Optimize Multitasking Management for the Underwater Vehicle Network.

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Abstract: In the underwater application of surveillance system multiple sensor device arrangements with communication protocol is widely used for the status quo of conversation among sensor nodes. In this project work localization and detection of malicious node at the running iterations is performed using communication protocols among sensor nodes. There are distinct areas like genetic algorithm, multi robotic challenge allocation, reservoir flood manage gadget, structural health tracking, underwater unmanned car system in which underwater WSN systems works. Although, various algorithms are proposed to improve the performance of network performance and they are actual powerful but there's some region which is untouched for a while. In underwater WSN, there are three tiers of venture allocations. Decrease the failure rate due to rejection of malicious node is the cause of this study, in doing so ACO is use in biding level. For showing our research we use the prototype of underwater vehicles equipped with sensor nodes.

Keywork: DAS, UWSNs, MURDOCH, ACO, MAS and WSN.

I. INTRODUCTION:

The underwater correspondences and advances give new chances to a progressively complete investigation of the seas and the submerged condition in an assortment of regular citizen and military applications. The ongoing headway in sen-sor innovation for submerged applications has driven the route to the appearance of the alleged Underwater Wireless Sensor Networks (UWSNs), where sensors are sent submerged and influence on a Distributed Antenna System (DAS) to gain admittance to the earthbound frameworks [1]. UWSNs are constrained to the investigation purposes, yet can likewise achieve the requests of a large number of submerged applications, which incorporate assortment of oceanographic information and cataclysmic events cautioning frameworks and bolster oil or mineral extraction, submerged pipelines or business sheries.

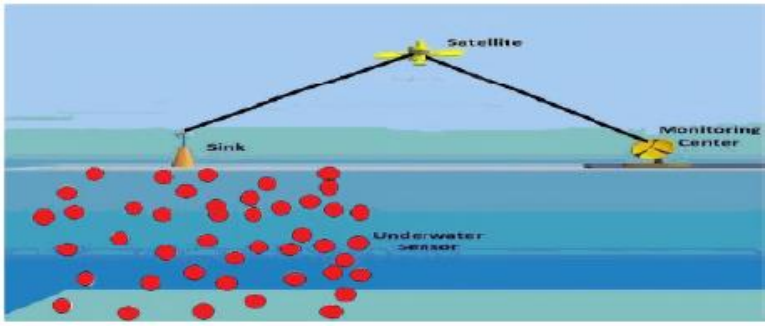

Fig1.1: Architecture of underwater wireless sensor networks (UWSNs).

In today's world technology is work as a base platform for every organization. In field of artificial intelligence, Sensor node agent based technology gives the best and appropriate results. These sensor node agents are alike of computer program. Multiple sensor node agents are accomplished under one organization is known as multi sensor node agent system. These MAS technology working on large scale in many field like medical organization, education system, gaming zone, space technology, security system, army, navy (UWSN swarm system), airforce system, traffic signal problem, etc.

II. LITERATURE REVIEW:

The way to utilizing the capacity of multirobot frameworks is participation. By what method can [1] T. Fukuda, finished participation in frameworks made out of disappointment slanted independent robots working in uproarious powerful conditions? In this works of art, we blessing a solitary strategy for dynamic objective portion for organizations of such robots. [1] T. Fukuda, applied and inspected an open deal based absolutely objective designation gadget which we name MURDOCH, developed upon a principled, helpful asset driven, distribute buy in correspondence model. A variation of the Contract Net Protocol, MURDOCH delivers an assigned guess to a global most satisfying of asset use. We demonstrated MURDOCH in two unmistakable areas: a firmly coupled multirobot physical control objective and an approximately coupled multirobot test in long-term period self-sufficiency. The essential commitment of this work is to uncover observationally that conveyed arrangement instruments comprising of MURDOCH are practical and powerful for organizing physical multirobot structures.

[2] L. Monostori, directed on interaction conventions and topologies of multisensor hub specialist structures (MASs) for objective based assignment distribution, explicitly in assembling utility. Asset sensor hub sellers underway are people of a system whose conceivable logicaltopologies and administering connection convention impact the booking and oversee inside the MAS. Four models are introduced on this works of art, each having explicit guidelines and qualities for planning and target essentially based assignment allotment. Two molds out of the 4 utilize a notable broad connection technique sensor correspondence convention simultaneously as the others are proposed on this work. The recently proposed models depend absolutely on ring topology and calculations progressed inside the investigations. A Java-based absolutely MAS transformed into additionally advanced mimic explicit circumstances of target basically based crucial and to think about the 4 molds regarding some booking by and large execution signs, utilizing cases from creation.

