



Research Article

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The interactive technology to intelligent office systems

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ABSTRACT

This paper designs and implements the intelligent office systems based on the intelligent interactive technology. The experiment results show that the presented method can implement the somatosensory interaction control for smart office effectively.

Key words: Intelligent Interactive; Design; Implementation; Intelligent Office System

INTRODUCTION

The development of modern colleges and universities is to try to become a high-tech digital platform [1]. Nowadays, the government, enterprises and other fields have formed an intricate information network, then high speed information transmission, timely information processing and fast information storage seems to be rather crucial [2]. As the basis and important component of the administrative management informatization, OA (office automation) is a rebuilding process that realizes the integration, perfection and digitization of modern office process and organizations, which is the only way to modern administrative management and the e-government development, also the necessary condition of improving the scientificity and objectivity of decision making, enhancing democracy consciousness and increasing administrative transparency [3]. The rapid development of computer network technology has not only provided a powerful network information-processing platform for different departments and units of Chinese social production, but also offered a strong technical support for the leapfrog development of digital campus construction in universities [4]. With the advent of knowledge management and informatization era, the past low-efficiency working mode and information processing mode have been far from enough to meet the requirements of modern campus network development [5-6].

REQUIREMENT ANALYSIS

During recent years, Guilin University of Aerospace Technology has worked actively to adapt to the digital demand of modern universities, enhanced self-consciousness and increased the investment in manpower, materials and financial resources, which has achieved some improvements for campus informatization in infrastructure and network construction. However, the whole work is still far from the demand and remains in the initial stage of the integrated development, which are mainly reflected in inadequate demand analysis, imperfect top-level design, mismatched infrastructure, obviously lagging-behind software construction, poor safety protection and office automation not systematic enough etc. These problems have greatly restricted the further development of the informatization construction in the college. They results from both immature external environment and mistaken concepts in office automation. Main causes are:

- (1) Computer infrastructure of most units with office automation is not integrated. They use independent personal computer only to complete word processing and form processing or make simple e-mail exchange through network.
- (2) The function of developed application software is too single. For long period, mature office automation software products still remain to focus on the processing of words and forms, and no other user demands especially the business processing demand are included in office automation.

(3) Concept of office automation is wrongly understood and disseminated. The current understanding overemphasizes the automation of the office process and has deviated from the practical requirements of the college.

(4) The system automation disagrees with the manual operation. The introduction of computer management system in the office process will inevitably affect the current system. It is especially obvious in official document processing. Manual document processing mode has prevailed for tens of years, and there is a set of complete system and effective mode. Most office workers have been accustomed to this operation mode, so it is hard to change their work habits and some leaders and office workers even have doubts and resistance against office automation. Therefore, office automation should be popularized in right way with accurate concept.

(5) Unsatisfactory safety of the system. Since the emergence of the first computer, safety has been the most important factor that hinders the application of computers, especially during the network age, further application of Internet usually means external peep. Since the information transmission, processing and storage is highly confidential in the office automation system in the college, it is easy to become the attack target of hackers and hostile forces.

In order to ensure the security of network system, the college mainly adopts the following safety measures: controlling and managing users' permissions through the security control mechanism provided by the operating system, database, E-mail and application system; installing anti-virus software on network desktop workstations; setting firewalls and isolation devices at the joint between Intranet and Internet and adopting encryption technique for the transmission of crucial information. However, these security measures are far from enough as to the office automation system in Hotan Teachers College that usually processes dead secrets, so the system is easy to be attacked by hackers and virus, and the transmitted data may be intercepted or tampered.

SYSTEM DESIGN

The designed system should conform to the development rules of software engineering, with a reasonable structure, high operating efficiency and satisfactory performance. The system should own good flexibility and extensibility and take advantages of existing software and hardware resources. A design scheme is proposed for the whole system process according to the function demand of office automation system. The system can work functionally only after being logged on. When logging on the system, users should input right information so that the system judges whether they have the rights to login. Information of registered users is put in Session. For safety, direct input of address in the address bar is not allowed and an error page pops up to remind users of login when unregistered users input address directly or users have logged out.

(1) Functional Design. Office automation system mainly focuses on "office automation" in application and development, including state document approval and office management. Its main function is: lining with the document examination and approval in different departments, building an examination and approval structural system that accords with business requirements of all departments in the college so as to realize "approval automation", thus saving time and labor cost in transmitting papers and improving approval work efficiency.

The function of office automation is: to realize automation of data processing, data protection and the whole work procedure so that office affairs of the whole organization are in a safe, controllable, well-organized and high-efficiency state. As to information processing, the office automation system should be responsible for input, output, publishing, communication, storage and recovery of information. During ordinary office affairs, often-used information includes: data, voice, words, diagrams, images. The main function of office automation is: Data processing, Word processing, Diagram processing, Graphic and image processing, Data representation and E-mail.

