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Review on Smart Multitasking Allocation Approach 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.

1. 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.

2. 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 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.

[3] Leaver, R. Greg, developed MV3204 to teach new students how to author 3D graphics for the Web. This course receives strong and increasingly enthusiastic support from computer-graphics students as well as students in a variety of other NPS curricula. It is an allowed alternative for MV4202, INTRODUCTION TO 3D GRAPHICS. Further innovations continue. Through my efforts with the Extensible 3D (X3D) Graphics specification and together with staff support, I have developed the software for a new authoring tool (X3D-Edit) that has significantly enhanced student productivity. This work directly builds on prior VRML efforts since X3D is an alternate encoding of VRML using the Extensible Markup Language (XML). From the course description:

"An introduction to the principles of hardware and software used for computer-generated 3D graphics via the World Wide

Web. The focus of the course is authoring interactive 3D scenes and a major design project. The course is intended for MOVES and Computer Science students working in visual simulation, or students in other majors interested in the basics of 3D modeling and rendering."

[4] Bailey, introduced a physics-based and control-oriented underwater vehicle model for near-surface operations. To construct the model, we follow an energy-based Lagrangian approach, where the presence of the free surface is incorporated using a free surface Lagrangian. This effectively modifies the system energy commonly used to derive the Kirchho equations, which govern underwater vehicle motion in an unbounded ideal uid. The system Lagrangian is then used to derive the 6-DOF equations of motion for an underwater vehicle maneuvering near
the free surface in otherwise calm seas. To illustrate the additional capabilities of the proposed model, we present an analytical hydrodynamic solution for a circular cylinder traveling parallel to the free surface. Comparisons are also drawn between the proposed model and the Cummins model (Cummins, 1962). While Cummins' model exactly satisfies the free surface boundary condition and approximately satisfies the body boundary condition, we choose to exactly satisfy the body boundary condition and approximately satisfy the free surface condition. This exchange removes the restriction that limits the Cummins equations to slow-maneuvering in a seaway.

[5] Arshad presented an analytical framework to model calm-water underwater vehicle maneuvering in the presence of a free surface, constructed from first principles. Using the free surface Lagrangian, the system energy Lamb used in deriving the Kirchof's equations (Lamb, 1932) was modified to incorporate free surface effects. The system Lagrangian was ultimately used to derive the 6-DOF equations of motion using a modified form of the Euler-Lagrange equations. Some of the capabilities of the equations were explored through the simple case of a 2-D circular cylinder.
A possible advantage of the proposed model is that knowledge of the underlying Lagrangian may lead to natural Lyapunov function candidates for assessing stability of steady motions, or input-output stability when considering excitation forces. Moreover, one may use Lyapunov-based control design to develop nonlinear feedback control laws that are inherently stabilizing. As an example application, we plan to develop energy-based control laws to stabilize underwater vehicle motion near the free surface. Additionally, it remains to devise a fully populated model that may be simulated and compared with high delity computational uid dynamics and/or experimental data. In particular, the hypothesis concerning memory effects discussed in Section 3.1 must be explored in further detail. The implications of our choice to trade hydrodynamic accuracy for expanded maneuvering capabilities should be characterized before moving forward.

Realistic multi-agent team applications often feature dynamic environments with soft deadlines that penalize late execution of tasks. This puts a premium on quickly allocating tasks to agents, but finding the optimal allocation is NP-hard due to temporal and spatial constraints that require tasks to be executed sequentially by agents.
[6] Jarmo T. Alander proposed 0. FMCTA, a novel task allocation algorithm that allows tasks to be easily sequenced to yield high-quality solutions. FMC TA first finds allocations that are fair (envyfree), balancing the load and sharing important tasks between agents, and efficient (Pareto optimal) in a simplified version of the problem. It computes such allocations in polynomial or pseudo-polynomial time (centrally or distributedly, respectively) using a Fisher market with agents as buyers and tasks as goods. It then heuristically schedules the allocations, taking into account inter-agent constraints on shared tasks. We empirically compare our algorithm to state-of-the-art incomplete methods, both centralized and distributed, on law enforcement problems inspired by real police logs. The results show a clear advantage for FMC TA both in total utility and in other measures commonly used by law enforcement authorities. Our experimental results show that FMC TA effectively and efficiently allocates and schedules tasks for agents in the complex, dynamic settings characteristic of law enforcement, which is common in other multi-agent applications. The comparison with LP demonstrates that the two-stage allocate-schedule approach is not solely responsible for the high quality of its solutions. Instead, it is the combination of fairness and efficiency of the allocations in the restricted problem that result in allocations that share important tasks, enabling synergistic cooperation that leads to higher quality task execution while driving down delays.
Despite this success, our results also pointed to a potential shortcoming: utility decreased in settings with high dynamism and many tasks. This effect was not limited to FMC TA but afflicted many other, unrelated algorithms. This may stem from our assumption that the future is unpredictable; while this is a very general approach, it precludes reasoning about what dynamic changes may occur in the future. Learning a model of the dynamics has been successfully applied in market-based task allocation before (Jones, Dias, and Stentz 2007), and incorporating such reasoning into FMC TA is an area of future research.

