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Smart Multitasking Allocation Approch Used over allocation strategy

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ABSTRACT: In the vicinity of multi agent device agreement internet protocol is widely used for the status quo of conversation among sellers. There are distinct areas like genetic algorithm, multi robotic challenge allocation, reservoir flood manage gadget, structural health tracking, underwater unmanned car system in which CNP works.
Keywords: *ACO, CNP, ICNP, UUV Agents.*

I. INTRODUCTION:

In today's world technology is work as a base platform for every organization. In field of artificial intelligence, Agent based technology gives the best and appropriate results. These agents are alike of computer program. Multiple agents are accomplished under one organization is known as multi 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 (UUV swarm system), airforce system, traffic signal problem, etc There are many technologies exist in the field of multi agent system; which improves the working of MAS in different parameter. MAS exist in area of computer intelligence from more than three decades. Intelligence is basically ability to reason, learn, act and react. The era of artificial intelligence work as the base for the invention of Multi Agent System. MAS developed to solve to complex problems which could not be solved by using single agent. Agent is nothing but a small computer program or robot which detect the problems and solve them by using its intelligence. MAS is nothing other then group of autonomous agents which are working in group in order to achieve final goal. In many MAS output of one agent is input of another agent. The member agent of Multi Agent System should be autonomous as well as collaborative to accomplish the complex task for which multi agent system designed specifically.MAS is designed because a single agent is not able to solve the complex or large problem because it has not sufficient resources and knowledge about that problem. [1] Unmanned Under water Vehicles (UUVs) have gained popularity for the last decades, especially for the purpose of not risking human life in dangerous operations. On the other hand, under water environment introduces numerous challenges in navigation, control and communication of such vehicles. Certainly, this fact makes the development of these vehicles more interesting and engineering-wise more attractive. Studies on Unmanned Underwater Vehicles (UUVs) have shown a dramatic increase specially in the last two three decades. Many examples of Remotely Operated Vehicles (ROVs), Autonomous Underwater Vehicles (AUVs) and Single –Shot ROVs (SSRs)were developed and used successfully on various applications; such as oceanographic surveys, bathymetric measurements, under water maintenance activities (e.g. those performed at oil platforms, fiber optic communicate online, etc.) and certainly military defence. Existing vehicles are how in continuous progress in term soft technology, advanced navigation and control functionalities, longer missions, flexibility and high capacity of pay loading addition to a very diverse suite of sensors. With the increasing scientific and technological development of Unmanned Underwater Vehicle (UUV) swarm system in science and engineering fields[2–4], and because of complex under water mission and dynamic environment[3,5],task optimal allocation has been attracted some attention. Multi-Agent system (MAS) is consisted of agents to realize the collaborative operation, those agents have a certain intelligent to independently think and reason under complex environment [6–9]. Therefore, the MAS theory and

technology can solve UUV swarm system related task optimal allocation because of its cooperative problem solving ability. In order to realize the collaboration, the design of communication interaction algorithm or protocol is very important.
In order to insure the collaboration and cooperation in multi 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 agents to gain knowledge about environment or surrounding in which they are situated. There are two level of communication in multi agent system- user to agent communication and agent to agent communication. Agent communication with user in order to characterizes their needs and provides them solutions and answers. Agent communication with another agent in order to exchange various kind of information.[17] While communicating with other agent, an agent uses a specific type of language known as agent communication language (ACL). A multi agent system architecture contains a communication process which handles communication activities as well as other process to perform various tasks like planning, decision making and negotiations.

II. RELATED WORK:

The key to utilizing the potential of multirobot systems is cooperation. How can **[1] T. Fukuda,** achieved cooperation in systems composed of failure-prone autonomous robots operating in noisy dynamic environments? In this work, we present a novel method of dynamic task allocation for groups of such robots. **[1] T. Fukuda,** implemented and tested an auction-based task allocation system which we call MURDOCH, built upon a principled, resource centric, publish subscribe communication model. A variant of the Contract Net Protocol, MURDOCH produces a distributed approximation to a global optimum of resource usage. We validated MURDOCH in two very different domains: a tightly coupled multirobot physical manipulation task and a loosely coupled multirobot experiment in long-term autonomy. The primary contribution of this work is to show empirically that distributed negotiation mechanisms such as MURDOCH are viable and effective for coordinating physical multirobot systems.
They have presented a novel method of dynamic task allocation for multirobot systems, based on the CNP. To evaluate our approach, we have implemented the task-allocation system MURDOCH, based on a principled publish/subscribe messaging model. In this model, all interrobot communication is necessarily anonymous and resource centric. We tested MURDOCH on physical robots in both a long-term loosely coupled task domain and a short-term tightly coupled box-pushing task. We demonstrated that the system is extremely reactive to changes in the environment, including abrupt failures of robots and random introduction of new tasks. The primary contribution of this work is the empirical demonstration that distributed negotiation mechanisms such as MURDOCH are effective in coordinating physical multirobot systems. Such systems are, as a rule, complex and difficult to coordinate. MURDOCH simplifies this problem by automating task allocation in a resource-efficient manner. The system is distributed, with no single point of congestion or failure, making it particularly well suited to multirobot coordination. We are continuing the development of this task-allocation system. In addition to applying MURDOCH to other domains, we are exploring algorithms for allocating tasks in environments in which there is not a robot-level resource abstraction. For example, if we want to track some phenomenon (such as a person walking) throughout a building instrumented with sensors, the intuitive solution is to pose a single task to the network. The sensors should then dynamically form teams and make collective bids for the task.We are interested in methods for guiding the formation of such teams.

