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Review on the various services of ambient intelligent environment and internet of things

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Abstract: Internet of things means a world-wide network of interconnected objects. These objects are uniquely identified using some standard communication protocols in which 'things' are refer as real world entity such as human beings, semantic data etc. The main goal of the IOT to create an environment provide a virtual and smart environment where physical objects/devices, sensor, actuators interconnect with each other and provided a valuable services to user. The specified goal is achieved using ambient intelligent and internet of things interconnected with each other using semantic technology. The overall review shows that the activity recognized in an ambient –assisted living environment is provided to demonstrate the efficiency and feasibility.

Keywords: Internet of things; Ambient intelligence; Quality of services; simulated annealing; Semantic technology.

I. INTRODUCTION

The ambient intelligent and internet of things are interconnected with one another using semantic technology. Ambient intelligent provide a virtual and smart environment where physical objects/devices, sensor, actuators interconnect with one another and provided valuable services to user. Internet of things provides ideas that enable different devices to fairly share their data and information with one another through internet. The Internet of Things is a processing concept that explains a future trend where each day real objects are going to be connected to the Internet and have the ability to represent themselves with respect to other devices [1]. The Internet of things is significant because a device represents itself digitally becomes something greater than be the mere device. More than just for user's requirements, the devices are also attached to surrounding objects and database. When many devices act together, they are called having "ambient intelligence".

Internet of things is a network of things (physical and virtual) which extracts a helpful knowledge from the network data. Semantic technology is capable to create a Semantic Web of services whose semantics, such as properties, capabilities and interfaces, are encoded in an unambiguous, machine-understandable form [19].

Semantic technology is used to supply data according to an individual's requirements or specifications on web. Once we combine it with internet of things it gives semantic interoperability. Semantic interoperability is achieved when we collect data from different service domains with their semantics (meanings) and interpret that meaning according to the given ontology. "Ontology is a common vocabulary for researchers who need to share information in certain domain (medical domain etc.). Ontology includes machine interpretable definition of basics concepts in the domain and relationship among them."[4]

A. *Ambient services classification*

Ambient services are defined as a concrete action or operation that can be accomplished by any logical or physical transformation functions. These functions take some data as inputs and produce some data as outputs in the form of event, context or effect in the ambient space. Services must be handles dynamically. Dynamic services selection is still open issue. Here is dependency between service discovery and service selection, so we handle both simultaneously. For example: if some discovered services are not presence at time of services selection lot of time ,energy waste if we select that service we doesn't get desired result instead of this if services updated at discovery level there not insure services executed successfully or not.

Ambient services broadly classified into three categories as shown in fig1:

1) ***Event aware services:*** These services detect particular event occur in physical environment and provide information about that event.

2) ***Context aware services:*** Context is refers as any information which can describe the situation of an entity [3]. These services take context as output message and can recognized the received context as output. The service context includes three parameters: location, category and energy. Location, as the most important context specifies the action area of a service such as room; corridor; etc. More precisely, it is the area from which the service gets information or for which it sends information. Category indicates whether the service is designed for context acquisition or context analysis. Energy indicates the energy level of the device which hosts the service [2].

3) ***Devices aware services:*** These services control and configure the devices disseminated in the environment and allow executing physical tasks such as opening a door, switching on light, etc. This category of services can produce various effects on the controlled devices.

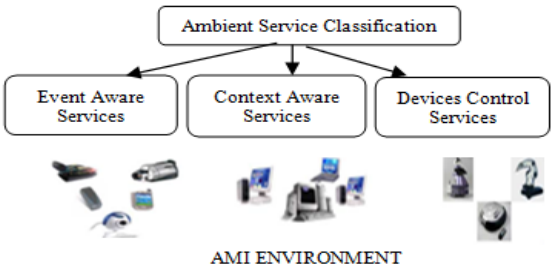

Figure 1: Ambient environment services classification [1]

B. Quality of service (QOS)

QoS describes the capability of a network to supply better service to user anytime over the network. It describes the characteristics of service supplied by ambient environment. Quality of service is the capacity of network to give different responses according to the requirement of applications, users, and provide a guarantee for continuous flow of data. The factor that impaired quality of service may be classified into "human" and "technical" factors. Human factors include stability and easily accessibility of services and user information. Services are reliable, scalable, and effectively provided to user including in the technical factors. Quality of services (QOS) can be reached by decreased the power consumption of composite resin solutions without effecting end user satisfaction.

Quality of services represented according these parameters:

1) Energy consumption

It identified over-all vitality consumption during the performance of services. Efficiently control an energy/battery usage of sensors/mobile units in order to improve battery life long and minimize vitality utilization and your essential level of web data superior regarding rate of recurrence and also reliability connected with sensing unit numbers within a specified physical area.

2) Service reliability

It described the number of received services from the total number of occurring services [2].

