Together with my PhD student Young Kim, I have explored how to deduce from spatially distributed moving point sets information relevant to situation awareness. A technology assessment of techniques from computational geometry has been augmented with new concepts responsive to customer requirements. The computed information has been presented in a pre-attentive manner to aid rapid comprehension.

In collaboration with Sami Kilic, visiting scientist, and Mete Sozen, Prof. of Civil Engr, I have completed a simulation study of the 9/11 Pentagon attack. Sozen is member of the Damage Assessment team organized by ASCE, and my work is included in the official report. See [http://www.cs.purdue.edu/homes/cmh/simulation](http://www.cs.purdue.edu/homes/cmh/simulation).

Additional findings in the more general setting of computational geometry include an investigation of the practical utility of kinetic data structures, a concept developed by Guibas and Basch at Stanford, and significant advances in geometric constraint solving, a key technology for positioning and moving geometric entities based on constraints. There has also been work on extracting geometric information from confocal microscopy images.
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Summary of Important Results
Together with my PhD student Young Kim, I have explored how to deduce from spatially distributed moving point sets information relevant to situation awareness. A technology assessment of techniques from computational geometry has been augmented with new concepts responsive to customer requirements. The computed information has been presented in a pre-attentive manner to aid rapid comprehension. The results have been reported in Kim’s PhD dissertation on line at http://www.cs.purdue.edu/homes/cmh/distribution/Theses/KimThesis.pdf. Preliminary findings have been reported at the 21st Army Science Conference at the University of Maryland (Baltimore County).

In collaboration with Sami Kilic, visiting scientist, and Mete Sozen, Professor of Civil Engr, I have completed a simulation study of the Pentagon 9/11 attack. Sozen is member of the Pentagon damage assessment team, organized by ASCE, and the work is included in their official report. The simulation results can be found at http://www.cs.purdue.edu/homes/cmh/simulation.

Additional findings in the more general setting of computational geometry include an investigation of the practical utility of kinetic data structures, a concept developed by Guibas and Basch at Stanford, and significant advances in geometric constraint solving, a key technology for positioning and moving geometric entities based on constraints. There has also been work on extracting geometric information from confocal microscopy images.

Publications
(a) Papers published in peer-reviewed journals
- “A Framework for Object Modeling,” CAD 31, 1999, 541--556; (with V. Kumar, D. Burns, and D. Dutta).
- “Robustness in Geometric Computations,” JCISE 1, 2001, 143--155.
- “Towards valid parametric CAD models,” CAD 33, 2001, 81--90; (with K.-J. Kim).

**(b) Papers published in non-peer-reviewed journals or in conference proceedings**

• “Making complex, multidimensional battlefield information intuitive.” *Proc. 21st Army Science Conference*, Univ. of Maryland, Baltimore, 1998; (with P. Emmerman, J. Walrath, R. Winkler, and Y. Kim).

**(c) Papers presented at meetings but not published in conference proceedings**

• “There are 12 Common Tangents to four Spheres,”

**(d) Manuscripts submitted, but not published**

• “Making Constraint Solvers more Usable,” (with B. Yuan and M. Sitharam).
• “Enhanced Battlefield Visualization for Situation Awareness,” with Young Kim.

**(e) Technical reports submitted to ARO**

None.

**Supported Personnel and Scientific Collaborations**

Young Kim, PhD 2000, presently completing a post-doc at UNC under Prof. Dinesh Manocha.
Gahyun Park, working on her PhD presently.
Ching-Shoei Chiang, visiting professor, now at Soochow University, Taiwan.
Dr. Sami Kilic, visiting scientist, Civil Engr, Purdue University.
Dr. Bo Yuan, visiting scientist, now at Solidworks, Inc, Boston.
J. Paul Robinson, Basic Med Sci, Purdue University.
Mete Sozen, Civil Engr, Purdue University.
Meera Sitharam, CS, Univ. of Florida.

**Inventions**

None

**Bibliography**

No additional citations.

**Technology Transfer**