[2] L. Monostori, focused on interaction protocols and topologies of multiagent systems (MASs) for task allocation, particularly in manufacturing application. Resource agents in manufacturing are members of a network whose possible logicaltopologies and governing interaction protocol influence the scheduling and control in the MAS. Four models are presented in this work, each having specific rules and characteristics for scheduling and task allocation. Two models out of the four use a well-known standard interaction method [contract-net protocol (CNP)], while the others are proposed in this work. The newly proposed models are based on ring topology and algorithms developed in the research. A Java-based MAS was also developed simulate different scenarios of task allocation and to compare the four models in terms of some scheduling performance indicators, using cases from manufacturing. The results produced meaningful differences between the four models, including their strengths and weaknesses. Two models, namely, modified ring and CNP-based peer-to-peer, gave superior performance compared

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with the others. Furthermore, the proposed modified ring exhibits significant potential in handling manufacturing task allocation applications.

In this work, four agent-based models for task allocation in manufacturing shop floor have been presented and compared by using Java-based simulation software developed as the test platform. The two models referred to as star and P2P, respectively, used the established and popular CNP, while the other This article has been accepted for inclusion in a future issue of this journal. Content is final as presented, with the exception of pagination. two models introduced in this work have been built using novel architecture and algorithms. Initially, the prominent position of the agent-based scheduling within the broad area of scheduling has been discussed. Experiments were conducted using real manufacturing data to test the performance of these models. Lead time, cost, and resource utilization have also been used as the performance criteria. The results show that, in most cases, the proposed modified ring and CNP-based P2P models give superior performance compared with the star and ring models. The new modified ring model, with its protocol developed in this work, is therefore a serious competitor to the CNP-based models.

III. METHODOLOGY:

(1)Ant Colony Optimization:

Collective natural bio-systems like ant and bee colonies, flocks of birds and swarms, as well as systems of cells and molecules are composed of multi- ple bio-entities residing in the physical environment and engaged in complex collective and organized behaviors, interactions and processes according to the laws of nature. There is a certain level of abstraction at which behav- ior of such systems can be modeled as distributed computational processes resulted from the interaction of artificial computational entities. Thus, we would expect distributed computing to have a lot of potential for the practical application of nature-inspired computing – i.e. computing inspired by behaviors of natural bio-systems.

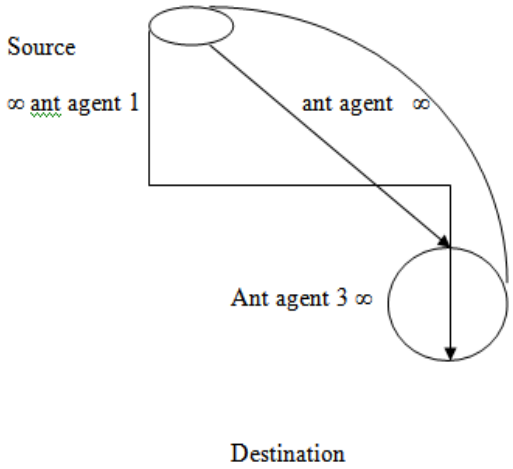

Fig.: Ant Colony Optimization

(2)Unmanned underwater vehicle system According to Hangato Liang, Unmanned Underwater Vehicle (UUV) formation system has an important role in the utilization of marine resource. In order to provide an efficient method to research modelling and simulation of UUV formation in the marine environment, the novel approach based on Multi-Agent Interaction Chain was proposed for the UUV formation system. Firstly, Multi-Agent Interaction Chain was analyzed, which mainly considered task and role of UUV in the formation, and the overall modelling process of UUV formation sys- tem based on Multi-Agent Interaction Chain was established. Then, the static structure of Multi-Agent Interaction Chain was researched focusing on Hybrid UUV-Agent model structure from the UUV-Agent State-Set and UUV-Agent Rule-Base which were the two aspects to strengthen reliability of interaction chain; the dynamic mechanism of Multi-Agent Interaction Chain was designed, which was focused on collaboration model and communication model through the Adaptive Dynamic Contract Net Protocol.