3) Response time

It's about time span involving the developing associated with expert services as well as performance associated with services. Additionally, it depicts the grade of time frame meant for the tangible expert services to be able to respond to presented input.

4) Dynamic service adaptation

Service selection scheme in this environment is self-adaptation. It means it is automatically handle the changes occur in the physical devices, network connection.

5) High level failure

Described the number of not handled services from the occurred services in the global services selection (i.e., Inside a services composition graph) [1].

6) Low level failure

Represent the number of negative responses occurred in the local services (i.e., inside a services class) [1].

C. Simulated annealing (SA)

Simulated annealing is one of the several heuristic optimization techniques that have been studied in the past to found out the most effective mix of weapons and their allocation to enemy targets in a multilayer defense scenario. Simulated annealing is a general stochastic search algorithm. It is an optimization method to find a near-optimal solution for optimization problems, but it is very difficult to give the accuracy to the founded solution [17].

The word simulated annealing come in exists from the roughly analogous physical process of heating and then slowly cooling a substance to obtain strong crystalline structures. The simulated annealing process lowers the temperature slowly until the system freeze no further changes occurred [15].

1) Comparison with other methods

a) Genetic algorithms

In the genetic algorithm approach finding the shortest path has high probability when the numbers of iteration are high. Whereas in simulated annealing number of iteration not influence the result because it work on the principal of random selection. This method usually not provides better bandwidth availability [14].

b) **Artificial bee colony (ABC) algorithm**

Artificial bee colony (ABC) algorithm is based on swam intelligence and is applied to global optimization problems. It has poor convergence rate in some situation.

c) Gradient methods

These methods are given better result when there is only one peak. This method is fail in case of multimode function or multi peak function.

d) Iterated Search

Iterated search method is simple method finding the shortest path. It gives better result if function does not have a too many local maxima.

TABLE I. **COMPARISON TABLE**

Sr. No.	Authors name	Paper title	Parameters						
			Response time	Success Rate	Low level failure	High level failure	Power consumption	Service reliability	Dynamic service adaptation
[1]	A.Yachir et al.Jan 2016	Event-Aware Framework for Dynamic Services Discovery and Selection in the Context of Ambient Intelligence and Internet of Things	No	Yes	Yes	Yes	No	No	No
[2]	Ali Yachir et al.27 June 2012	Towards an event-aware approach for ubiquitous computing	Yes	No	No	No	No	Yes	No

		based on automatic service composition and selection							
[3]	K. Tari et al.2010	Context-aware dynamic service composition in ubiquitous environment	Yes	No	No	No	No	Yes	Yes
[4]	Ahmad M. Nagiba et al.2016	SIGHTED: A Framework for Semantic Integration of Heterogeneous Sensor Data on the Internet of Things	Yes	No	No	No	No	No	No
[6]	Ali Yachir et.al.31 Dec 2016	A Comprehensive Semantic Model for Smart Object Description and Request Resolution in the Internet of Things	Yes	No	No	No	Yes	Yes	No
[13]	Mohamed Essaid Khanouche et al. Jan 2016	Energy-Centered and QoS-Aware Services Selection for Internet of Things	Yes	No	No	No	Yes	Yes	No
[14]	Yan Wu et al.2013	A novel method for calculating service reputation.	Yes	No	No	No	No	Yes	No
[16]	PengWei Wang et al. June 2014	Constraint-aware approach to web service composition	Yes	No	No	No	Yes	Yes	No