(2) Database Design. A website with modules like User Login, Technology Forum, Contact Us, Online Test, Online Class and News and Trends will be designed through ASP and access, and operational tests will be made on designed web pages under the server environment and client-browser. Information of personal teaching websites is managed through database. Currently, various database systems can be used in websites and this website adopts Access 2000 database system, because the size of the designed web is small, suitable for small-scale intranet, besides, ODBC driver of Access performs more efficiently and the debugging is also convenient. In order to publish database through web pages, the first job is to build a database users need, containing the building of forms, indexes and storage procedure etc.

(3) Safety Design. Databases should be protected from illegal use that may result in data leakage, change or breach. In a database system, large amounts of data are centralized and directly shared by many users. They are precious information resources and relevant safety protection measures are necessary to prevent from malicious damage and illegal access. A fully functional database system should be safe besides being able to manipulate data accurately and involved safety problems are: How to prevent illegal users from using databases and guarantee data integrity.

SYSTEM IMPLEMENTATION

In order to realize intelligent control, firstly gesture recognition and voice recognition instructions of various household articles should be defined individually. Kinect icons are listed in the homepage of smart home system, shown in Figure 1.

All the start instructions begin with bridging arm shape. In order to prevent wrong operations, responses must be made within five seconds after the shaping of bridging arm, or the response is invalid. Pause with T-shape, such as the pause of open or close of curtains and windows. We can select close or open of Kinect, speech and somatosensory recognition to check the power-on state. Long-term operation of Kinect in smart home system will greatly shorten its life span, so a self-protection pattern should be designed in which Kinect will stop working automatically when no bridging arm shapes begin within the defined time range.

This system employs VS 2010 as the development tool and is equipped with Kinect for windows SDK 1.6. It obtains twenty nodes information of users' skeleton, and makes judgment according to the position relation of skeleton nodes represented with special user posture, thus realizing intelligent control of smart home system.

The recognition of gesture tracking is necessary for the control of smart home system and the author adopts the gesture tracking recognition based on Hidden Markov Models in this paper. Firstly, obtain depth information of images through Kinect sensor, then determine the palm position through the hand analysis module of OpenNI and abstract the tracking features, finally train the effective tracking samples and realize tracking recognition according to Hidden Markov Models.



Figure 1. Control Pages of Smart Office System

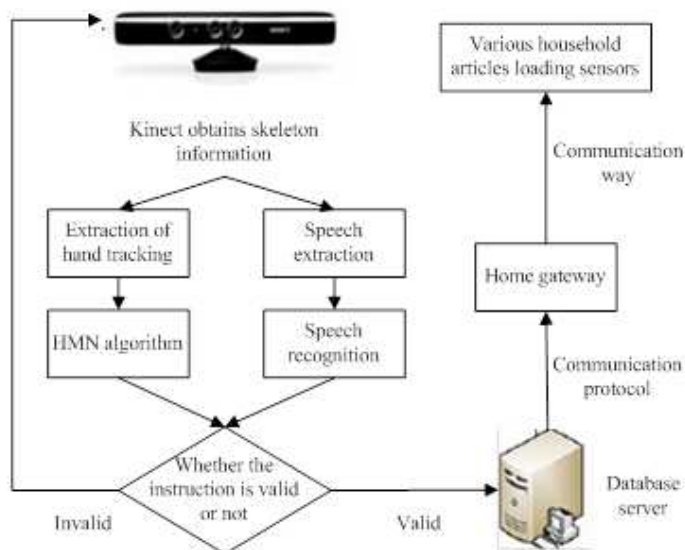


Figure 2. Control Flow of Kinect

Speech recognition is implemented through Microsoft Speech SDK in Kinect SDK which can realize speech recognition and control. However, it does not support Chinese speech recognition at present, so English speech is employed. Control instructions corresponding to gesture instructions and speech instructions obtained through Kinect are respectively associated with ZIGBEE, RS485 serial bus and Wi-Fi infrared control and then transmitted through gateway to realize intelligent control. The control flow of Kinect is shown in Figure 2.

CONCLUSION

This paper designs and implements the intelligent office systems based on the intelligent interactive technology. The related technologies, Smart Home System, Kinect Sensor and Active Server Pages are introduced, and the requirement of intelligent office systems is analyzed. The design and implement solution of intelligent office systems is proposed based on the intelligent interactive technology. The experiment results show that the presented method can implement the somatosensory interaction control for smart office effectively.

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