A Web-Based Appointment System through GSM Network

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ABSTRACT

Nowadays, the trend is clear that technologies are taking place in teaching and learning. As a message can be transmitted from a Web to a mobile phone, with the use of mobile phone and Internet access have been increasing rapidly, class organization seem to be possible in electronic form. This paper describes a study of information dissemination in teaching and learning. An Agent Notification for Appointment System will be developed in order to ease and facilitate user to make an appointment or announcement through a teaching web and will be notified via GSM Network using Short Message Services. The Notification Agent is responsible for the notification service on behalf of recipients. A notification generally comprises four data which are the recipient to whom the notification is addressed; the message store holding the message; the message identifier that the recipient uses for retrieving the message; and the (publicly visible) name of the account on the message store for the originator of the message. Since the system will run online, the web server used is Internet Information Services (IIS) and Active Server Pages as web-based scripting language and Microsoft SQL Server as database.

Keywords

Notification, Agent, Appointment, Appointment System
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1. INTRODUCTION

The variety of teaching and learning methods which is used within a course is an important ingredient in creating a course with interest to students. The way in which information is accessed and courses are delivered is changing. The Internet is one aspect of this change. Most teachers approach the Internet with a certain degree of apprehension. Many academicians have access to the Net through their institutions. The Web is the primary means by which tutors deliver online materials to students. However, the use of this web can be enhanced to serve several needs in the environments. Moreover, the Internet provides an infrastructure that supports unprecedented communication capabilities and opportunities for collaboration.

Many models of interaction for information dissemination in teaching and learning have been contributed but mostly are on content flow. Besides content flow, teaching and learning also include class organization.

Intelligent agents are pieces of software that are designed to make computing and other tasks easier by assisting and acting on behalf of the user. The user interacts with the agent at a user interface while the agent senses and acts autonomously in a work environment such as an operating system. The agent performs a given task using information taken from its environment.

Sankar Virdhagriswaran of agent technology company Crystaliz Inc. define that the term *agent* is used to represent two orthogonal concepts. The first is the agent's ability for autonomous execution. The second is the agent's ability to perform domain oriented reasoning. This definition can be expanded in certain areas. First, an agent executes; it acquires input and produces output. Agent processing is domain-oriented: An agent "knows" about certain concepts, data structures, rules, and interfaces but is not necessarily capable of interpreting information outside its field. An agent also "reasons" by encapsulating rules that allow it to transform conditions into decisions. And it operates autonomously by virtue of being persistent and capable of operating in a changing environment.

Notification services allow students and lecturers interact with different notification services. In this paper, we present a chained negotiation engine, enabling notification services to support negotiation.

Notification services are messaging middleware components providing asynchronous communications

between services and/or users in a distributed environment. They are responsible for the delivery of messages between publishers and subscribers; publishers (such as information services) provide information that is then filtered and delivered to subscribe consumers [1, 2, 3] based on a specification of topic and delivery parameters.

In this paper, we discuss the proposed architecture of an agent notification that implementing chained negotiation.

Appointment is a time reserved for something such as a doctor visit, business deal, and much like a reservation. Recipient notification agents accept message notifications on behalf of recipients. Getting systems with many independent participants to behave is a great challenge.

On the other hand, an artificial intelligence agent is a computer program that assist user with a routine computer task and represents on behalf of human agents. These agents are addressed to the capabilities of acting independently, exhibiting control over their internal state. Thus the core of these agents is the capability of performing flexible autonomous action, reactive, pro-active and social behavior. Agents are currently the focus of much attention in several application areas. But the tendency of having successful agency applied in such areas are corresponds to the appropriateness of an agent based solution. The Notification Agent is responsible for the notification service. The agent starts every day at a defined time by itself and yields the messages to mobile phones can be transmitted through the Web using Internet applications. Thus a single transmission from the application can transmit to the lecturer's mobile phones**.** There is an agent to play the role of multicasting/broadcasting messages to the mobile phones. As a message can be transmitted from a Web to a mobile phone, with the use of mobile phone and Internet access have been increasing rapidly, class organization seem to be possible in electronic form. In order to implement this appointment system, several requirements have been identified such as Web server will act as host, server side script for engine development and database to structure the data. Since the system will run online, the web server used is Internet Information Services (IIS) and Active Server Pages as web-based scripting language and Microsoft SQL Server as database.

