Energy-efficient adaptive data compression in wireless sensor networks

Jonathan Gana Kolo*

Department of Electrical and Electronics Engineering,
Federal University of Technology,
PMB 65 Minna, Niger State, Nigeria
Email: jgkolo@gmail.com
*Corresponding author

Li-Minn Ang

School of Computing and Mathematics,
Charles Sturt University,
NSW 2650, Australia
Email: lang@csu.edu.au

Kah Phooi Seng

School of Engineering,
Edith Cowan University,
Joondalup, WA 6027, Australia
Email: k.seng@ecu.edu.au

S. Anandan Shanmugam
and David Wee Gin Lim

Department of Electrical and Electronics Engineering,
The University of Nottingham Malaysia Campus,
Jalan Broga, 43500 Semenyih,
Selangor Darul Ehsan, Malaysia
Email: Sanandan.Shanmugam@nottingham.edu.my
Email: Lim.Wee-Gin@nottingham.edu.my

Abstract: In wireless sensor networks (WSNs), a large number of tiny, inexpensive and computable sensor nodes are usually deployed randomly to monitor one or more physical phenomena. The sensor nodes collect and process the sensed data and send the data to the sink wirelessly. Energy consumption is however a serious problem affecting WSNs lifetime. Radio communication is often the major cause of energy consumption in wireless sensor nodes. Thus, applying data compression before transmission can significantly help in reducing the total power consumption of a sensor node. In this paper, we propose an efficient and robust adaptive data compression scheme (ADCS). The proposed scheme independently compresses each block of source data losslessly or lossily on local nodes based on the given application. Simulation results show the merits of the proposed compression scheme in comparison with other recently proposed compression algorithms for WSNs including S-LZW, LEC, MPDC, Two-modal GPC and LTC.

Biographical notes: Jonathan Gana Kolo received his PhD from the University of Nottingham (Malaysia Campus) in 2013. He is a Senior Lecturer at the Department of Electrical and Electronic Engineering, Federal University of Technology Minna, Nigeria. His research interests are in the fields of signal processing, data compression, embedded systems and wireless sensor networks. He has published research papers at national and international journals, conference proceedings as well as chapters of books.