

Physics Seminar

Friday, 3:30 pm April 29, 2011

Optimized Techniques For Geo-Fencing In Robotics Using Heron's Formula and The Cayley-Menger Determinant

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The goal of this research is to optimize the way mobile embedded processors compute, store and react to GPS data with intent of Geographical Fencing (Geo-Fencing). The current method of Point-in-Polygon processing is very computationally intensive, especially as the cardinality of the dataset begins to grow. In robotics it is important to know if you are heading towards that virtual "fence" by determining your distance from the fence and making physical adjustments in preparation to avoid crossing the virtual geo-fence. Distance triangulation techniques require a large number of floating point calculations when using GPS data. To optimize this technique in source code for embedded mobile processors, a derivative of Heron's Formula known as the Cayley-Menger Determinant will be used. Using the Cayley-Menger Determinant to nearly eliminate floating point calculations results in minimizing the amount of processing power and overall energy consumption needed to accomplish the task of geo-fencing in embedded processors. These results give way for significant reduction in cost and increase in battery longevity for standalone proprietary geo-fencing devices.

Physics Graduation Party will start immediately after the seminar with refreshments.

Location: Ross 0220 (Ground level of Ross Hall)