

Motion Planning in Unknown Environments

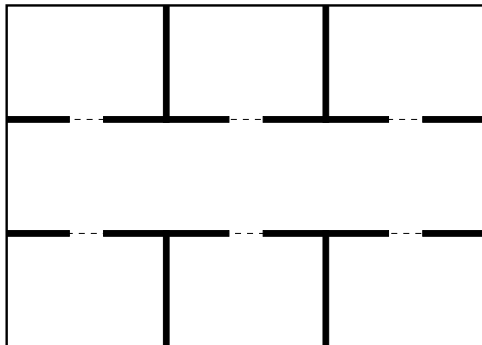
K. Grover¹, F. Barbosa², J. Tumova², J. Křetínský¹

¹Technical University of Munich, ²KTH Royal Institute of Technology

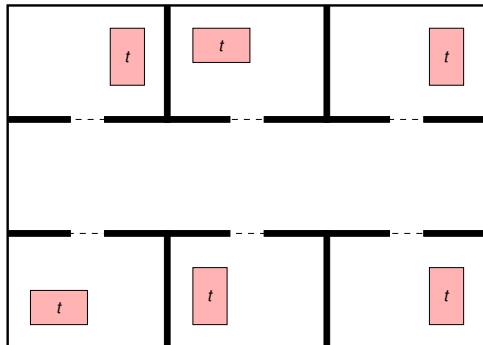
Highlights 2021



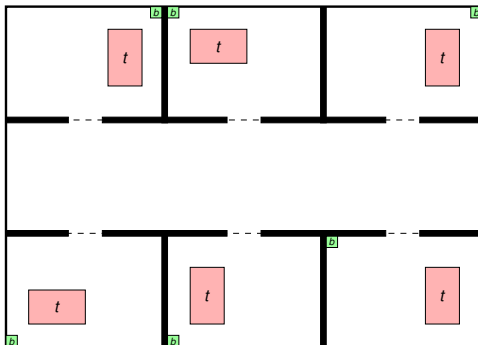
Motivation



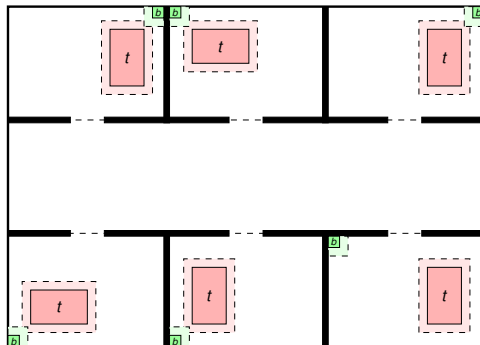
Motivation



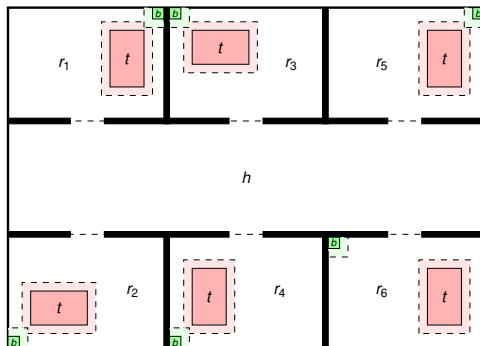
Motivation



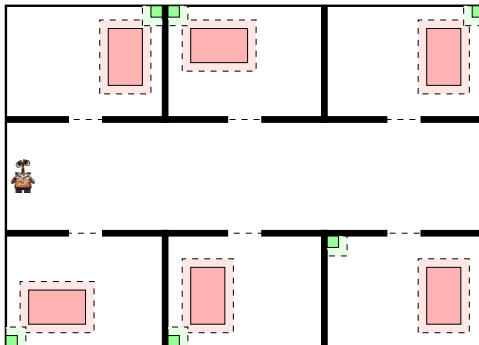
Motivation



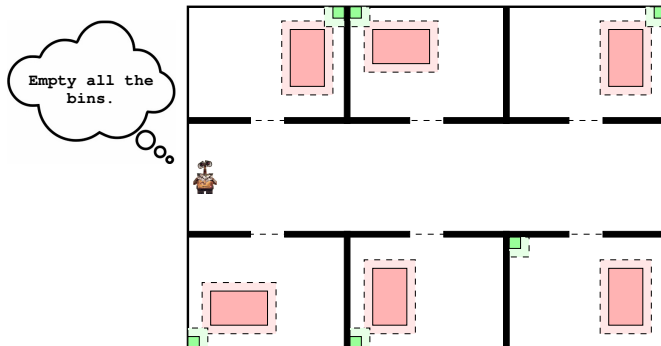
Motivation



Motivation



