e-DOTS: AN INDOOR TRACKING SOLUTION

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Accurately tracking an object as its moves in a large indoor area is attractive due to its applicability to a wide range of domains. For example, a typical healthcare setup may benefit from tracking their assets, such as specialized equipment, in real-time and thus optimize their usage. Existing techniques, such as the GPS, that focus on outdoor tracking do not provide accurate estimations of location within the confines of an indoor setup. Prevalent approaches that attempt to provide the ability to perform indoor tracking primarily focus on a homogenous type of sensor when providing an estimation of an object's location. Such a homogeneous view is neither beneficial nor sufficient due to specific characteristics of single type of sensors. This research aims to create a distributed tracking system composed out of many different kinds of inexpensive and off-the-shelf sensors to address this challenge. Specifically, the proposed system, called Enhanced Distributed Object Tracking System (e-DOTS), will incorporate sensors such as web cameras, publically available wireless access points, and inexpensive RFID tracking tags to achieve accurate tracking over a large indoor area in real-time. As an object, in addition to moving in a known indoor setup, may move through an unknown confined area, the e-DOTS needs to incorporate opportunistic discovery of available sensors, select a proper subset of them, and fuse their readings in real-time to achieve an accurate estimation of the current position of that object. A preliminary prototype of e-DOTS has been created and experimented with. The results of these validations are promising and suggest the possibility of e-DOTS achieving its desired goals. Further research is aimed at incorporating different kinds of sensors, different fusion techniques (e.g., Federated Kalman Filtering) and various discovery mechanisms to improve the tracking accuracy and the associated response time.