

Indoor Parking Facilities Management Based on RFID CoO Positioning in Combination with Wi-Fi and UWB

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SUMMARY

The advantage for the development of a positioning solution for indoor parking facilities management relates to the fixed geometric constraints imposed by man-made structures, the minimal weather influences and the low vehicle dynamics. Furthermore, easy access to commodities such as electrical supply and internet can facilitate further the use of alternative localization procedures. Notwithstanding, other factors, including the severe multipath conditions and the high attenuation and signal scattering effects, as well as the extended non-line-of-sight (NLoS) conditions make the positioning problem a difficult and case dependent task. This study offers a low-cost positioning solution to the problem relying primarily on the RFID Cell of Origin (CoO) technique resulting in to a discrete point vehicle trajectory. Then, Wi-Fi Receiver Signal Strength (RSS) observations act as a supplement to fill in the gaps and refine the final continuous vehicle trajectory. Also, this study introduces the concept of using UWB technology as a means of supporting the RFID/Wi-Fi solution through dedicated check points of higher positioning accuracy given its high accuracy potential and the continuously decreasing system cost. A number of tests have been undertaken to examine the validity and the potential of this approach and preliminary results of the analyses are presented. It could be proven that all major user requirements (i.e., positioning accuracy, availability, continuity) are being met.

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