There exist many definitions for intelligent agents, according to the number of fields of science involved in the topic and varying with the main area of interest: artificial intelligence, software engineering, networking, etc. In this context we will use the following definition: Intelligent agents are software

programs for the realization of specific tasks for an owner, using a degree of intelligence allowing them to carry out the work at least partly autonomous by interacting with their environment in a sensible way.

Some of the advantages of intelligent agents are higher efficiency in work, i. e. less time is needed by the user as agents work autonomously and more effectively because agents can search huge amounts of information and filter out important things which would be impossible for humans. This opens new opportunities like an arrangement of appointments inclusive of searching for the empty slot for an appoinment and responde to whom at may concern.

Agents have been discussed since about 30 years but are still at an early stage of development. With the rise of the Internet the interest in agents also grew, resulting in a number of environments focusing on different aspects. The very high expectations for artificial intelligence could not quite be met, so agents are today only semi-intelligent. This does not exclude some specialist agents, which can do their (limited) task with an appearance of high intelligence.

Especially in an education field which are concerned by the difficulties that have arisen by the conventional appointment system. Some of these problems are dealing with unsolicited and unwanted appointment, confirmation and notification to the appoinment that have been made. A rather ordinary, but increasingly important, problem is searching for an empty slot for the arrangment of an appointment according to the time table of lecturers individually. All these are, amongst many others, typical areas of application for intelligent agents.

An intelligent agent is one which is able to make rational decisions, i.e., blending proactiveness and reactiveness, showing rational commitment to decisions made, and exhibiting flexibility in the face of an uncertain and changing environment [4]. A number of significant applications utilising agent technology [5] have already been developed, many of which are decidedly non-trivial.

2. RELATED WORK

Mobile data communication has become a very important and rapidly evolving technology as it allows users to transmit data from remote locations to other remote or fixed locations. Mobile telephony took off with the introduction of cellular technology which allowed the efficient utilization of frequencies enabling the connection of a large number of users. Advances in software technology, ubiquitous devices and the increasing volume of digital knowledge offer the opportunity for more sophisticated and user-friendly digital services. Mobile software agents

represent one of recently emerged paradigms related to pervasive computing that carry a tremendous promise in solving some of the real world problems. Within the explosive data and wide range use of mobile communications, the use of artificial intelligence (AI) technique may allow mobile units to be an ultimate personal assistant.

Agent-based systems technology is one of the AI generation has generated lots of excitement in recent years because of its advantages and opportunities for embarking new concept of conceptualizing, designing and implementing software systems [6]. A major value of intelligent agents is that they are able to assist in searching through all the data. The mobile agent's paradigm is a useful and important technology enabling pervasive and ubiquitous computing [7]. Additionally, the ability of agents (i.e. mobility and intelligent) is ideally suited for performing adaptation in pervasive systems. This combination results in agents changing their information retrieval and locations according to newly available data. Therefore, the framework of such system design should be established in order to remains its effectiveness.

Apart from wide range application of agent-based in other domain (i.e. business, medical, network), agent application in teaching environment also had create its avenue [8]. The growth of mobile devices has tremendously increased its usability and provides more easy access. As devices become smaller and more portable, the demand for computing and networking solutions while on the move has increased steadily. In education field, the use of these devices may be enhanced with some technological optimization. While learning organizations offers various way of student-teachers communication, mobile devices can be used to extend this communication [9]. Hence, agent-based technology systems are assumed to involve AI and include a degree of autonomous problem-solving and communication ability. Also state by [10] that agent should react as a perfect helper.

Razek, Frasson, and Kaltenbach proposed the application of software agents to provide distance learning students with timely and useful information on a group discussion [11]. The software agents can observe conversations among a distance learning community. While [12] proposed an agent-based distance learning system for effective delivery of course material. Additionally, [13] reports a development of a knowledge and expertise on customized mobile services that can be realized on next-generation mobile networks. However, this study tackled the communication in terms of student-teacher appointment arrangement using mobile devices.