[3] Leaver, R. Greg, advanced MV3204 to teach new undergrads an approach to creator 3-d pix for the Web. This heading gets solid and progressively energetic guide from PC photographs understudies just as undergrads in a choice of different NPS educational programs. It is a permitted elective for MV4202, INTRODUCTION TO 3-D GRAPHICS. Further enhancements hold. Through my endeavors with the Extensible 3D (X3D) Graphics detail and on the whole with group of laborers support, I really have built up the product program for another creating apparatus (X3D-Edit) that has significantly better student productiveness. This canvases legitimately expands on prior VRML endeavors when you consider that X3D is a trade encoding of VRML the utilization of the Extensible Markup Language (XML). From the course depiction:

“An introduction to the concepts of hardware and software program used for laptop-generated 3D photos thru the World Wide Web. The cognizance of the route is authoring interactive 3D scenes and a major design challenge. The route is meant for MOVES and Computer Science students operating in visual simulation, or students in different majors interested in the basics of 3-D modeling and rendering.”

MACA-based conflict conventions and TDMA or CDMA-based contention free conventions can be applied in a UW-LAN relying on the exact necessities and imperatives. Multi-modem versatile MAC conventions for AUV systems were proposed to offer a brought together interface to higher layers. AODV and DSR-essentially based light-weight directing conventions were proposed for submerged use. Effective steering for advert-hoc cell submerged systems regardless of the way that stays an open research venture. Normalization for submerged systems administration is expected to offer interoperability and straightforwardness of activity and help quicken the exploration in the field.

III. METHODOLOGY:

3.1 Interaction protocol:

In order to insure the collaboration and cooperation in multi sensor node agent system there are various communicative acts of communication language are performed. Communication in MAS is have to be very clear and essential. Communication is the medium which help sensor node agents to gain knowledge about environment or surrounding in which they are situated. There are two level of communication in multi sensor node agent system- user to sensor node agent communication and sensor node agent to sensor node agent communication. Sensor node agent communication with user in order to characterizes their needs and provides them solutions and answers. Sensor node agent communication with another sensor node agent in order to exchange various kind of information.

While communicating with other sensor node agent, an sensor node agent uses a specific type of language known as sensor node agent communication language (ACL).

3.2 Sensor communication protocol:

Sensor correspondence convention is undeniable level convention which is worried about the translation of the correspondence rather then the transmission of touch streams. It orders the sensor hub specialists as one or the other initiator/anchor hub or member/reference hub. The sensor hub specialists trade their jobs for various agreements as sensor correspondence convention permits further designation of subcontracts to other sensor hub specialists. As indicated by Tuomas Sandholm this is undeniable level convention and generally utilized by sensor hub specialists to impart. He examined the execution of sensor correspondence convention dependent on minimal expense estimation.

3.3 Limitations of Sensor communication protocol:

A limitation of Sensor communication protocol is that a target based task might be awarded to a reference node with limited capabilities if a better qualified reference node is busy at award time. [5] For defining that my work has improve the results of previous sensor communication protocol, I have to take some parameter [1].

3.6 Methodologies:

3.6.1. Ant Colony Optimization:

Aggregate characteristic bio-frameworks like subterranean insect and honey bee provinces, flocks of fowls and multitudes, just as frameworks of cells and particles are made out of different bio substances living in the physical condition and occupied with complex group and composed practices, collaborations and procedures as indicated by the laws of nature. There is a sure degree of reflection at which conduct of such frameworks can be demonstrated as disseminated computational procedures came about because of the connection of artificial computational substances. Hence, we would anticipate that circulated processing should have a ton of potential for the viable use of nature-motivated figuring for example figuring enlivened by practices of regular bio-systems.[3]

