

Oakland university student discovers new method to detect and prevent jamming in wireless sensor networks

The Oakland University and School of Engineering and Computer Science communities are invited to attend Waleed Aldosari's defense of his Ph.D. dissertation. Seating is limited. RSVP with Katie Loodeen at loodeen@oakland.edu.

NEW METHODOLOGY USING SIGNAL TO NOISE AND KALMAN FILTER FOR DETECTING AND PREVENTING JAMMING IN WIRELESS SENSOR NETWORKS

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In this dissertation, we proposed a jammer localization system which consists of four levels. First, we proposed an algorithm for boundary nodes detection during a jamming attack. The jamming power received by the tracker is mixed by the original signal and not being pure and have considerable noise due to signal path loss and shadowing. Therefore, The Linear Kalman filter (KF) is utilized to filtered out the noise and estimate the jammer's power by each selected boundary node. Third, in order to improve the localization accuracy, we proposed Distance Ratio (DR) based on Signal to Noise Ratio (SNR), Jammer to Noise Ratio (JNR), and Jammer's Received Signal Strength (JRSS). Finally, the Extended Kalman Filter (EKF) is designed to receive tracking data at each time step by all the detected boundary nodes and track the jammer without any interrupt and missing data

A jamming signal is an intentional interference to block the wireless channel, intended to interrupt a wireless transmission and make a legitimate node unable to use network resources. Due to the shared communication medium of wireless sensor networks (WSNs), jammers efficiently disrupt the communication between nodes by emitting a signal towards the target channel using the same frequency band. The jamming signal harms the wireless channel based on the jammer position and transmitting power.

Locating a jammer in WSNs is very important to support the improvement of existing countermeasures. Moreover, by detecting the jammer location, the routing protocol is forced to avoid the jamming region, which causes repeated messages due to the delivery failure. Other reasons for locating the jammer position are capturing, eliminating, and isolating jammer from the network.

Time: 10:00 a.m. – 12:00 p.m.
Date: Wednesday, September 4, 2019
Location: 347 EC