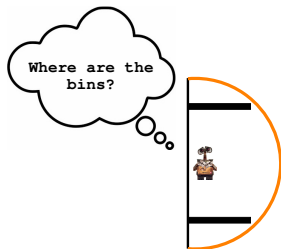
Motivation



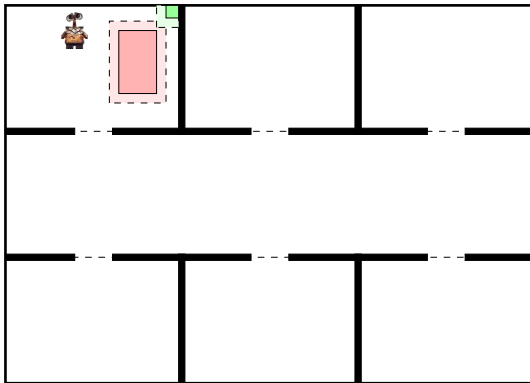
Motivation



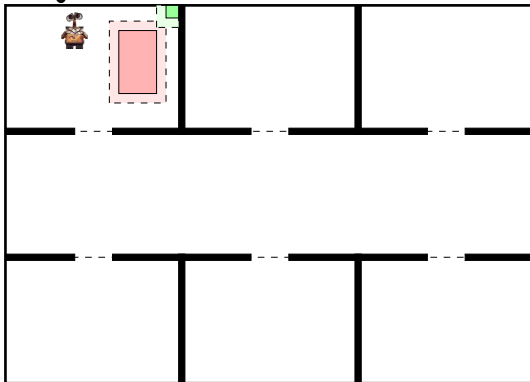
Motivation



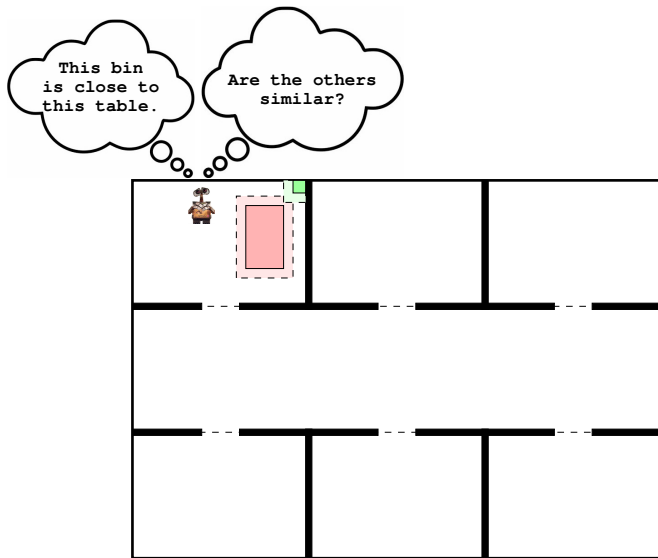
Observation



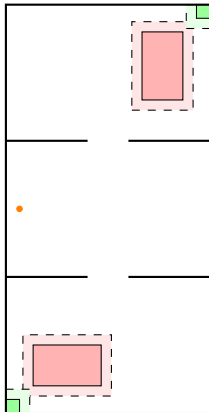
Observation



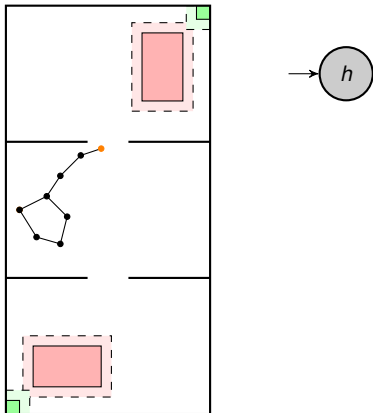
Observation



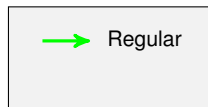
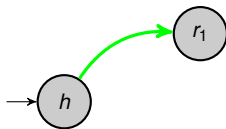
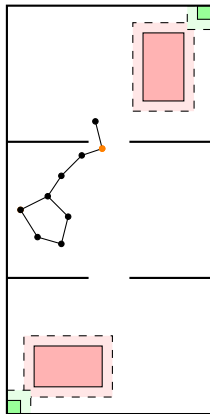
Our Solution



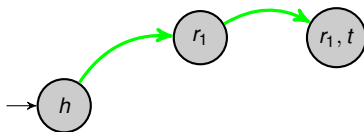
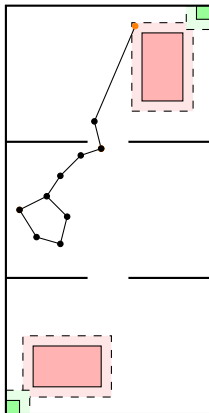
Our Solution



