

Composite Fault Diagnosis Protocols for Wireless Sensor Networks

Speaker: Rakesh Ranjan Swain, Assistant Professor at the Department of Computer Science and Engineering, Institute of Technical Education and Research (ITER), Bhubaneswar, India

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Abstract: Wireless sensor networks (WSNs) are spatially distributed tool in supporting various real-world applications. However, due to the harsh and human inaccessible environment, the network may behave unexpectedly, which in turn may lead to network failures. The undesirable behaviors of sensor nodes affect the overall efficiency and quality of service (QoS) of the intended purpose of deployment. Therefore, fault detection and diagnosis need to be handled carefully with various types of faulty nodes in the network. The fault detection, identification, and isolation could increase the assurance of quality, reliability, and safety of systems. There are situations in which faults can induce cuts (island of nodes) in the network. However, the problem of detecting cuts in the network is yet another challenging problem to solve. Further, there are serious constraints on the resources available for a WSN to function. Given such strict situations, it is essential to build highly accurate and low-cost automated fault diagnosis protocols for the sensor network. The real motivation for WSN modeling stems from the need for intelligent fault detection in complex sensory systems. In this seminar, the above issues and challenges are addressed, mainly focusing on developing the fault diagnosis protocols for WSNs to diagnose composite faulty nodes, faulty links, and cut nodes in the sensor network. Simulations and experimental works are conducted to evaluate the performance of the proposed fault diagnosis protocols. Experimental implementation and results show that it is feasible to implement such protocols in the real-world application of WSNs.

Bio: Rakesh Ranjan Swain received his Ph.D. in 2019 from the Department of Computer Science and Engineering, National Institute of Technology (NIT), Rourkela, India. He received his M.Tech. degree in 2014 from the Department of Computer Science and Engineering, VSSUT Burla University, India. He has received his B.Tech. degree in 2010 from Department of Information Technology, BPUT University, India. He is currently an Assistant Professor in the Department of Computer Science and Engineering, Institute of Technical Education and Research (ITER), Siksha 'O' Anusandhan (Deemed to be University), Bhubaneswar, India. He has authored 25 research articles in reputed journals and international conferences. His research interests include Wireless Sensor Networks, Internet of Things, Machine Learning Applications, and Fault Diagnosis in Wireless Sensor Networks.