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A Wearable Computer Wireless Sensor Network

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Abstract: *The article proposes a type of interface using wearable computers as intelligent wireless sensor nodes and describes the architecture of wireless sensor networks (WSN), as well as the design that can satisfy the network's demand for wearable computers' intelligent nodes. The interface of the software system is studied dynamically generated, key problems such as dynamic service load, analyses the key problems affecting the overall experiment system performance, and proves the feasibility of the proposed interface.*

Keywords: Wireless sensor network, Wearable computer, Dynamic interface generation, Dynamic service loading

I. INTRODUCTION

The term "wireless sensor network" (WSN) refers to a collection of sensor nodes that operate in an ad hoc, wired, or wireless network, integrating sensor technology, embedded computing technology, distributed information processing technology, and wireless communication technology. It does this by utilizing a variety of integrated microsensors, real-time monitoring, sensing, and acquiring data from various environmental or monitoring items, using an embedded system for information processing, and then using a random self-organizing wireless communication network.

The user will be able to fully control and respond to the situation of the monitoring area after numerous hops interrupt the way information is perceived and provided to the user terminal.

The idea of a wearable computer has emerged in recent years as a new type of personal mobile computing system. It is a type of wearable, wearable mobile information system that is micro or extremely small, a wearable man-machine "best combination and coordination," and it aims to realize the inevitable conclusion that "the computer should be with the person this.". The goal of this wearable man-machine "best combination and coordination" is to realize the inescapable conclusion that "the computer should be with the person this." It is a type of wearable, wearable mobile information system that is micro or extremely small.

II. SYSTEM ARCHITECTURE

Based on the characteristics, the wireless sensor network based on wearable computers has the system structure shown in figure 1.

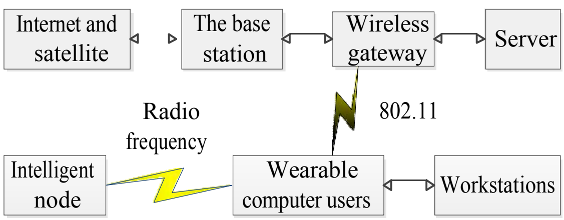

Figure 1: Experimental system structure diagram

Its characteristics are:

A. Dynamic Adaptive:

This architecture provides a monitoring mechanism in module, communication module and GPS module.Generally, the hardware for the wearable computer has been modularly restructured and is completely compatible with PCs. The exterior video is typically collected by the video capture module and wirelessly transmitted to the system using a zoom fixed micro camera and an active camera. The voice input, output, and voice actions supported by multimedia modules mostly involve headphones and microphone. Core modules integrated single machine system can be used, at the same time equipped with one hand holding order to ensure the network's ability to react dynamically, various pieces of equipment in wireless sensor networks (WSN) can be changed, and the results of such changes are sent to interested parties via a callback method.

B. Context Awareness

Wireless sensor network (WSN) provides a user context perception mechanism. By using this mechanism, the network may preserve the user's location context information and provide services for the upper programming interface, allowing for the development of wearable computers based on context-aware services and applications.

C. Distributed Service Mode

Through this service system, wearable computers may dynamically access the current network of different services while wandering in a wireless sensor network (WSN), while also allowing import licensing computers to own their own information and service networks to realize information sharing. Based on the design, a wireless sensor network experiment system primarily consists of hardware and software components.

II. HARDWARE DESIGN

As can be seen from figure 1, workstation computers, servers, networks, base stations, wireless gateways, wearable computers, and intelligent nodes make up the hardware of the experimental system. Wearable computers and smart nodes are the main ones that users must create, however additional hardware and services are also available.

2.1 Wearable Computer

The construction module of wearable computer mainly includes video capture module, multimedia module, core a keyboard mouse) (internal integration and VGA color display or wearing the QVGA eyes wore a display, to supply energy, lithium-ion batteries should be used. The mobile communication module is utilized to facilitate wireless voice and data transmissions, as well as the transmission and receiving of infrared and radio frequency data. GPS modules come with both GIS and GPS.