The greater part of the works identified with conveyed ACO don't give a natural and straight forward mapping of ACO calculations onto disseminated figuring frameworks. Or maybe, existing methodologies depend on adjusting the old style successive calculations for equal and superior registering models without a cautious and top to bottom thought of the inborn disseminated nature of ACO. In this unique situation, we bolster the possibility that ACO ought to permit an increasingly clear mapping onto existing conveyed structures, including multi sensor hub specialist frameworks middleware. Along these lines, to exploit the maximum capacity of nature motivated computational methodologies, we have begun the examination of new disseminated types of ACO utilizing best in class multisensor hub specialist innovation. The focal point of our exploration is to propose a superior computational design and programming for the execution of ACO calculations using accessible best in class conveyed multi-sensor hub operator middleware. We predict two potential benefits of our work: (I) first, it adds to the building of ACO calculations utilizing disseminated processing models, with the capability of getting increasingly versatile and efficient calculations; (ii) second, as a result, our work adds to better comprehension of new types of sensor hub specialist based appropriated ACO.

Specifically, Ant Colony Optimization (ACO in the future) [1] is motivated by aggregate conduct of provinces of regular ants when they investigate nature looking for nourishment. During their hunt procedure, ants emit pheromone on their way back to their ant colony dwelling place. Different ants of the settlement sense the pheromone and are pulled in to the stamped ways; the more pheromone is stored on a way, the more alluring that way becomes. The pheromone is unpredictable and vanishes after some time. Vanishing deletes pheromone on longer ways just as on less intriguing ways. Shorter ways are invigorated all the more rapidly, consequently getting the opportunity of being all the more every now and again investigated. Instinctively, ants will combine towards the most efficient way because of the way that it gets the most grounded grouping of pheromone.

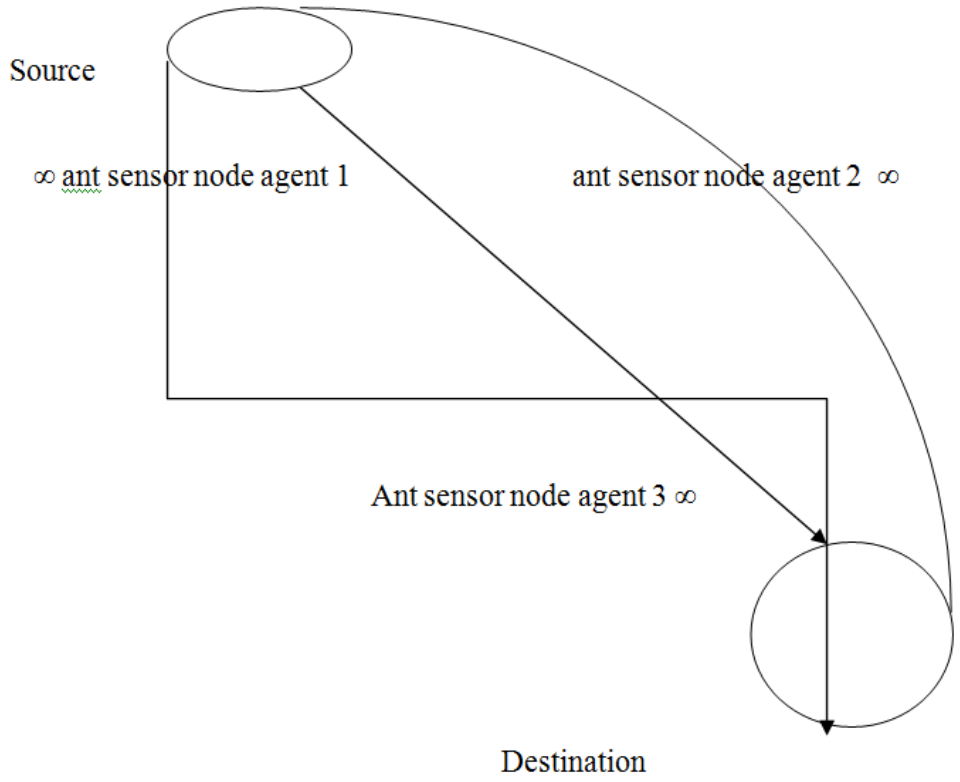

Fig3.6.1.1: Ant Colony Optimization.