Formation control is a cooperative control concept in which multiple autonomous underwater mobile robots are deployed for a group motion and/or control mission. **[7] T. I. Fossen** presented a brief review on various cooperative search and formation control strategies for multiple autonomous underwater vehicles (AUV) based on literature reported till date. Various cooperative and formation control schemes for collecting huge amount of data based on formation regulation control and formation tracking control are discussed. To

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address the challenge of detecting AUV failure in the fleet, communication issues, collision and obstacle avoidance are also taken into attention. Stability analysis of the feasible formation is also presented. This work may be intended to serve as a convenient reference for the further research on formation control of multiple underwater mobile robots.
For decades, AUVs have been widely used for many tasks. The ruthless and unstructured nature of the underwater environment causes significant challenges for underwater autonomous systems. This work presents a comprehensive review on the current control issues on a group of AUVs. For decades, formation control has become an active research topic and has broad applications in Robotics. The formation control algorithms are subdivided based on the technical approach, controllers used, level of coordination and communication constraints. The work has also highlighted some areas for future work in the field. Recent advances in stability analysis have been developed for rapid improvement of formation control. In addition, some basic challenges and applications have been presented. The work also informs briefly a new consideration on formation control stability which has a promising future research direction.

The bibliography database is updated on a regular basis and certainly contains many errors and inconsistences. The editor would be glad to hear from any reader who notices any errors, missing information, articles etc. In the future a more complete version of this bibliography will be prepared for the genetic algorithms in control research community and others who are interested in this rapidly growing area of genetic algorithms. When submitting updates to the database, work copies of already published contributions are preferred.
[8] John H. Holland. Worked copies (or ftp ones) are needed mainly for indexing. We are also doing reviews of different aspects and applications of GAs where we need as complete as possible collection of GA works. Please, do not forget to include complete bibliographical information: copy also proceedings volume title pages, journal table of contents pages, etc. Observe that there exists several versions of each sub bibliography, therefore the reference numbers are not unique and should not be used alone in communication, use the key appearing as the last item of the reference entry instead. Complete bibliographical information is really helpful for those who want to second your contribution in their libraries. If your work was worth writing and publishing it is certainly worth to be referenced right in a bibliographical database read daily by GA researchers, both newcomers and established one

In the past this research efforts in optimizing earthwork processes focused mainly on minimizing transportation costs and mass haul distances, respectively. This kind of optimization problem, well known as *earthwork allocation problem* can be solved by applying linear programming techniques. As a result, the most cost-efficient cut-to-fill assignments will be found. In this article, starting from an optimal cut-to-fill assignment, we formulate a new corresponding combinatorial optimization problem. This *earthwork section division problem* arises when a large road project is divided into several linear construction sections and tendered to different normally non-cooperating construction companies. The optimization objective is to partition the optimized cut-to-fill-assignments in different earthwork sections with minimal earth movements between them. This problem is subjected to certain user-defined constraints, like number of sections, minimal and maximal section-length, etc.
[9] ASKEW, proposed solution model will be integrated into an earthwork modeling and assessment system which allows performing a quantity take-off from a roadway model to provide the necessary input data for the optimization algorithms
This work introduces two major problems arising in optimizing earthwork processes: finding the most cost-efficient cut-to-fill-assignments (*earthwork allocation problem*) and dividing a large earthwork project into sections with minimal inter-sectional material flows (*earthwork section division problem*). This work also presents the mathematical formulation and solution model of these two problems using (binary) linear programming technique. The introduced models and their solutions are applied in a real-world construction project, a highway construction site in Germany, to enhance the productivity in construction project. In future research, we aim at solving two further optimization problems focusing on minimizing earth transport equipments and the project duration:
• With a given number of transporters, what is the minimal earthwork duration?
• To the given earthwork duration, what is the minimal number of transporters required to execute all transportation within the prescribed duration?

[10] Baldoni, designing a suitable communication protocol is a key challenge in engineering a multiagent system. This work proposes Muon, an approach that begins from representative samples of interactions or scenarios. Muon identifies key semantic structures and patterns based on (social) commitments to formally analyze the scenarios and overs a methodology for designing protocols that would meet stakeholder needs. Interestingly, Muon applies its formal representations to suggest ways to identify additional scenarios needed to address exceptions arising in the interactions. This work contributes (1) a conceptual model of message types and causal relationships among them as a foundation for developing commitment-based communication protocols; (2) a robust, reusable characterization of semantic structures reecting the above model; (3) a mapping from an annotated scenario to causally related interactions; and (4) a methodology to synthesize specifications of communication protocols. This work reports on an empirical evaluation involving developers creating protocols from two real-life cases. Muon addresses the problem of specifying protocols that not only capture stakeholder needs but also reect a commitment-based understanding of interactions among autonomous parties. Capturing scenarios is a natural way to elicit stakeholder requirements and to provide a design rationale for the protocol. Work on scenarios (Filippidou, 1998) shares the intuition that the concreteness of scenarios helps in coming up with models. Notice that the primary work done by the designers is in coming up with the scenarios; understanding and semantically annotating them; and deciding how to expand scenarios. Muon introduces semantic structures and patterns for commitments and helps designers by overing sanity checks based on commitments and converting annotated scenarios into a protocol. It provides a natural approach to determine a modular protocol from a set of scenarios. Our empirical endings suggest that Muon produces gains in exibility and quality, thereby showing the promise of introducing multiagent concepts into software engineering practice. A common challenge to all protocol approaches is one of perspective. That is, what should happen if the parties involved do not agree as to the facts? There is no fundamental solution to this challenge except to introduce an authoritative Muon: Designing Multiagent Communication Protocols from Interaction Scenarios 27 party or an agreed upon infrastructure that captures the facts definitively for the interaction. This challenge, however, is orthogonal to our approach since we are concerned with specifying a protocol, and an appropriate protocol should reect such considerations in its messages. Our causal approach to patterns points to a natural way to create protocols that avoid problems such as race conditions.

3. 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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