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Abstract

Over the years many techniques have been developed for indoor tracking. However, most of these techniques have limitations such as requiring specific infrastructure, electromagnetic interference and long response time. Most of the times, these limitations affect the accuracy of the techniques and make them not suitable for certain applications. For that reason, new ideas have been proposed with the intention of eliminating these restrictions and providing accurate indoor localization. Visible Light Communication (VLC) - based indoor localization has many advantages that solve many of these issues; however, the proposed methods don't have a back channel from positioning devices to landmarks, which is an important part for Real Time Localization Systems. Based on the fact that LEDs can be used as signals transmitters and sensors such us photodiodes can collect the intensity of light, this research proposes to use visible light and a retroreflector as a new system to solve the problem of real time indoor localization. The basic idea is to collect the Received Signal Strengths (RSS) of the light that is being retroreflected to the photodiode and use them to approximate the distance between the LED light panel and the retroreflector, and trilateration is then used to obtain the approximate coordinates of the object that needs to be located. Our main goal is to prove that this system can provide a low localization error and therefore can be applied to different real life applications with good results. Different set of experiments have been conducted using this technique. The objective was to determine the range in which indoor localization can be applied effectively and it was successfully proved that even with vertical distances of 1.5 meters between the retroreflector and the photodiode, localization is still possible. Future research will concentrate on a simulation of the system using a Ray-Tracing Software to compare the theoretical and experimental values in order to prove its overall efficiency.