

Quick Search

[Search History](#) **1 of 1****Proceedings, Annual Conference - Canadian Society for Civil Engineering**

Volume 3, 2009, Pages 1256-1265

ISBN: 978-

161567376-6

CODEN: PCSEE

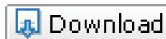
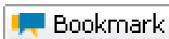




Document Type:

Conference Paper

Source Type:

Conference

Proceeding

[View references](#) (33)**Canadian Society for Civil Engineering Annual Conference 2009; St. Johns, NL; 27 May 2009 through 30 May 2009; Code 78615****Collaborative multi-agent system for supporting construction equipment**[Zhang, C.](#)<sup>a</sup> , [Hammad, A.](#)<sup>b</sup> , [AlBahnassi, H.](#)<sup>a</sup>  <sup>a</sup> Building, Civil and Environmental Engineering Department, Concordia University, Montreal, QC, Canada<sup>b</sup> Concordia Institute for Information Systems Engineering, Montreal, QC, Canada**Abstract**

This paper proposes collaborative multi-agent system for real-time planning and monitoring of construction sites. A multi-agent system framework is discussed to support construction equipment operators by using agents and field data capturing technologies. Data collected from sensors attached to the equipment, in addition to an up-to-date 3D model of the construction site, are processed by the multi-agent system to detect any possible collisions or other conflicts related to the operations of the equipments, and to generate a new plan in real time. Different algorithms for path planning, path re-planning, and centralized and distributed decision-making are investigated for using in the multi-agent system. The paper summarizes the undergoing research and a preliminary outdoor test for capturing field data.

**Language of Original Document****Cited By since 1996**



This article has been cited **0** times in Scopus.

Inform me when this document is cited in Scopus:

- [E-mail Alert](#)
-  [RSS](#)

**Find related documents**

In Scopus based on

-  [references](#)
-  [authors](#)

On the Web based on

- [title](#)
-  [authors](#)

References (33) [view in table layout](#)Select:  Page

1.  Deen Ali, M.S.A., Babu, N.R., Varghese, K.  
**Collision free path planning of cooperative crane manipulators using genetic algorithm**  
 (2005) *Journal of Computing in Civil Engineering*, 19 (2), pp. 182-193. [Cited 12 times](#).  
 doi: 10.1061/(ASCE)0887-3801(2005)19:2(182)  
Abstract + Refs View at Publisher  SFX
2.  Arizono, Noriyoshi, Shiota, Kenji, Uemura, Yutaka, Sasada, Takashi, Morikawa, Yasuhiko, Onoda, Masaru  
**Crane operation support system**  
 (1993) *R and D: Research and Development Kobe Steel Engineering Reports*, 43 (1), pp. 47-50. [Cited 3 times](#).  
Abstract + Refs  SFX
3.  Bilek, J., Hartmann, D.  
**Development of an Agent-based Workbench Supporting Collaborative Structural Design**  
 (2003) *Proceedings of the 20<sup>th</sup> CIB W78 Conference on IT in Construction*. [Cited 4 times](#).  
 New Zealand  
 SFX
4.  Brandt, D.  
**Comparison of A\* and RRT-Connect Motion Planning Techniques for Self-reconfiguration Planning**  
 (2006) *Proceedings of the 2006 IEEE/RSJ International Conference on Intelligent Robots and Systems*. [Cited 3 times](#).  
 China  
 SFX
5.  Choset, H., Lynch, K.M., Hutchinson, S., Kantor, G., Burgard, W., Kavraki, L.E., Thrun, S.  
**Principles of Robot Motion - Theory, Algorithms, and Implementations**. [Cited 248 times](#).  
 the MIT Press, Cambridge  
 SFX
6.  Cranimation  
 (2006)  
<http://www.cranimax.com>  
 SFX
7.  (2008)  
 Crane Accident Statistics  
<http://www.craneaccidents.com/stats.htm>  
 SFX
8.  (2008) *Commission de la santé et de la sécurité du travail*  
 CSST, du Québec  
<http://www.csst.qc.ca/portail/fr>



9.  Davis, B.R. and Sutton S.C. 2003. A Guide to Crane Safety. N.C. Department of Labor, Division of Occupational Safety and Health.
- 
10.  Durfee, E.H.  
**Distributed continual planning for unmanned ground vehicle teams**  
(1999) *AI Magazine*, 20 (4), pp. 55-61. [Cited 8 times](#).
- [Abstract + Refs](#)
11.  Ferber, J.  
(1999) *Multi-Agent System, An Introduction to Distributed Artificial Intelligence*. [Cited 804 times](#).  
Addison-Wesley, Pearson Education Limited
- 
12.  Ferguson, D.  
(2006) *Single Agent and Multi-agent Path Planning in Unknown and Dynamic Environments*. [Cited 2 times](#).  
Ph. D. Dissertation, The Robotics Institute, Carnegie Mellon University
- [View on Web](#)
13.  Ferguson, D., Kalra, N., Stentz, A.  
**Replanning with RRTs**  
(2006) *Proceedings - IEEE International Conference on Robotics and Automation*, 2006, art. no. 1641879, pp. 1243-1248. [Cited 8 times](#).  
ISBN: 0780395069; 978-078039506-0  
doi: 10.1109/ROBOT.2006.1641879
- [Abstract + Refs](#) [View at Publisher](#)
14.  Kamat, V.R., Martinez, J.C.  
**Visualizing simulated construction operations in 3D**  
(2001) *Journal of Computing in Civil Engineering*, 15 (4), pp. 329-327. [Cited 63 times](#).  
doi: 10.1061/(ASCE)0887-3801(2001)15:4(329)
- [Abstract + Refs](#) [View at Publisher](#)
15.  Kang, S.  
(2005) *Computer Planning and Simulation of Construction Erection Processes using Single or Multiple Cranes*  
Ph. D. dissertation, Department of Civil and Environmental Engineering, Stanford University
- 
16.  Kang, S., Miranda, E.  
**Planning and visualization for automated robotic crane erection processes in construction**  
(2006) *Automation in Construction*, 15 (4), pp. 398-414. [Cited 12 times](#).  
doi: 10.1016/j.autcon.2005.06.008
- [Abstract + Refs](#) [View at Publisher](#)
17.  Kim, K. and Paulson, Jr.B.C. 2003. Agent-based Compensatory Negotiation Methodology to Facilitate Distributed Coordination of Project Schedule Changes. *Journal of Computing in Civil*

