

Received Signal Strength Indicator Based Localization of Bluetooth Devices Using Trilateration: An Improved Method for the Visually Impaired People

Authors : Muhammad Irfan Aziz, Thomas Owens, Uzair Khaleeq uz Zaman

Abstract : The instantaneous and spatial localization for visually impaired people in dynamically changing environments with unexpected hazards and obstacles, is the most demanding and challenging issue faced by the navigation systems today. Since Bluetooth cannot utilize techniques like Time Difference of Arrival (TDOA) and Time of Arrival (TOA), it uses received signal strength indicator (RSSI) to measure Receive Signal Strength (RSS). The measurements using RSSI can be improved significantly by improving the existing methodologies related to RSSI. Therefore, the current paper focuses on proposing an improved method using trilateration for localization of Bluetooth devices for visually impaired people. To validate the method, class 2 Bluetooth devices were used along with the development of a software. Experiments were then conducted to obtain surface plots that showed the signal interferences and other environmental effects. Finally, the results obtained show the surface plots for all Bluetooth modules used along with the strong and weak points depicted as per the color codes in red, yellow and blue. It was concluded that the suggested improved method of measuring RSS using trilateration helped to not only measure signal strength affectively but also highlighted how the signal strength can be influenced by atmospheric conditions such as noise, reflections, etc.

Keywords : Bluetooth, indoor/outdoor localization, received signal strength indicator, visually impaired

Conference Title : ICWMNA 2019 : International Conference on Wireless, Mobile Network and Applications

Conference Location : Dubai, United Arab Emirates

Conference Dates : March 21-22, 2019