Our Solution

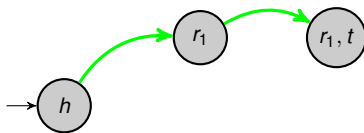
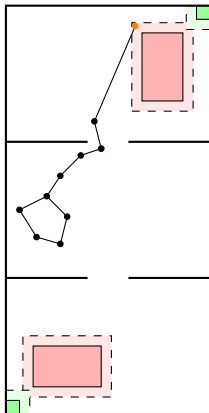


Our Solution



→ Regular

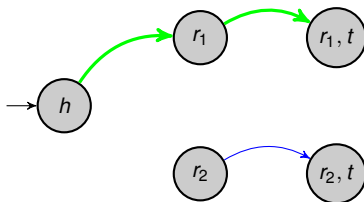
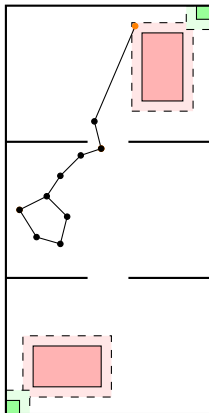
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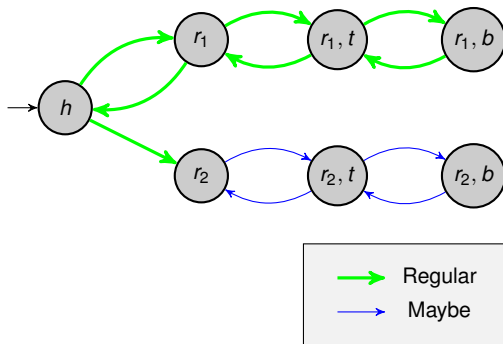
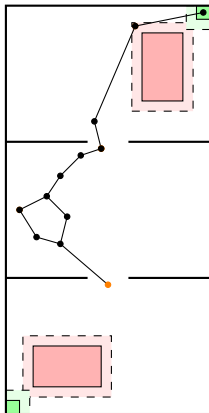
$Changes = \{t\}$

→ Regular

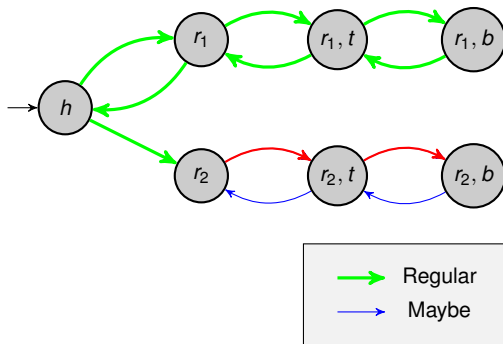
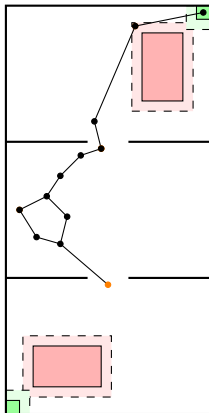
Our Solution


$$Changes = \{t\}$$

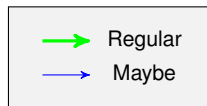
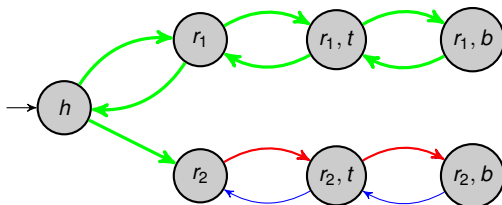
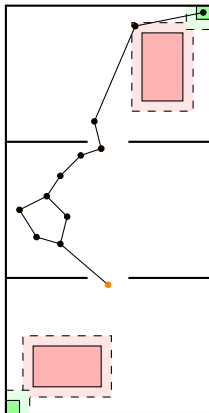

Our Solution



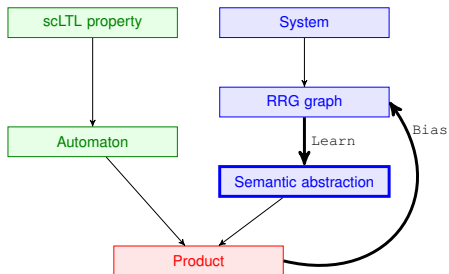
Our Solution



Our Solution



Our solution: An overview



Compared different approaches on 100 randomly generated office-like environments.

Office-like environments			
	Explore, then plan	Simultaneous	Simult. biased
Total length	79.1 (7.1)	62.9 (16.5)	32.3 (11.8)
Total Time	9.6 (2.5)	8.3 (3.2)	9.1 (2.4)
RRG size	2313.8 (550.9)	1868.7 (498.2)	1901.4 (301.2)

Conclusion

- We gave an algorithm to find a path satisfying an scLTL specification in an unknown environment.
- Introduced biasing based on the semantic relations present in the environment.
- Showed experimentally that this approach is much better than exploring the whole environment first and then planning.

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