Engineering, ASCE, 17(1): 10-18.



18.  Lee, J., Bernold, L.E.  
**Ubiquitous agent-based communication in construction**  
(2008) *Journal of Computing in Civil Engineering*, 22 (1), pp. 31-39. [Cited 3 times](#).  
doi: 10.1061/(ASCE)0887-3801(2008)22:1(31)  
[Abstract + Refs](#) [View at Publisher](#)
19.  (2007)  
LiftPlanner  
<http://www.liftplanner.net>
20.  (2008)  
[NIOSH, The National Institute for Occupational Safety and Health](#)
21.  Nwana, H.S., Ndumu, D.T.  
(1998) *A Brief Introduction to Software Agent Technology, Agent Technology, Foundations, Applications, and Markets*  
Springer
22.  Ren, Z., Anumba, C.J.  
**Learning in multi-agent systems: A case study of construction claims negotiation**  
(2002) *Advanced Engineering Informatics*, 16 (4), pp. 265-275. [Cited 15 times](#).  
doi: 10.1016/S1474-0346(03)00015-6  
[Abstract + Refs](#) [View at Publisher](#)
23.  Russell, S., Norvig, P.  
(2003) *Artificial Intelligence, A Modern Approach*. [Cited 3681 times](#).  
second edition, Prentice Hall
24.  Shapiro, H.I., Shapiro, J.P., Shapiro, L.K.  
(2000) *Cranes and Derricks*. [Cited 22 times](#).  
3rd Ed, McGraw-Hill, New York
25.  (2007)  
[Simlog](#)
26.  Sivakumar, P.L., Varghese, K., Ramesh Babu, N.  
**Automated path planning of cooperative crane lifts using heuristic search**  
(2003) *Journal of Computing in Civil Engineering*, 17 (3), pp. 197-207. [Cited 14 times](#).  
doi: 10.1061/(ASCE)0887-3801(2003)17:3(197)  
[Abstract + Refs](#) [View at Publisher](#)
27.  Spong, M.W., Lewis, F.L., Abdallah, C.T.  
**Robot Control - Dynamics, Motion Planning, and Analysis**

(1992) *IEEE Press, IEEE Control Systems Society*



28.  Wing, R.  
**RFID applications in construction and facilities management**  
(2006) *Electronic Journal of Information Technology in Construction*, 11, pp. 711-721. [Cited 7 times](#).  
[http://www.itcon.org/data/works/att/2006\\_50.content.06353.pdf](http://www.itcon.org/data/works/att/2006_50.content.06353.pdf)



29.  (2008)  
WorkSafeBC  
<http://worksafebc.com>



30.  Zaki, A.R., Mailhot, G.  
**Deck Reconstruction of Jacques Cartier Bridge Using Precast Prestressed High Performance Concrete Panels**  
(2003) *PCI Journal*, 48 (5), pp. 20-33. [Cited 10 times](#).



31.  Zhang, C., Hammad, A., Zayed, T.M., Wainer, G., Pang, H.  
**Cell-based representation and analysis of spatial resources in construction simulation**  
(2007) *Automation in Construction*, 16 (4), pp. 436-448. [Cited 3 times](#).  
doi: 10.1016/j.autcon.2006.07.009



32.  Zhang, C., Hammad, A., AlBahnassi, H.  
(2009) *Path Re-planning of Cranes Using Real-time Location System (Under reviewing for the 26th International Symposium on Automation & Robotics in Construction, ISARC2009)*



33.  Zhang, C., Hammad, A. and AlBahnassi, H. 2009b. Collaborative Multi-agent Systems for Construction Equipment Based on Real-time Field Data Capturing. *Next Generation Construction IT: Technology Foresight, Future Studies, Roadmapping, and Scenario Planning* (accepted).



Zhang, C.; Building, Civil and Environmental Engineering Department, Concordia University, Montreal, QC, Canada  
© Copyright 2010 Elsevier B.V., All rights reserved.

## Proceedings, Annual Conference - Canadian Society for Civil Engineering

Volume 3, 2009, Pages 1256-1265

[Search History](#) **1 of 1**

[Help](#)

[About Scopus](#) | [Contact us](#) | [Terms & Conditions](#) | [Privacy Policy](#)

Copyright © 2010 [Elsevier B.V.](#) All rights reserved. Scopus® is a registered trademark of Elsevier B.V.