

***DEVICE-FREE INDOOR LOCALIZATION SYSTEM MENGGUNAKAN
PARAMETER RECEIVED SIGNAL STRENGTH INDICATOR (RSSI) DAN
ILUMINANSI BERBASIS WIRELESS SENSOR NETWORKS (WSN)***

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INTISARI

Kebutuhan akan sistem *indoor localization* meningkat seiring dengan berkembangnya teknologi *Internet of Things (IoT)*. Saat ini kebanyakan penelitian tentang *indoor localization* mengacu kepada *device-based indoor localization system*. Sistem ini tidak cocok untuk beberapa aplikasi yang mengedepankan fleksibilitas tinggi dan biaya yang murah. Sementara itu, *device-free indoor localization* memiliki tantangan, salah satunya adalah cenderung rentan terhadap efek *multipath interference*. Oleh karena itu pada penelitian ini diusulkan sistem *device-free localization* berbasis RSSI dan iluminasi. Pada sistem ini tidak perlu adanya alat khusus yang harus dipasangkan pada target yang akan diketahui posisinya. Penentuan lokasi dilakukan dengan melihat perbedaan nilai parameter pengukuran di tiap *wireless sensor nodes* pada saat ruangan kosong dengan saat target berada di berbagai titik di dalam ruangan. Metode *fingerprinting* yang dibantu dengan model *deep learning Convolutional Neural Networks* sebagai *pattern matching algorithm*. Penggabungan parameter RSSI dan iluminasi dapat meningkatkan performa sistem *device-free localization* sebesar 33 %, Dengan nilai *Mean Square Error* yang didapat sebesar 1,13 m. Lalu sistem *device-free localization* yang diusulkan ini, hampir dapat menyamai hasil prediksi yang dihasilkan dengan sistem *device-based localization* dengan selisih nilai *Mean Square Error* sebesar 0,08 m

Kata kunci : *Device-free localization, RSSI, Visible Light Localization, Wireless Sensor Networks, Convolutional Neural Networks*

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DEVICE-FREE INDOOR LOCALIZATION SYSTEM USING RECEIVED SIGNAL STRENGTH INDICATOR (RSSI) DAN ILLUMINATION BASED ON WIRELESS SENSOR NETWORKS (WSN)

by

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ABSTRACT

The demand for indoor localization systems has been increasing, and the development of the Internet of Things (IoT) technology. However, most research on indoor localization currently refers more to device-based, which is not suitable for some applications where high flexibility and low cost are prioritized. However, because the device-free localization system tends to be vulnerable to multipath interference, this study proposed a device-free localization system based on RSSI and Illumination. In this device-free localization system, the target whose position will be known does not need to be installed with special tools. Determining the location is done by looking at the difference in the value of the measurement parameters at each wireless sensor node when the room is empty and targets at various points in the room. The fingerprinting method is assisted by the deep learning model of Convolutional Neural Networks as the pattern matching algorithm. The combination of RSSI and Illumination parameters can improve the device-free localization system's performance by 33%, with a Mean Square Error value of 1.13 m. Then the proposed device-free localization system can almost match the predicted results generated by the device-based localization system with a difference in the Mean Square Error value of 0.08 m

Keywords : *Device-free localization, RSSI, Visible Light Localization, Wireless Sensor Networks, Convolutional Neural Networks*

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