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Hakim, G.P.N.[a b] , Hadi Habaebi, M.[a] , Elsheikh, E.A.A.[c] , Suliman, F.M.[c] , Islam, M.R.[a] , Yusoff, S.H.B.[a] , Adesta, E.Y.T.[d] , Anzum, R.[a]

Levenberg Marquardt artificial neural network model for self-organising networks implementation in wireless sensor network

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[a] Department of Electrical and Computer Engineering, Kulliyyah of Engineering (KOE), International Islamic University Malaysia (IIUM), Selangor, Malaysia
[b] Department of Electrical Engineering, Faculty of Engineering, Universitas Mercu Buana, Jakarta, Indonesia
[c] Department of Electrical Engineering, College of Engineering, King Khalid University (KKU), Abha, Saudi Arabia
[d] Department of Industrial Engineering Safety and Health, Faculty of Engineering, Universitas Indo Global Mandiri (UIGM), Palembang, Indonesia

Abstract
The Wireless Sensor Network needs to become a dynamic and adaptive network to conserve energy stored in the wireless sensor network node battery. This dynamic and adaptive network sometimes are called SON (Self Organizing Network). Several SON concepts have been developed such as routing, clustering, intrusion detection, and other. Although several SON concepts already exist, however, there is no concept for SON in dynamic radio configuration. Therefore, the authors' contribution to this field would be proposing a dynamic and adaptive Wireless Sensor Network node radio configuration. The significance of their work lies in the modelling of the SON network that builds based on our measurement in the real-world jungle environment. The authors propose input parameters such as SNR, the distance between the transmitter and receiver, and frequency as the static parameter. For adaptive parameters, we propose bandwidth, spreading factor, and its most important parameter such as power for data transmission. Using the Levenberg Marquardt Artificial Neural Network (LM-ANN) self-organise Network model, power reduction and optimisation from 20 dBm to 14.9 dBm for SNR 3, to 11.5 dBm for SNR 6, and to 12.9 dBm for SNR 9 all within a 100-m range can be achieved. With this result, the authors conclude that we can use LM-ANN for the wireless sensor network SON model in the jungle environment. © 2023 The Authors. IET Wireless Sensor Systems published by John Wiley & Sons Ltd on behalf of The Institution of Engineering and Technology.

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intelligent control; radiowave propagation; RSSI; self-adjusting systems; wireless sensor network

Index Keywords
Backpropagation, Intrusion detection, Neural networks, Radio transmission; Adaptive networks, Dynamic network, Levenberg-Marquardt Artificial Neural Networks, Network models, Radio configurations, Radiowaves propagation, RSSI, Self-adjusting systems, Self-organising, Sensor network nodes; Sensor nodes

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Correspondence Address
Hadi Habaebi M.; Department of Electrical and Computer Engineering, Selangor, Malaysia; email: habaebi@iium.edu.my

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