

Characteristics of Indoor Geomagnetism and Geomagnetic based Indoor Localization

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ABSTRACT

One of approaches to estimate the position of targets inside of buildings where the GPS signal is insufficient to be used is to use geomagnetic value that is sensed by magnetometer. To estimate the target's position using geomagnetic value, the algorithm should measure the magnetic field on its own position using a magnetometer embedded in smartphones and compare the sensor measurement with the magnetic map. The estimated position is calculated by a stochastic system based on particle filter algorithm. For this approach, geomagnetic map in the buildings should be generated in advance, but the distribution of the geomagnetic value depends on the elements of the buildings, especially steel elements. This paper proposes how structure of the buildings effect to the disturbance of geomagnetic value that can be used for the estimation approach. How to build the maps is introduced by several papers, but the researchers try to find better and faster way to do it. This paper focuses on maps that are built from various types of buildings. So, we tried to obtain the map data from as many places in different buildings as possible for the research. Also, we figured out that measurement height is one of the critical effects to the sensed geomagnetic field, so the maps are generated from various heights. Then this paper tries to analyze the relationship between the building structures and distribution of the geomagnetic field in order to use the map for the position estimation algorithm. At last, the maps are compared with each other by simulation test.

KEYWORDS: geomagnetic, localization, particle filter