3.6.2. Underwater WSN system

As per Hangato Liang, UWSN arrangement framework has a significant job in the use of marine asset. So as to give an efficient technique to explore displaying and recreation of UWSN arrangement in the marine condition, the novel methodology dependent on Multi-Sensor hub specialist Interaction Chain was proposed for the UWSN development framework. Right off the bat, Multi-Sensor hub specialist Interaction Chain was dissected, which predominantly considered objective based errand and job of UWSN in the arrangement, and the general demonstrating procedure of UWSN development framework dependent on Multi-Sensor hub operator Interaction Chain was built up.

3.6.2.1 Corresponding relationship between the UWSN formation system and MAS

MAS hypothesis as the ground-breaking and effective instrument for displaying is utilized and alluded by the issues that is from UWSN arrangement framework. Along these lines, comparing relations between UWSN development framework and MAS are set up and appeared in Fig. 3.2. As appeared in Fig. 3.2, Part A spotlights on the UWSN-Sensor hub specialist demonstrating, which can be understood by the Sensor hub operator design displaying and receptive conduct displaying; Part B centers around the Multi-Sensor hub operator community oriented displaying of UWSN development framework, which can be tackled by topology structure and shared system of MAS.[4]

Implementation of super sensor node agent in system will help to reduce the drawback of sensor communication protocol we introduced earlier. Super sensor node agent has the database which contain the capabilities of all the agents in the system. Super sensor node agent will be used to allocate the target based task to the reference node and anchor node.

3.7 Proposed Work:

Localization in Underwater Sensor Networks have attracted significant interests in recent years [1].Position information are vital to monitoring activities. The simplest straightforward way to determine location is using Global Positioning System (GPS). But they are not suitable for underwater environments. Wave has good propagation in water and hence suitable for underwater communication but suffer from multi-path propagation and Doppler effect. The method filters out malicious node signals on the basis of the Ant colony optimization (ACO) approach among multiple parameters of nodes. This method hence tolerates malicious node signals by adopting an iteratively refined selection scheme without any high number based explosion of search combinations with minmum effect of grid size and solution time delay. This algorithm is simple but has robustness and improved accuracy.

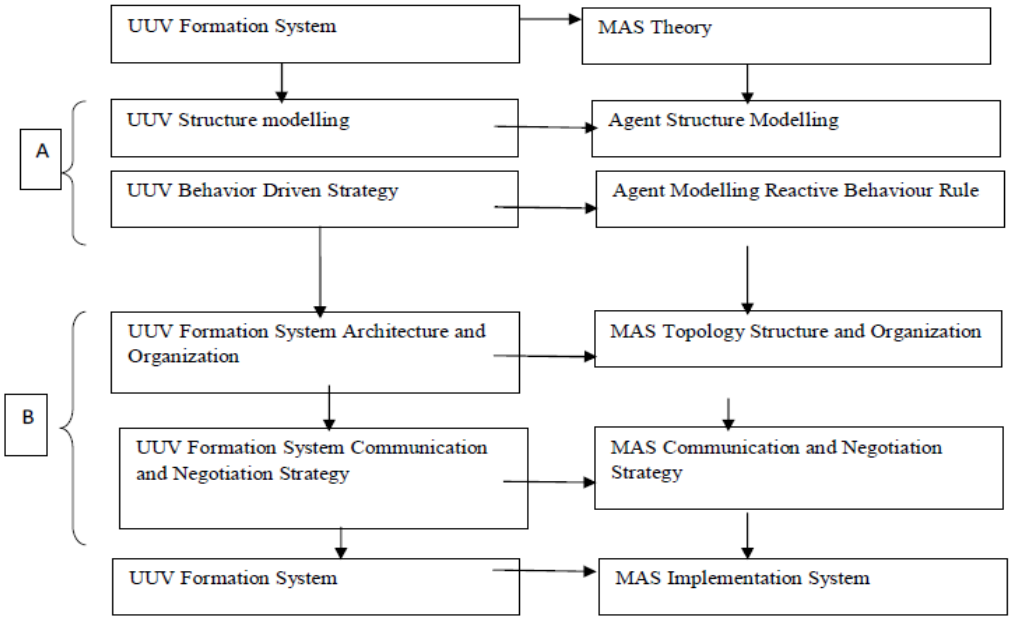

Fig. 3.2: Corresponding Relationship.

