

ABSTRACT

Wireless Sensor Network (WSN) is a collection of huge wireless sensor nodes which are connected wirelessly. WSN is used for sensing, monitoring and recording the physical conditions of the environment such as humidity, vibration, noise, pressure, radiation, etc. and passes the monitored information through the network to a destination node. Some characteristics of Wireless Sensor Networks include capacity to handle node failures, mobility, scalability to large scale network distribution, capability to ensure environmental conditions, reliable network, computation, Quality of Service and lifetime of each sensor node. The advantages of WSN include wireless infrastructure, centralized monitoring, flexibility and they provide accommodations for the new devices at any location at any time. Wireless Sensor Network applications include patient health care monitoring system, surveillance, transportation, agriculture, smart home, Energy control systems and other commercial areas.

Localization is the process of estimating the original geographical local of sensor nodes by using information of some known nodes called as anchor nodes or beacon nodes. Localization is a major research issue which deals with wireless sensor nodes location and it has been studied for many years. The node localization drawback has received a high attention from the analytical community, therefore action that is vital and difficult work.

The objective of the localization algorithm is to decrease localization error, increase accuracy with less computational cost and reducing additional hardware expense. However, localization accuracy is categorized by two important problems such as expensive hardware for

setting up GPS device and beacon nodes. The localization is generally classified into two categories such as range based and range free localization scheme.

The determination of the position using range based scheme such as Time of Arrival (ToA), Time Differences of Arrival (TDoA) and Angle of Arrival (AoA). In the range-based localization, nodes estimate their anchors by using signal propagation time or the strength of the received signal. The act of localization can be considered as estimation of the true location of a node and is characterized by a certain amount of inherent uncertainty and operational bias that results in localization errors. In Range free Scheme the estimation of each unknown node's position is determined with the help of beacon nodes location information and it is a cost effective scheme than range based localization scheme. Proposed Line of intersection algorithm, estimates the position of a sensor node is done with the help of nearby beacon node's midpoint information as a result after executing the proposed algorithm gives more accuracy and less average localization error.

To reduce the error for estimation of the location of the unknown node, several algorithms are proposed and available in literatures. Some of the existing algorithms are Centroid Localization (CL), Weighted Centroid Localization (WCL) and Self-Corrected Received Signal Strength Indicator (SC-RSSI) Localization. Centroid Localization and Weighted Centroid localization are range-free algorithms and Self-Corrected Received Signal Strength Indicator (RSSI) localization algorithm comes under range based algorithm. Improvement in localization accuracy, time complexity and computational complexity are required in these algorithms.

In order to overcome the drawbacks of the existing localization algorithms, a Modified Centroid Localization (MCL) algorithm which is a

range-Free Localization algorithm is proposed. The proposed MCL algorithm has various advantages such as less average localization error, lower computational complexity, time complexity and high accuracy. Line of Intersection (LoI) Localization Algorithm is also proposed for the further reduction of average localization error. The proposed LoI algorithm was compared with Centroid, Weighted Centroid, Self-Corrected RSSI and Modified Centroid Localization algorithms and it was inferred from the simulation results that the LoI algorithm performed better when compared to other algorithms in terms of average localization error, accuracy, computational complexity and time complexity.

Routing in wireless sensor networks is the process of sending the packets across multiple networks. Some of the issues faced by WSN during the routing process are high energy consumption, low packet delivery ratio, lesser network lifetime and bandwidth. In order to overcome the issues in Routing, several routing algorithms were proposed in the various literatures. Some of the routing algorithms used to eliminate the issues are Least Expected Distance (LED), Conditional Mean Square Error Ratio (CMSER) and Energy Conditioned Mean Square Error (ECMSE) algorithms. To overcome the drawbacks in the existing works, a Modified Energy Conditioned Mean Square Error (M-ECMSE) algorithm is proposed. The proposed M-ECMSE algorithm has various salient features such as high packet delivery ratio, lower energy consumption, higher network lifetime and lesser number of average number of hops.