2.2 Intelligent Node

The intelligent node consists of processor module, radio frequency communication module, energy management module, I/O extension module and secondary storage module. The main processor USES a 4-mhz atmega103l8-bit MCU with 128K Flash and 4K system RAM. It contains a DS2401 silicon serial number, which gives each Smarter a unique identifier. RF module contains a single piece of TR1000 RF transceiver, the separate components as well as the need to perform wireless transmission, its send radius range from several meters to tens of meters, transmission speeds of up to 115 kbit/s. From TX modulation pin input current to control the transmission of energy, at the same time using DS1804 digital potentiometer to dynamically adjust the wireless sending energy. The wireless interface is directly controlled by the signals transmitted, allowing arbitrary communication protocols. A 4M Atmel AT45DB041BFlash can be used to store the text, voice, and video data that the user will use, while Flash on the main processor must be greater than 128K to hold the data. The energy module can adjust the supply voltage of the system, design a Maxim1678 DC-DC converter, and provide a stable 3.0V voltage. The I/O module interface has 51 pins extension connectors that connect to a series of sensor interfaces and programming interfaces.

2.3 Network Communication Section

The wireless gateway in the system covers the entire system. The wearable computer is equipped with a 802.11 wireless card that can be accessed through a wireless gateway into the experimental system to get the various services provided by the experimental system. Wearable computers and Smarter connect with each other via TR1000 radio frequency protocols at the same time as Smarter is integrated throughout the entire system. The wearable computer can monitor nearby Smarter and get current information and service information available for the current location. Smarter can monitor to the location of the wearable computer information and wearable user information, and to put the information sent to the control of its host, wearable computer via the host to provide active service. Serial communication connects Smarter and its host. The environment contains an autonomous Smarter (no control host), which can offer services directly to the wearable computer.

2.4 Servers

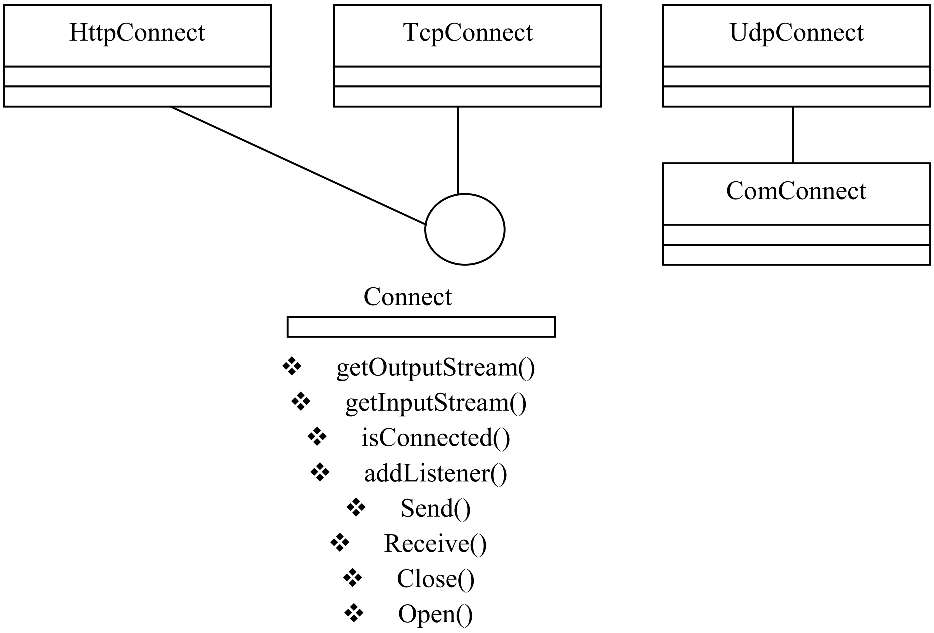

Figure 2: Abstract connection interface

IV. SOFTWARE DESIGN

Design using Rational Rose, to construct the entire software system, a UML design tool was used. Rational Rose is a tool for object-oriented analysis and design. The full-service system is constructed using Java development once the implemented modules have been designed, built, and then disassembled into class diagrams using this tool. The server actively offers the service to the user when it discovers the wearable computer, which is the approach taken by the system service system. The three main elements of the graphical interface service system are the network connection, servers, and wearable computer users.