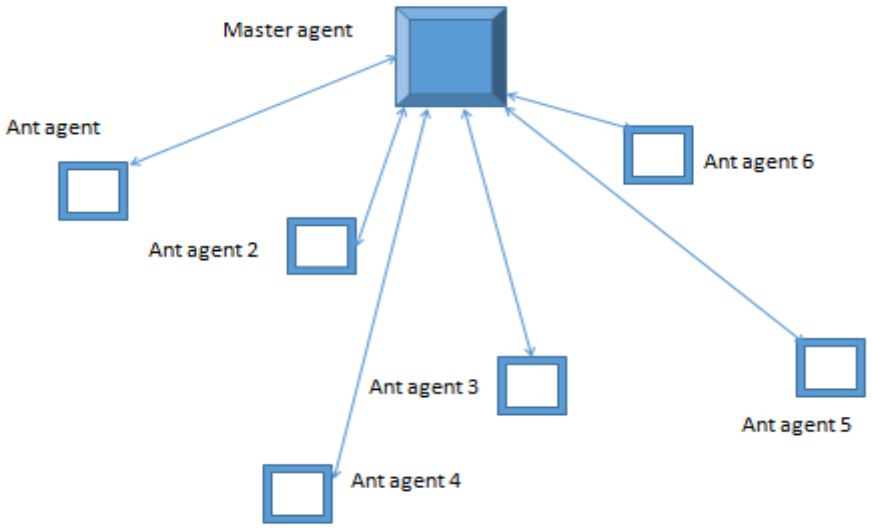

Fig. 3.6: Representation of Underwater Sensor node as ant agent.

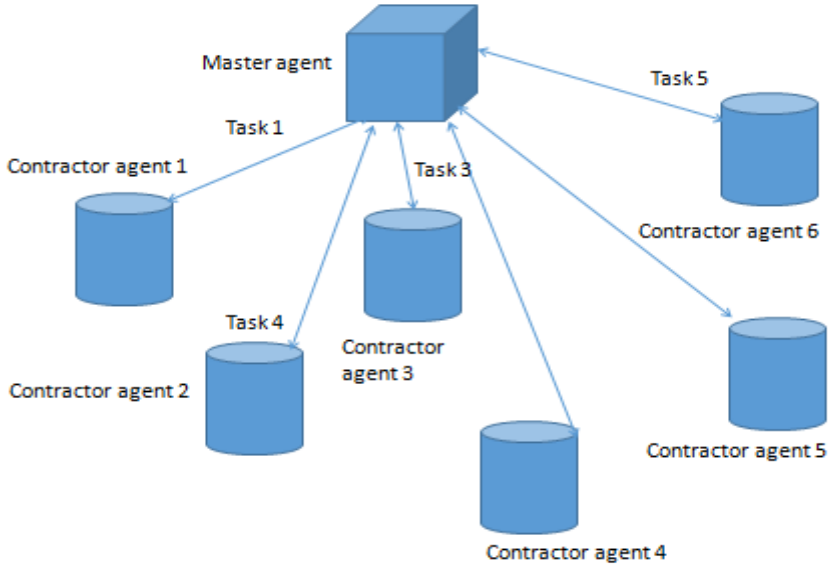

Fig. 3.7: Underwater Sensor node System monitoring for target based task.

IV. RESULT AND DISCUSSION:

In this chapter the step by step approach is described as used in this project work. First of an under water WSN system is defined in terms of length and width of underwater area. Let the number of sensor nodes is N and the number of targets are T. The under water area has length and width as L and W. As shown in figure 4.1 here a underwater area having length and width is 20,000m x 10,000 m and the N=15,T=30.The nodes has random locations x_{nodes} / y_{nodes} and the tasks (T1 to T30) has coordinates location as x_{task}/y_{task}.
The underwater vehicle mounted sensor nodes are assumed to be dynamic with speed randomly varies from 0 to 200km/hr. Similarly other parameters of all the tasks are defined as given below:
Node intial energy: 500Joule
Minimum mass: 200kg and maximum mass:300k

Distance is measured in between the nodes using the available location information of nodes by position sensing (GPS) system knowledge base mounted on all sensor nodes.The table below shows the D_{meas} i.e measured distance in between nodes usin node co-ordinates.

