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A Study of Context Aware Applications

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Abstract:
Context aware computing has continuously been vying for the attention of technology enthusiasts. And gradually accruing, it is finally getting accepted by developers and business analysts around the world who now consider it as an important factor which contributes towards customer satisfaction and business proficiency. No doubt that it has a promising future ahead. The goal of this research study is to put forward a literature review of the various context aware applications along with the issues they face.

Keywords: Context Aware applications, review, evolution

1. Introduction

Context is formally defined as "the interrelated conditions in which something exists or occurs" [1]. In the computational world, context is being used in applications that have the ability to make sense of their environmental conditions and use this knowledge to provide certain resourceful information to the users.

Most of the research in the domain of personalized recommendation focuses on suggesting items based on the user's preferences without taking into account any contextual information such as weather information, day time, day of the week, location of the user, proximity to other users etc., however, these contextual information plays a decisive role in presenting accurate recommendations to the users.

Context awareness, first used in terms of ubiquitous computing by Schilit in 1994 [2], was an altogether new concept a decade back. It gradually started gaining recognition from Scientists and Computer Experts and became an interesting area of research. Currently, we are on a whole different level of context aware applications, but still there's so much left to exploit. Scientists and Domain Experts continue to research this grey area with an aim to improve the richness and quality of human computer interaction, in terms of communication and inferring the gathered information to provide the best services modern technologies can provide. F or this, applications should have the capability to be aware of their environment and be adaptive to the fast changing environmental conditions. Thus, the odds are pretty high that Context Awareness can be a game changing technological advancement which, if exploited to the fullest, can become a huge asset, not only for the researchers, but for the common people as well.

Through this research study, we present the challenges and the issues associated with the current context awareness systems and a literature review that can help researchers to make use of existing technologies in order to iteratively improve the present technologies.

2. Problem Foundation

A context aware system provides suitable services or content to the users by using contextual knowledge. However, context awareness is still an emerging field of research that needs to be scrutinized for deploying its complete advantages. In this section, we divulge various obstacles in the field that are not yet discovered.

1. Architecture of context aware applications is still in its early stage of development. Support tools like context sensing devices are yet to be developed so they can collect suitable data to adjudge user's preferences.
2. It is not clearly defined what context is needed for different applications. The challenge is to first collect useful information and then to decide what factors weigh more than others.
3. Sources of context information vary widely and may have been replaced dynamically by other sources.
4. Sources of context information include, sensors, web services, publish-subscribe systems, instant-messaging systems, static repositories such as databases and calendars and so on. Different sources of context information provide data in different formats and in different units of measurement which then needs to be analysed and aggregated to make good use of it.
5. Also context aware systems raise privacy issues among the users. Users are skeptical about the fact that their collected personal and sensitive information can be misused.
6. Polling passive data sources at regular intervals can result in excessive processor and network load if the desired interval is too short, or in worned out data if the interval is too long. Some active data sources may generate data at inopportune times, when the data is not really needed.
7. Despite the fact that context awareness has forayed a decade ago and looked upon as the abettor of the various domains, it still hasn't been able to make its mark.

8. Customer satisfaction is another area where context awareness has to establish its foothold.

3. General architecture of Context Aware Applications
To better understand how such applications work, we considered summarizing the whole architecture of a general context aware service. Fig 1 explains the service architecture of context aware application [3].
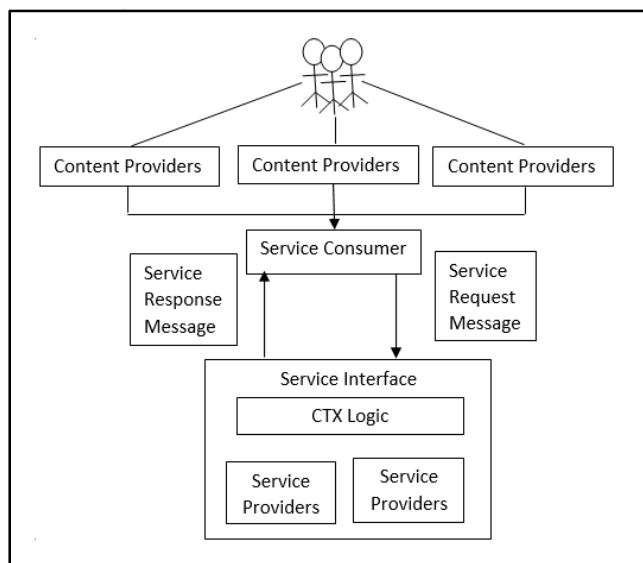

Figure 1: General Architecture of Context aware service

Content provider encloses all the sources and the mechanisms by which information is accumulated. Some of the sources include GPS services, sensors and so on. Once the desired information has been gathered, it is sent to the service providers with details of the requested functions in the form of a service request message. Service providers then processes the information using a business logic to provide service that best meets the requirements of the users in that context. And finally, the response message containing the functional information and selected context information is sent back to the service consumers.