Developing intelligent communicator systems that incorporate these agents will offer some challenges [8][14], as well. Understanding these challenges and the merging opportunities will help educational technology administrators prepare to take advantage of the next generation of communication in teaching and learning environments.
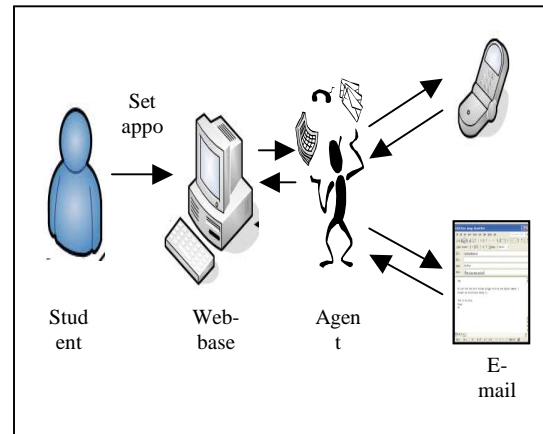
3. ARCHITECTURE

Figure 1. Proposed architecture

Figure 1 illustrates a proposed architecture for agent-based student appointment system. The role of agent here is to organize the delivery message from the server to the lecturers' mobile phones and lecturers' e-mail. An agent autonomously set status as pending if lecturers' doesn't reply to approve the appointment and if the appointment was setting up at an empty slot, an agent will notify the lecturer that an appointment has been accepted but subject to reject with reason. Student will set an appointment using front-end web interface and the system will request approval for the appointment. If the system received an approval from lecturer then appointment status will change accepted otherwise if the slot is currently empty (free from other commitment), an agent will automatically set an appointment to the particular slot then notify the lecturer regarding the appointment.

4. METHODOLOGY

The methodology used is adopted from [15]. There are two research approaches as suggested by [16] involved in the methodology which are; the investigative, elicitative and deductive approach; and, the analytical, constructive and hypothetico approach. Generally, the methodology with the main tasks is illustrated in Figure 2.
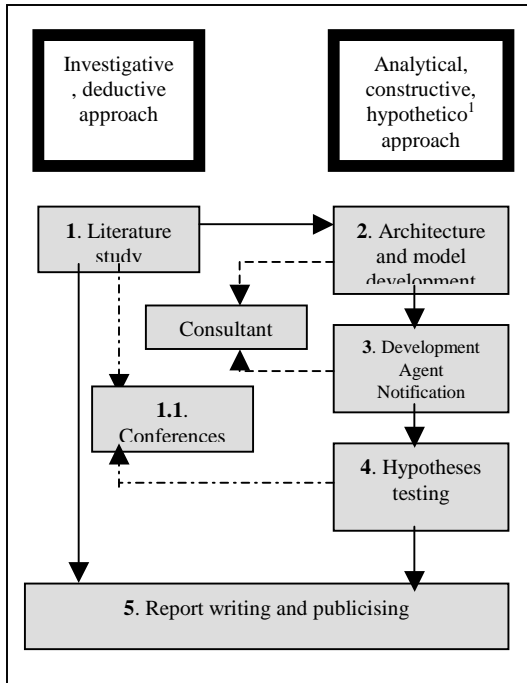
Figure 2. Methodology

5. IMPLEMENTATION

This section focuses on the implementation of an Agent-based Appointment System that is currently under development. This actual application consists of the following components:

1. An web front-end that allows a message to be sent to a lecturers' mobile phones
2. An SMSC database which contains the settings for various user mobile phones

This system is a web-based application which utilizing computer as client and server. Internet Information Services (IIS) will function as host to locate application files so that it can be accessed through Internet. The client was developed using HTML, ASP and Macromedia Dreamweaver, Microsoft SQL Server as database. Operations and dialog with the SMSC API were performed with ASP and GSM modem.

Active Server Pages or simple known as ASP is a Microsoft scripting technology that it uses to develop web-based application. In order develop the application; Macromedia Dreamweaver MX is used as an editor for Interface and agent development process. Microsoft Access will be

used as database to store and keep all the data available and record the transactions.

6. CONCLUSION

As an on-going project we can conclude that the effect of increasing volumes and sizes of SMS on cellular phone can be significant. Rather than facilitate user to make an appointment for students and lecturers, this system also performing flexible autonomous action, reactive, pro-active and social behavior. The great challenge and main work remaining is to make sure that the system will behave with many independent participants.

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