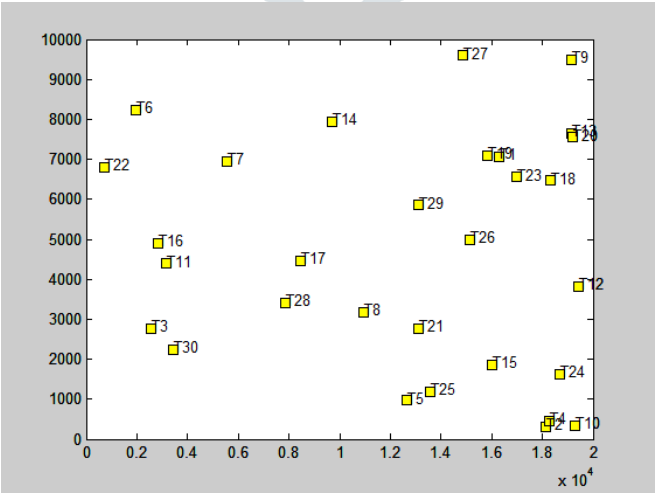

Figure 4.1 (a): Location of multiple targets in underwater system.

Table: Measured distance in between nodes

Node id	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	0	1462	7929	10138	6534	5908	1493	7611	7266	7882	6686	6451	2505	6032	3491
2	1461	1	8893	8901	6544	6118	1020	8316	7442	7497	5242	5239	3803	5434	4236
3	7928	8893	0	17719	13926	13070	9392	1831	4763	15637	12659	10840	8179	7972	4692
4	10138	8901	17720	0	8230	8961	8675	16899	15223	6463	6325	8892	11455	11730	13028
5	6534	6544	13926	8229	0	1011	5550	13969	13787	2255	9480	10897	5788	11928	9949
6	5909	6118	13070	8962	1010	0	5101	13193	13170	3248	9586	10783	4898	11551	9236
7	1493	1020	9392	8675	5549	5101	0	8980	8332	6619	5795	6117	3239	6454	4852
8	7611	8315	1831	16899	13969	13193	8980	1	2970	15484	11467	9448	8419	6429	4131
9	7266	7442	4763	15223	13787	13170	8332	2970	0	14934	9309	7009	8881	3840	4145
10	7882	7497	15637	6463	2255	3248	6618	15484	14934	0	9132	10990	7683	12576	11372
11	6686	5242	12659	6325	9480	9586	5795	11467	9309	9132	0	2573	8996	5578	8217
12	6451	5239	10840	8892	10897	10783	6117	9447	7008	10989	2573	0	8951	3176	6819
13	2506	3804	8179	11454	5788	4898	3239	8419	8881	7683	8996	8951	1	8367	4746
14	6031	5434	7972	11730	11928	11550	6453	6429	3841	12576	5578	3176	8367	1	4724
15	3491	4236	4692	13028	9949	9237	4852	4131	4144	11373	8216	6819	4746	4724	0

After getting the inter nodes distance anchor nodes are randomly selected and measured distance wrt to anchor nodes to reference nodes is stored in the anchor nodes. Let the selected anchor nodes are:

Anchor node id :15,7,8,9

Anchor x-cord , y-cord: (12559,2691);(7819,3724);(16628,1981);(16067 ,4897).

After this step the anchor nodes broadcast localization message request to all the refrences nodes. On getting the broadcast request by the reference nodes these nodes replies the acknowledgement as a reply to the anchor nodes and if the communication do not undergoes any failure then each reference node sends the location value in terms of x,y co-ordinates to the anchor nodes.

V. CONCLUSION AND FUTURE SCOPE:

This research work suggests the mission allocation manner in underwater automobile system is a extensive location for research. UWSN gadget brings the drastic adjustments in lots of fields like marine hydrology, underwater warfare, oceanography, seafloor survey, and existence underwater survey. Sensor communication protocol installed the verbal exchange in UWSN gadget. Targets are allocated by one of a kind technique but every technique shows distinct results. Some technique decrees the execution time, some methodology increases the accuracy. In my research the failure price is took as a parameter to reveal the outcomes as shown in fig 4.1. After calculating the pleasant location information the mission is provided. In table 4.1 it shows that the failure charge if iterated sensor communication protocol (.06) is extra than the failure rate of ACO BASED sensor communication protocol (.03). In future work the efficiency of sensor communication protocol will improve by using other methodologies. This process will also used in the distributed architecture of UWSN system.

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