

Venn Diagram of types of navigation.

In order to emphasize the importance of the connection between the technology and its applications, a top-down approach is used for this survey. Thus, in this paper we will first review a few different application fields, after which a few examples of applications in these fields will be given. In the second part of the paper we will discuss the most used techniques for these applications and the algorithms behind these techniques.

1.1 Cleaning

Cite: [6] [1]

1.2 Swarm-Assisted Fire Fighting

Description: *Swarm-Assisted Fire Fighting makes interactive use of autonomous robots in fire emergency settings. These swarms of robots are capable of supporting and enhancing fire fighting operations co-operatively with each other and are coordinated by a single human supervisor.*[4, 5]

The techniques required for Swarm-Assisted Fire Fighting include, but are not limited to: *foraging, formation, mapping and exploration.*[4, 5]

Check more sources and verify techniques

The foraging techniques are needed in order to give the swarm the ability to search and locate victims. Formation is required in order for the swarm to navigate optimally and prevent conflicts in exploration. The mapping and exploration service are required to create a well constructed map of the explored area, such that the human and other robots are aware of their surroundings, even if it is impossible to get a visual due to reduced visibility caused by smoke.

1.3 Toxic Emission Source Discovery by Robotic-Swarms

Description: *Due to the ambiguity of this name, there have been many applications which have aimed to achieve this, from nuclear spills and oil spills to fire-origins. Much of this however is theoretical work, due to the fact that the price of these individual robots is still rather high.*

Some of the techniques used in toxic source discovery are: control, communication and distribution.[3]

1.4 Draft

Give an overview of real-world applications possible with Robotic Swarms. A list of possible applications:

1. Cleaning
2. Space Exploration (swarm of Mars rovers)
3. Rescue Missions
4. Treacherous Radioactive Survey
5. Survey and cleanup of Toxic Spills
6. Surveillance

Categories

- Region Covering
- Dangers
- Scaling in time
- Redundancy

2 Definitions from Literature

3 Definitions from Literature

3.1 Orientation

Location-based vs Range-based ...

3.2 Applications

List of applications.... idea for table: Orientation Table: LB RB LF RF

	Location-based	Location-free
Range-based	...	
Range-free	...	

3.2.1 Service Required

4 In-depth review of Services

... small introduction

4.1 Service 1

... Introduction to problem 1.

4.1.1 Comparison of Solutions

4.1.2 Remaining Problems

4.2 Service 2

... Introduction to problem 2.

4.2.1 Comparison of Solutions

4.2.2 Remaining Problems

4.3 Service 3

... Introduction to problem 3.

4.3.1 Comparison of Solutions

4.3.2 Remaining Problems

4.4 Service 4

... Introduction to problem 4.

4.4.1 Comparison of Solutions

4.4.2 Remaining Problems

5 Unsolved Problems

6 Discussion

References

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