Heuristic Based Sensor Ranking Algorithm for Indoor Tracking Applications

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Location awareness in an indoor setup is an important function necessary in many application domains such as asset management, critical care, and augmented reality. Location awareness, or tracking, of an object within an indoor setting requires a high degree of accuracy, as room-to-room location may be very important. With the current proliferation of smart devices, with often a multitude of built-in sensors, and inexpensive sensors it is now possible to build a network of sensors, for the purpose of tracking, within an indoor environment without the high cost of installing the needed tracking infrastructure. In an effort to increase accuracy, as well as coverage area, various different sensors may be used in the tracking of an object. In this heterogeneous tracking situation, it is important for the tracking infrastructure to quickly and accurately decide which, all or a subset, of available sensors to use. Challenges related to heterogeneous data fusion and clock synchronization, must be addressed in order to provide accurate location estimates. We have proposed a heuristic based ranking algorithm to address these challenges. In this algorithm, the individual sensors are ranked based upon their quality of service (QoS) attributes and the resulting ranking is used by a filtering service during the sensor selection process. This information is provided to the filtering service when a sensor joins the tracking infrastructure and is subsequently only updated during idle periods, thereby, there avoiding additional overhead. We have implemented this algorithm into the existing prototypical Enhanced Distributed Object Tracking System or e-DOTS. e-DOTS has been extensively experimented with and the results of these experimentation validate the hypothesis that accurate indoor tracking can be achieved using a heterogeneous ensemble of cheap and mobile sensors. Our current investigation involves the incorporation of trust associated with sensors and deploying e-DOTS in a typical healthcare setup.

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