Corresponding relationship between the UUV formation system and MAS

MAS theory as the powerful and effective tool for modelling is employed and referred according to the problems that is from UUV formation system. Therefore, corresponding relations between UUV formation system and MAS are established and shown in Fig. 3.2. As shown in Fig. 3.2, Part A focuses on the UUV-Agent modelling, which can be solved by the Agent architecture modelling and reactive behavior modelling; Part B focuses on the Multi-Agent collaborative modeling of UUV formation system,

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which can be solved by topology structure and collaborative strategy of MAS

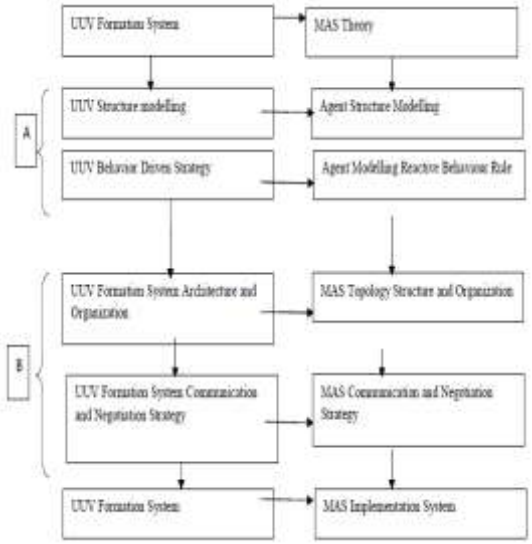

Fig.: Corresponding Relationship

(3)Contract net protocol

According to (Wooldridge 2007), multi agent systems address five main trends that have driven the advances in computing: ubiquity, interconnection, intelligence, delegation, and human-orientation. An agent is autonomous because it has control over its actions and internal state, social because it works with others in order to achieve goals, reactive because it responds to changes that occur in its environment, and proactive because it has goal-oriented behavior.

The Contract Net Protocol (CNP) is a task-sharing protocol for a collection of software agents that form the 'contract net' (Smith 1980) (Smith and Davis 1981). It was developed to specify problem-solving communication and control for nodes in a high-level distributed problem solving protocol by a negotiation process. Each agent in the network can, at different times or for different tasks, be a manager or a contractor. The CNP controls the flow of contracting and subcontracting throughout the network of agents. The CNP is designed to allow agents to break down tasks (or problems) that they cannot efficiently handle on their own into more manageable, smaller subtasks (or sub problems) using delegated agents to complete the task. Agents can bid on tasks based on their capabilities.

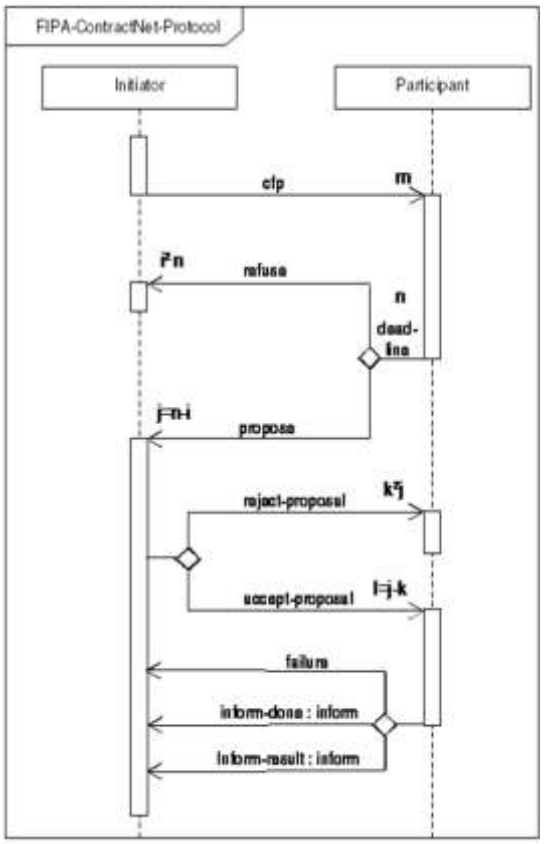

Fig.: CNP

(4) Iterated contract net protocol

The iterated contract net protocol is an extension of the basic FIPA CNP and is another FIPA standard for negotiation between agents (FIPA 2002b). The major difference from CNP is that it allows multi-rounding iterative bidding and allows multiple contractors to be chosen for a subtask (and thus team formation). From the participants who send proposals, the manager may accept the intended number and thus complete the protocol. But it may decide to issue a revised call-for-proposals to a subset of those that bid. Note that the iterated CNP requires more time, communication, and computation than the simple CNP