4.1 Network Connection

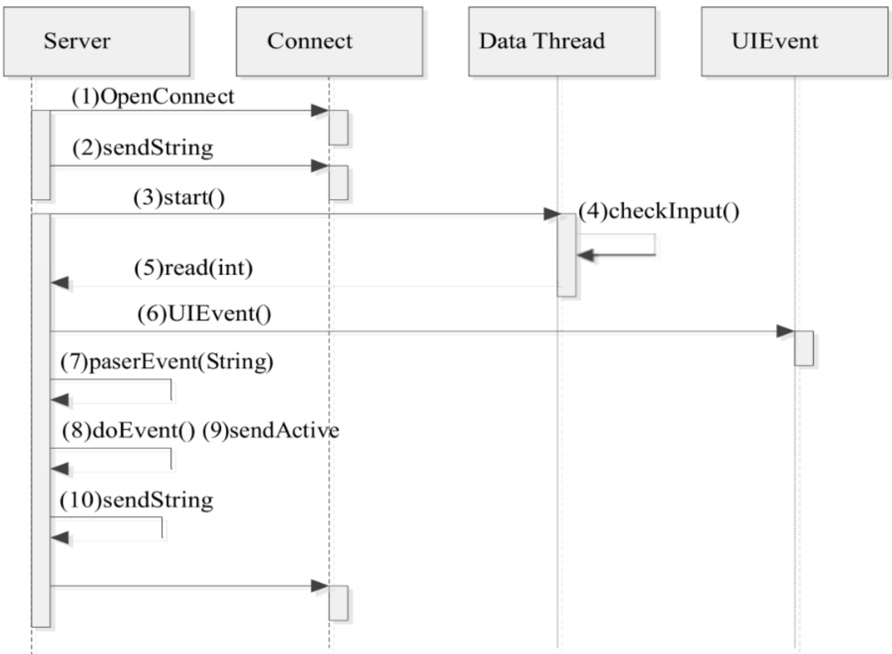

Figure 3: Server processes

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Figure 2 for all physical connections, specifies an abstract connection interface. Services and customers just need to access the network connection through this fictitious interface; they are not required to understand the physical media and communication protocol that are connected. These wearable computer users can change and adapt to different connection protocols automatically, allowing them to move around in different communication contexts. For network interface design, HTTP, TCP, UDP, and serial communication protocol are the four protocols used.

The service and the event processing and the interface generation/update modules are the three core modules found in the server. The server's graphical user interface is exported in an XML language by the interface generation module. The event processing module transforms the XML description's event parsing into a standard event. The service keeps track of the network-delivered events, carries out the appropriate actions in response to the event, and then notifies the wearable computer user of the outcomes. In figure 3, the server operation flow is displayed.

When the server user perception, Open the communication channel (1), send the XML GUI description (2), launch the network connection thread (3), and the network monitoring thread (4). When data is received, the data is transferred to the server (5). Data from active service data and generate an event parser (6), parse event (7), and then to deal with events (8), finally will behavior through the network connection is sent to the client (9) and (10), loop execution (4 ~ 10).

4.2 Wearable Computer Users

The User interface processing modules and the event processing modules, and application modules are all included in the wearable computer user software (App). A service is identified by an App object. The interface processing module receives the XML interface from the server, which is then automatically generated or converted to the common HTML/WML user interface depending on the user setup. The event processing module keeps track of user input and, depending on how the interface element binding behaves, when the user enters input, either updates the interface or sends the current event to the server

V. RESEARCH ON KEY ISSUES

The development and implementation of these experimental system depend on research in software systems, particularly the software for wearable computers. Dynamic interface generation and dynamic service loading issues have a direct impact on the performance of wearable computers as wireless sensor networks to implement their intelligent interfaces.

