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RFID-Context Awareness System

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Abstract:

This paper presents the design and development of a context aware system using RFID technology. This system contains RFID tags RFID reader and a server as the processors and screen monitor at various locations. The objective of this system is to sense the location of the system and urgently deliver message to the user. This paper aims to design and implement an RFID-based reliable and efficient solution to sense the location of system. The wireless LANs are used to communication between the tag reader and the web server. The result of this survey has indicated that the proposed system is efficient and easy to use.

Key words: *RFID (Radio Frequency Identification), Ubiquitous Computing, EPC (Electronic Product Code) tag.*

1.Introduction

RFID is a technology for automated identification of objects and person the skillful human being are at identifying objects under a variety of challenge circumstances [6]. In the morning, all bleary –eyed people can easily pick up a cup of coffee on a cluttered breakfast table. According to computers vision it perform this task very poorly. RFID may be viewed as a means of explicitly labeling objects to facilitate their perception by computing devices.

The use of RFID technology may lead it in a variety of application like factory automations and integrations, B2B and B2C networks [1], smart parking lot access [2], material tracking information systems [3], libraries management systems [4], hospital management system, Pharmaceutical manufacturing [5] , supply chain management and Airline baggage Identification.

RFID is an automatic identification method, relying on storing and remotely retrieving data using devices called RFID tags. These tags are also known as EPC (Electronic product code) tags. The RFID tag includes an antenna and a chip, a reader equipped with antenna and a transceiver and a transponder electronically programmed with unique information. The antenna emits radio signals to activate the tag and at the same time read and write data to it. Antennas are the middleman between the tag and the transceiver.

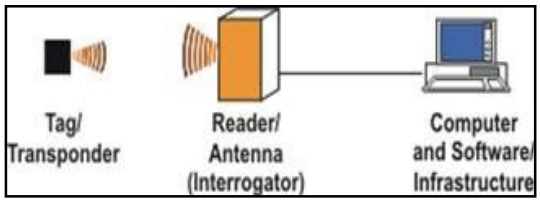

Figure 1: RFID Infrastructure

2.Context Awareness

In the ubiquitous computing context awareness is the important issues in the academic and the industrial area. Context awareness is point that describes the ability of the system to provide personalized service on the basis of detected context. Context is that information which characterizes the situation of any person, place or object that is considered relevant to the interaction between a user and an application [7]. The basic idea of context awareness regarding application is to recognize not only environmental condition and location but also status of internal system and provide users with smart

services that fit on user intention and their current situation. These are called external and internal conditions and events are known as context.

Context is characterized into four types that are Time, Identity, Location and Entity. First, Time context comes in use when the user enters in a service zone and if the service is available at that if the service is available at that time that means the service is working for the users. Second, Identity refers the user whom the system is communicating. Third, Location represents the location of the user or the location of an identity that the user is interested in. And the last is, Entity which refers to the portray information of anything that the user may be currently using.

There is a huge difference between Context Awareness System and Traditional computer system. Generally, these systems ignore contextual information. Their outputs are based on the explicit input data to the application as given by the user.

3.**RFID-Context Awareness System**

This paper presents RFID Context Awareness System that implements context aware concept for a system using RFID technology. R-CAS is leveraging on RFID technology to ensure the notification reached the intended audience before the given deadline. The mean of using RFID for context awareness system is to detect, sense, interpret and respond to user by adopting automatic identification method, relying on storing and remotely retrieving data. RFID System can identifies the user's intention by sensing the change of a tag values or observing the environmental conditions by reading tags attached to objects, people or locations.

Features of RFID system are really very important.

Firstly, the value it read is clear, accurate and explicit. RFID system can read multiple data concurrently at higher speed rate than other sensors.

Secondly, to view surrounding values RFID needs at least two elements, a tag and a reader. Because when the systems a tag value, that means the system has tag value and the reader's ID.

Third, RFID can easily cooperate and combined with other sensors. Individually, RFID is unable to sense the physical environment like temperature and humidity by itself.