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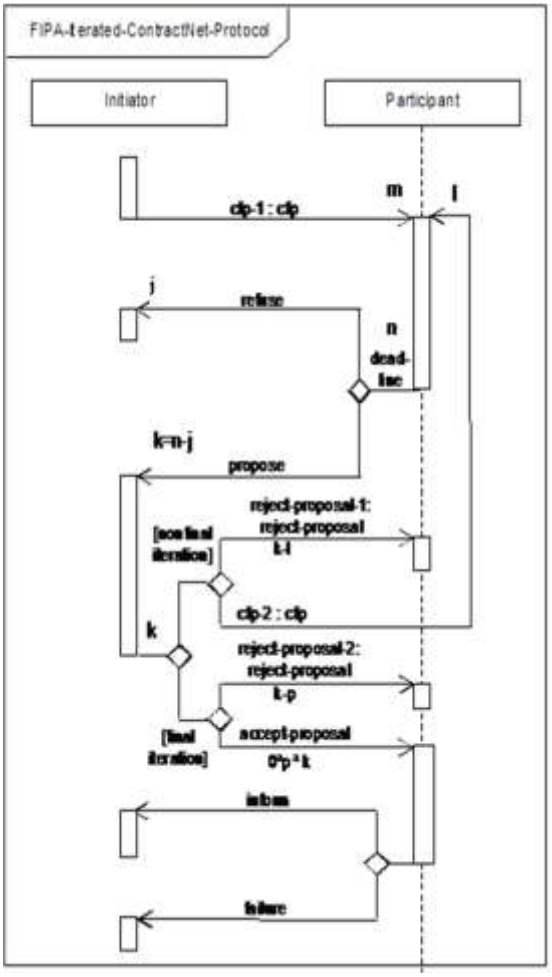

Fig.: ICNP

IV. RESULT AND DISCUSSION:

After optimization of the objective function using MATLAB command, the optimized function value and the optimal parameter values are obtained. The different cases using different SA algorithm functions and the corresponding solutions obtained are as follows:

To examine my research, the 7 loops of 30 iterations is implemented. In every loop the wide variety of duties is increasing like two hundred, four hundred, 600, 800, 1000, 1200, 1400, 1600, 1800, 2000. In every loop the failure fee at various nodes is decreasing in superb way. Nodes at which the failure rate is calculate are 30,60,a hundred and twenty, 240,480,960,1920. At the node 30,60, and a hundred and twenty the failure rate is comparable as ICNP [1] however at the node 240,480,960,1920 is failure fee is decreasing in comparison to ICNP[1] the table beneath defined the distinction in ACO based CNP and ICNP.

Table 4.1: failure rate at different nodes

NODES	ICNP	ACO BASED CNP
30	0	0
60	0	0
120	0.01	0.01
240	0.05	0.01
480	0.07	0.05
960	0.13	0.08
1920	0.23	0.10
AVG. VALUE	0.068	0.055

As shown in fig. 4.1 , the graphical representation of the failure rate at different nodes compared with the ICNP and when the task number is increasing the new version of CNP with ACO works well.

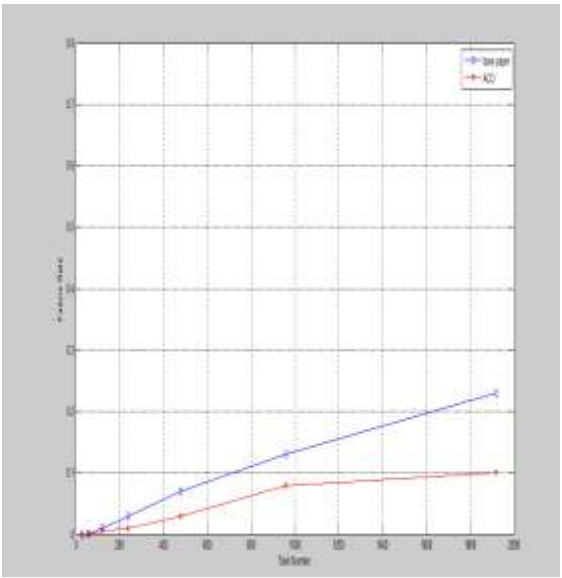

Fig: Graphical Representation

V. CONCLUSION:

This research paper suggests the mission allocation manner in underwater automobile system is a extensive location for research. UUV gadget brings the drastic adjustments in lots of fields like marine hydrology, underwater warfare, oceanography, seafloor survey, and existence underwater survey.

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