

Indoor localization using NFC and mobile sensor data corrected using neural net*

Tibor Tajti^a, Gábor Geda^a, András Perjési^a, Péter Magyar^a,
Tamás Balla^a, Attila Szívós^a, Tamás Gregus^a

^aEszterházy Károly College

{tajti,gedag,andris,mapee}@aries.ektf.hu

Abstract

We are researching the RFID/NFC technology combined with other possibilities available in mobile phones. We are trying to use mobile sensors and NFC together for indoor positioning. Localization and navigation is a fast emerging area, we are using it when driving our car or to find a shop or other target in near. It is possible with the help of the GPS (Global Positioning System), but it is not working indoors. Fortunately mobile phones have many possibilities which can be used for localization in such environments. They can measure signal strengths of WIFI or Bluetooth stations. Some indoor localization projects are based on that method. In our project we try to get the best result from the possibilities of several sensors available in mobile phone. Such sensors are: magnetometer, gravitation, acceleration and gyroscope sensors. There are virtual sensors (eg.:linear acceleration) which are computed values derived from the other ones. The sensors provide enough information to compute the direction, speed and then the position, but their values are noisy, so the cumulated error grows with the time. Fortunately we have some possibilities to deal with the error. We can combine redundant information to reduce the error, and we can use reference positions thanks to the NFC (Near Field Communication) technology. More and more mobile phones have NFC chips, which are easily able to get information from NFC tags. Such NFC tags are not expensive, they can be placed on the walls and querying them takes very little time. QR (Quick Response) code can be a backup solution, which can be queried using the mobile phones camera. NFC or QR reference positions are very simple and effective solution to get the exact location when the computed position's error is too large. Other good possibility of the mobile phones is their communication and computation ability. The data collected from the sensors can be stored in a database where more intelligent algorithms can be tried in addition to the simple computations described

*Supported by: FutureRFID Development possibilities in the RFID / NFC technology
TÁMOP-4.2.2.C-11/1/KONV-2012-0014

above. We try to teach neural network algorithm to give good outputs from the sensor data including the virtual sensors and our computed values.

Keywords: NFC, hybrid, mobile, localization, neural network

MSC: 68N01, 68T05