Optimizing Sensors Distribution for Enhancing WSN Intrusion Detection Probability in Euclidian’s Space

Abstract

Intrusion detection is one of the most important issues in Wireless Sensor Networks (WSNs). WSN sensors distribution plays an important role in intrusion detection process; uniform distribution of sensors yields the same intruder detection capability for all WSN points. Many applications require different levels of security (i.e. the security level should be increased around some specific locations in WSN. Most of the related works focus on using Normal and Uniform distributions in 2D WSN applications with homogenous sensors. Many applications may be applied in 3D such as space monitoring and underwater ecosystem which still need extensive studies for intruder success probability. Sensors heterogeneity is also another important issue that should be well studied since most of intrusion detection researches focus on using homogenous sensors. So, in this paper, the normal and the uniform distributions in 3D WSN applications with heterogeneous sensors are studied. This proposed study presents two situations for intrusion detection process. In the first situation, only one sensor is enough to detect the intruder. The second situation, uses multiple sensors (k, k>1), to detect the intruder. Furthermore, the probability of intrusion detection with Normal distribution, Uniform distribution, and a mixture between them are compared. Finally, the results proved that the performance of the Normal distribution is better than the Mixture and the Uniform distributions as regard the ability of intruder detection and the general WSN efficiency.
Optimizing Sensors Distribution for Enhancing WSN Intrusion Detection Probability in Euclidian’s Space

References

location tracking using sensor networks," in IEEE Wireless Communications and Networking Conference.


http://mathworld.wolfram.com/Sphere-SphereIntersection.html


Index Terms

Computer Science

Applied Mathematics

Keywords

Intrusion Detection WSNs Sensors WSNs Security.