Cooperative Autonomous Navigation and Intelligent Sensing (CANIS)

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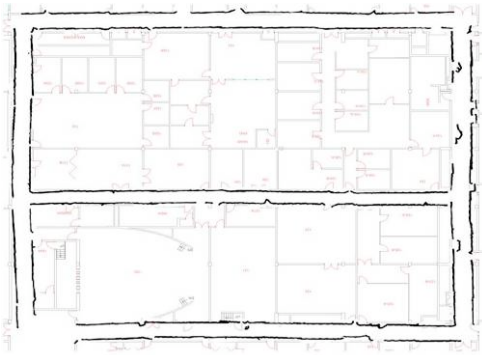
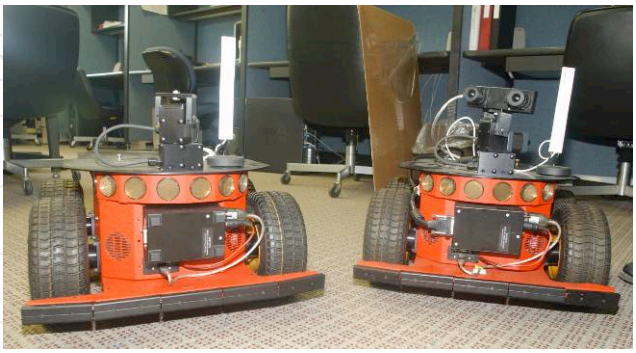
Sponsor: Air Force Research Laboratory (AFRL)





The Cooperative Autonomous Navigation and Intelligent Sensing (CANIS) research project involves incorporating cooperative control, 3-D mapping, path planning, and target tracking capabilities into autonomous robots to augment present integrated sensor and communication technologies. The specific objectives are the development of a 1) prototype radio-based navigational platform, 2) integration of navigational information, sensor data, and image data into a three-dimensional map with path planning, 3) software for automatic target recognition, and 4) cooperative autonomy by which one vehicle locates a target and others determine the optimal path to the target using the first vehicle's information. For complete functionality, these capabilities should extend into urban and physically constrained environments where GPS is unavailable, such as indoors or in caves. To achieve autonomous processing, the vehicles must be able to sense the environment, process data and work in a cooperative fashion. This behavior requires an adaptive multi-agent artificial intelligence that can produce accurate results in real-time. Likewise, since all communication will be wireless, the intelligence must be able to make rational decisions in the presence of noisy, inaccurate data or a communications black out.

For more information, see Owens, Kevin L., *Robot Mapping with Real-time Incremental Localization Using Expectation Maximization*, MS Thesis, Air Force Institute of Technology, March 2005.