4.System Design

4.1.Context Model

By taking an example of Campus environment we have taken three types of context. Firstly, time context is taken to represent the timestamp of using system by the students. This obtained value will now evaluate and compare with the expiry date of notification posted by the staff. Identity context refers to the student who is going to receive the notification. This context will help to empower the personalization feature. Location context denotes the current location context denotes the current location or venue of the student while accessing the system. According to Abowd's dimensions [8] and design approach [9] we are modeling the context.

The model of our context is as follows:

Context::==Time_context+Identity_context+Location_context
Time_context::=Timestamp+Expiry;
Expiry::=Date+AM/PM+Hour+Minute;
Identity_context::=Personal_profile;
Personal_profile::=Tag_id+Course_id+Preferences;
Preferences::=['Book'|'Class'|'Sports'|'Events'|'misc'];
Location_Context::=Building_name+Venue_name;

4.2.Context Aware Category

We want that the system perform the required action autonomously based on presented and detected context [10]. The inferring mechanism is using IF-THEN rules and represented as follows:

IF<context1>
AND<context2>
….
AND<context(n)>
THEN<display_notification(i)>

For example, consider a scenario of which current context is as follows:

Time = ‘5 pm’

Identity = ‘1038’

Location = ‘Sports Complex’

Preferences = ‘Sports’

Then the rules will be presented as follows:

IF hour = 5

AND ampm = ‘pm’

AND location = ‘sports_complex’

AND preferences = ‘sports’

THEN display_notification = “inter-varsity football

league is on now”

5.System Architechture

System Architecture is important enough to determine the system’s framework and design. Mostly the RFID systems trigger their services on the event of RFID tag reading, so they are considered event driven.

As above in Context model we take an example of campus environment. For that the proposed System architecture is given by fig-2. When any student passes through any RFID reader, the reader will detect the presence of a tag(embedded in the student’s matrix card). We are now using passive tag in this system. Each and every student’s matrix card is assigned a unique tag ID and each reader is assigned a unique location ID [11]. The server will find the respective information in the database based on the detected tag ID and location ID. Once the server found the ID and the matching notification, it will then display the notification on the screen monitor nearby to the student.

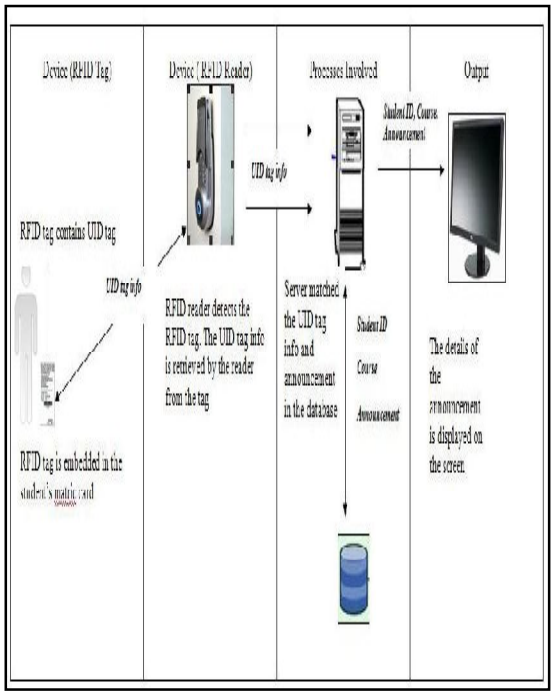

Figure 2: System Architecture

6.Conclusion

RFID technology provides an innovative solution to the present business process and management. Various companies and academia prefers RFID application as a tool to re-think about the design of business process flows .RFID is something different from the currently used barcode labels. Hence, the RFID tag price is still much higher than the barcode labels. The tag price issue is always the biggest concern for the companies who are considering adopting RFID solutions.

We propose a design for a RFID context aware system(R-CAS) that aims to retrieve the information and deliver notification to the intended recipients in timely manner leveraging on RFID technology. We use contextual attributes such as time, location, identity and entity of the user in inferring the right notification to display in this system.

7.Reference

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