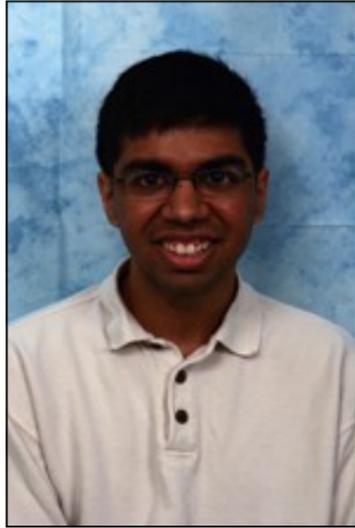# Field Robotics Center Seminar Series

Tuesday, April 26, 2011 GHC 2109 11am- noon

Pizza will be served.

Nisarg Kothari
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Robust Indoor Localization on a Cell Phone

Abstract

GPS capabilities have revolutionized outdoor navigation in the last decade, but similar systems for indoor environments have yet to see mass consumer adoption. Potential applications for such a system include giving people directions in airports and malls and providing the visually impaired with more freedom and autonomy. To be truly useful to people in everyday life, an indoor localization platform would have to be inexpensive and convenient for the user. Cell phones provide such a platform. Modern smartphones have a vast array of built-in sensors that can be combined to provide a reliable estimate of location even in GPS-denied indoor environments.

In this talk, I will present an indoor localization system based on an Android Nexus S smartphone. The system combines multiple sensors to provide a more accurate estimation of position even in the presence of one or more sensor failures. Accelerometer, magnetometer, and gyroscope sensors are fused to perform dead reckoning. Wifi signal strength fingerprinting techniques are also used to initialize the system and bound the position error over time. These techniques are combined with a map of the environment using a particle filter, yielding an estimate that takes into account all available sources of information. The design of the localization system must be able to handle magnetic anomalies, gyroscopic drift, sparse calibration data, and other problems which are unavoidable in real applications. I will discuss how these challenges were addressed and show empirical performance results from two different indoor environments.

Speaker Bio

Nisarg Kothari is a Masters student at the Robotics Institute, advised by Bernardine Dias. He has a B.S. in Electrical and Computer Engineering, also from Carnegie Mellon. He is interested in exploiting the latent capabilities in modern smartphones, and will be joining Google Inc. as a software engineer upon graduation.

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