4. Literature Review
Evolution of Context awareness started with a small program developed by Roy Want et all in 1992 [4] primarily for telephone call routing. Following is a literature review of how context aware applications evolve throughout the time.

YEAR	AUTHORS	APPLICATION	REF
1992	Roy Want, Andy Hopper, Veronica Falcão and Jonathan Gibbons	The system provides a way to locate different active badges wearer using sensors that are attached to the badges and are responsible for sending and receiving unique infrared signals. The system is mainly used for telephone call routing.	[4]
1994	Bill N. Schilit, Norman Adams, and Roy Want	Authors presented a multi user drawing application in sort of a virtual whiteboard. When a person enters a room, the application automatically binds the person's mobile host and the virtual whiteboard present in the room. The application was also designed in a way that it can detect group of people and not just a location.	[5]
2001	Anind K. Dey, Gregory D.Abowd and Daniel Salber	The authors tried to developed a Context Awareness Toolkit that can be used for prototyping, and eventually designing and developing Context Awareness Applications. The authors have also put forward an organized design approach that assists in finding context abstractions which ultimately leads to a software design.	[6]
2004	Jakob E. Bardram	The author introduces the concept of Context Aware Hospital Bed and a context aware pill container. The hospital bed would be installed with a computer that would serve as an entertainment system for the patient and can also be used to generate the medical records of the patient whenever a nurse/doctor enters the active zone (Patient's room). The pill container is also used to remind the patient about which pill to take at what time.	[7]
2007	Chih-Yung Tsai, Shuo-Yan Chou and Shih-	A location aware tour guide system is used to locate the visitors in different context in a Taiwan museum and provides a customized service as a tour guide of the museum.	[8]

	Wei Lin		
2007	Carlos .A Gomez-Uribe and Neil Hunt	Netflix, started as a DVD-by-mail service in 1998, and now serves streaming to over 190 countries. The company is using a complex ecosystem of algorithms which they use to dynamically recommend TV shows and movies on the basis of their customer's preferences.	[9]
2008	Ying-Wen Bai and Yi-Te Ku	Ying-Wen Bai and Yi-Te Ku introduced automatic room light detection and control. By using pyroelectric infrared sensor circuit and light sensor circuit, they detect whether someone is passing in and out of the detection area. At the time of insufficient room light intensity, all the lights controlled by Home Light Control Module are turned on and using RF modules, send signals to the nearby Light Control Module to turn on its light. This would result in the increase of light intensity. The main aim of the design was to achieve high efficiency in home power management.	[10]
2010	SRI International and Apple Inc.	Starting summer of 2007, SRI executives began the project of designing SIRI, a virtual assistant which is a voice control software that let people ask questions and SIRI will provide answers to or perform a given task. SIRI was later acquired by APPLE in April 2010 and was one of the features in IPhone 4S.	[11]
2012	Wael Alghamdia, , Elhadi	The authors propose a Context Aware Driver Assistance system which would be used to warn the driver against possible hazards and reduce	[12]
	Shakshukia and,Tarek R.Sheltamib	the chances of an accident. The authors have discussed many functions like adaptive cruise control, blind spot detection, lane keeping assistance function and the like which would use the current environment of the vehicle and immensely reduce the number of accidents on the road.	
2014	Google	Google has launched it's much awaited android wear which certainly has changed the game in many ways. Loads of features and presence of precise information when needed have showed the potential of context awareness. Based on your location this can tell you where you are at current time and give you issue relevant notifications.	[13]

Table 1: Study of Context aware systems

5. Conclusion and Future Scope

We are on the verge of seeing the context being applied much more sensibly and rationally rather than just to detect the current location. More than being at a specific location, what we are doing at that location, the environment we are in, what infrastructure is present, temperature information, acceleration, flickering light, pressure are some of the factors that need to be analyzed to give user a sheer experience and the information they covet. In this survey, we tried highlighting the evolution of context aware systems by the means of various significant context aware applications that prove to be a milestone in the history of this domain.

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