II. RELATED WORK

A.Yachir et al. [1] proposed a new service-oriented, user-centered and event-aware Framework has ability to performing services monitoring for automatically handled the events that may occur in ambient space. This monitoring is depending upon the dynamic services discovery and selection process to increase the self-adaptation to handle the unpredicted changes, and provide services with best quality. Ali Yachir & Yacine Amirat et al. [2] in this paper author provide a variety of high level and complex services by combining active services using two main phases: off-line phase and on-line phase. It overcome the issues like automatic service composition with little human interference, context and quality of service management, and service selection under unpredictable changes. K. Tari, Y. Amirat et al. [3] proposed a layered design framework that is used to robust the negative service response. İn this method re-composition time and the number of services optimizes improved by removing the phase of rediscovery in large-scale environment. Ahmad M. Nagiba et al. [4] SIGHTED a sensor data integration framework is proposed to find out the availability of sensor data from the various sources. It enhanced the scalability of system and provides accessibility for sensor data anytime, anywhere to user. It has an ability to query and reuse integrated sensor data from multiple sources to create more flexible horizontal applications. Ali Yachira et al. [6] in their proposed worked author use description logic with help of ontology techniques evaluate new semantic model for smart objects. It provides description of iot devices as per user request. It improves the services availability that shares the same or similar functions. Zefang Li, Huajing Fang, Lisha Xia et al. [8] in this paper increasing mapping based hidden Markov model (IMHMM) is used to identified dynamic process state and reduce the memory requirement. Wanchun Dou et al.[9] In this paper author using the k-means algorithm select the previous record so that it protect the cloud privacy, as result it reduce the time complexity. Noha Ibrahim et al. [10] evaluate the user request by providing the services according their availability. It improves the efficiency of services in real time. Swaroop Kalasapur et al. [11] in this paper user provide resources to user according their requirements. It provides facilities like user mobility, heterogeneity, and the uncertain nature of involved resources. Mohamed Essaid Khanouche et al. [13] in this paper author reduce the energy consumption using the QoS constraints relaxation technique. It improved the selection time of services and energy efficiency. Yan Wu, ChunGang Yan, et al. [14] in this paper user described a method to calculate the reputation of a service, which can be explained by an olfactory fatigue phenomenon**.** This method gives more accurate results than others. T.R.Gopalakrishnan Nair et al. [15] In this paper author's find the optimal path using two heuristic techniques genetic algorithm and simulated annealing algorithm. These techniques increased the bandwidth along forward channel and decreased the route length. PengWei Wang, ZhiJun Ding et al. [16] Proposed work used to graph search-based algorithm is use to handle the constraint that has an impact on service composition. Sanjay Bisht et al. [17] in this paper author evaluated two optimization techniques such as genetic-simulated annealing. It extracts the feature of local stochastic hill-climbing from simulated annealing and local crossover operator from genetic method. It reduces the computation time. Wonpil Yu, Jae-Yeong Lee [18] in this paper author described communication protocols to exchange

data between the robotic spaces, and then implemented a robot security application. This framework give knowledge about virtual space, Utilization of sensor network was implicitly defined. Mathias Broxvall et al. [19] It combine the robot systems into smart enivorment identified by ambient intelligence. Young-Guk Ha et al. [20] in this paper author proposed a framework SURF which has ability to automatically combine the networked robots into ubiquitous computing environments using a semantic technology. It automatically discovered the required services using the OWL_S ontology. Romain Rouvoy et al. [21] author explained how the planning framework handles a use case in which the Travel Assistant and the Instant- Social applications of a mobile user exploit ubiquitous services, such as location, map, and content services, to improve their utility whenever such services become available. The Travel Assistant has successfully validated the service binding and discovery.

TABLE II. STATE OF ART TABLE

Sr. no.	Author name	Proposed worked	Limitations
[1]	A. Yachir et al.	Proposed worked used to automatically handle the occurring events.	The impact of the different preconfigure parameters number of ambient services class, number of detected events is ignored.
[3]	K. Tari et al.	Proposed work is use to characterize the situation and location of given entity by using their context information.	This work is not giving information about events that are unpredicted in given domain.
[10]	Li, Zefang, Huajing Fang, and Lisha Xia	Proposed model use fuzzy cognitive map model in service selection and matching process.	This model is use only to detect single services not detect the event.
[11]	W. Dou et al.	Proposed model is use to improve the reliability of services instead of using the value announced by service provider, QOS service values are estimate by previous data. It uses k-means clustering technique.	It has some computational limitation due to use of k-means technique on large historical data values.
[12]	N. Ibrahim et al.	It uses service adaptation mechanism.	It works only in case of appearance and disappearance of services.
[13]	S. Kalasapur et al.	Support dynamic appearance and disappearance of devices.	It does not successfully explain self-adaptation process. Triggered in case of composite plan failure.
[14]	J. Y. Tigli et al.	The proposed work is assembly of the internal component of composite service is update without changing its basic components.	It is fail if some basic components fail runtime.
[18]	Wonpil Yu, Jae-Yeong Lee et al.	Proposed worked evaluate capabilities of the robotic like its decision, recognition power using the techniques mobility-supporting algorithms, precision localization networks, dynamic reconfiguration, and virtual world modeling.	It does not support any selection especially when several context interpretation networks are available for same situation.
[19]	Mathias Broxvall et al.	Purposed framework is truly suitable for robotic applications, where devices having large scale capabilities act in uniform way.	Proposed worked does not handled service selection use just first correct configuration that can be found.
[20]	Young-Guk Ha et al.	Purposed framework is capable automated incorporate the networked robots into ubiquitous computing environments using Semantic technology.	Does not include mechanism for service selection and cannot handle the unpredictable changes.

[21]	Romain Rouvoy et al.	Design framework for self-adaptive mobile applications. It dynamically adapts the changes and improved the utility of application in given execution context.	Does not support context changes, mainly when services not available or fail at runtime.

III. CONCLUSION

This paper survey's a service-oriented, user-centered and event-aware framework which has the ability to perform services monitoring for automatically handling the events that may occur in ambient environments. The comparisons of ambient services depends on various parameters has been carried out. The review has shown that still IOTs suffers from these issues the impact of the different preconfigure parameters number of ambient services class; number of detected events is ignored. So to overcome these issues we will propose simulated annealing based automatic ambient services classification.

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