein at a mobile robot of the cluster of mobile robots receives one or more scalable robotic tasks;

a memory with a set of instructions; and

at least a processor, wherein the processor is communicatively coupled with the memory, wherein the processor is configured to:

analyze the one or more scalable robotic tasks for offloading to one or more external resources based on computation, communication load and energy usage of each scalable robotic task; and

offloading the one or more scalable robotic tasks based on the analysis,
wherein offloading the one or more scalable robotic tasks to the one or more external
resources comprises partitioning of simultaneous localization and mapping (SLAM)
execution between the mobile robot and the one or more external resources and
5 wherein the simultaneous localization and mapping (SLAM) is partitioned to meet
latency requirements, to achieve accurate robot localization and to build a map of the
unknown environment.

5. The system claimed in claim 4, wherein the one or more scalable robotic tasks include
10 building a map of an unknown environment by using the mobile robot, navigating the
environment using the map and localizing the mobile robot on the map.

6. The system claimed in claim 4, wherein the system estimates a map of an unknown
environment by using the mobile robot, wherein at the same time the mobile robot
15 localizes itself on the map.

7. The system claimed in claim 4, wherein the processor priorities the one or more
scalable robotic tasks to minimize the execution time of the one or more scalable
robotic tasks of the mobile robot.

20 8. The system claimed in claim 4, wherein the system is configured to execute
computation of the one or more offloaded scalable robotic tasks at one or more external
resources comprising steps of:

sending the one or more scalable robotic tasks from the mobile robot to the
25 edge and from the edge to the back-end cloud infrastructure;

sharing one or more location updates from the back-end cloud to the edge and from the edge to the mobile robot; and

re-sending the one or more scalable robotic tasks after resampling from each of the external resources to the mobile robot.

5

9. A computer readable medium storing instructions for offloading one or more scalable robotic tasks in a mobile robotics framework, the instructions comprise:

receiving one or more scalable robotic tasks at a mobile robot of a cluster of mobile robots, wherein the one or more scalable robotic tasks include building a map of an unknown environment by using the mobile robot, navigating the environment using the map and localizing the mobile robot on the map;

10

estimating the map of an unknown environment by using the mobile robot, wherein at the same time the mobile robot localizes itself on the map;

15

analyzing, the one or more scalable robotic tasks for offloading to one or more external resources based on computation, communication load and energy usage of each scalable robotic task, wherein the analysis module priorities the one or more scalable robotic tasks to minimize the execution time of the one or more scalable robotic tasks of the mobile robot; and

20

offloading the one or more scalable robotic tasks to one or more external resources based on the analysis, wherein the one or more external resources comprising a mobile cloud and an edge of a network, and wherein offloading the one or more scalable robotic tasks to the one or more external resources comprises partitioning of simultaneous localization and mapping (SLAM) execution between the mobile robot and the one or more external resources.

25

10. The computer readable medium claimed in claim 9, wherein the computer-executable instruction further comprising:

partitioning the simultaneous localization and mapping (SLAM) to meet latency requirements, to achieve accurate robot localization and to build a map of the unknown environment.

11. The computer readable medium claimed in claim 9, wherein the computer-executable instruction further comprising:

executing computation of the one or more offloaded scalable robotic tasks at one or more external resources comprising steps of:

sending the one or more scalable robotic tasks from the mobile robot to the edge and from the edge to the back-end cloud infrastructure;

sharing one or more location updates from the back-end cloud to the edge and from the edge to the robot; and

re-sending the one or more scalable robotic tasks after resampling from each of the external resources to the mobile robot.