5.1 Interface Dynamic Generation Algorithm

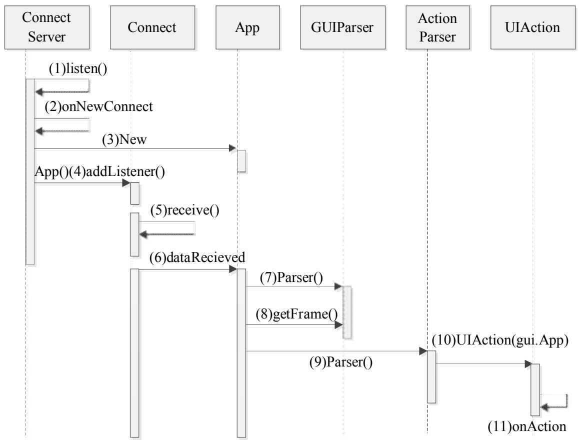

Figure 4: Wearable computer user processes

The goal of interface dynamic generation is to convert the XML description's GUI interface into a Java GUI interface. The algorithm additionally USES recursive methods since the interface description consists of a recursive description (an object containing child objects and child objects in the child objects). All the interface pieces are inherited from the UICreate class, which is introduced as the algorithm's central concept. Figure 5 illustrates how UICreate offers the abstract method of producing an interface primitive. The create function, which the UICreate XML Gui parser invokes to construct the object, is broken down into the following steps: The current element is initially created (3), then its Java component phase is accessed (4), and finally its attributes are set (5), (6) create child elements. Adds the created child element to the current object (7), parses the behavior of the current object binding (8), and relates the behavior to the event of the current element (9).

The process of wearable computer user software is shown in figure 4. As it listens to the network, the client launches the connection server (1). The user launches a new App when the server receives the active service request (2). (3). An app's network connection is established by the connection server (4). When the network connection is established (5), data is received and sent to the associated app object (6), the app determines the kind of data flow, and when the graphical interface for XML is created (7), the generated interface for the main window (8) is obtained and displayed. When the data flow describes the behavior of the behavior, the parser (9).

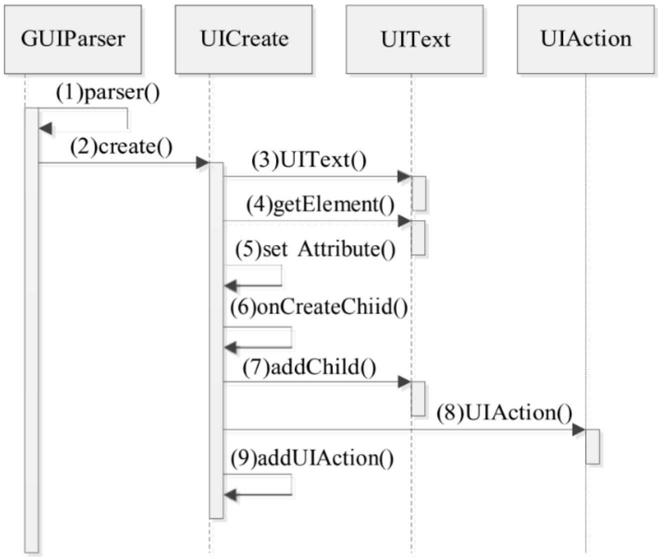

Figure 5: Interface analysis flowchart

5.2 Dynamic Service Loading

A specific dynamic service load process is shown in figure 6. When a user event occurs, the on Action(2) in UIAction is executed UIAction executes the behavior's on Action method (3)(4) after taking the behavior object registered in the exhaustive list. Calling a behavior object on Action method causes the behavior it stands for to be carried out; Create a calculator, and send server events (3) (6).

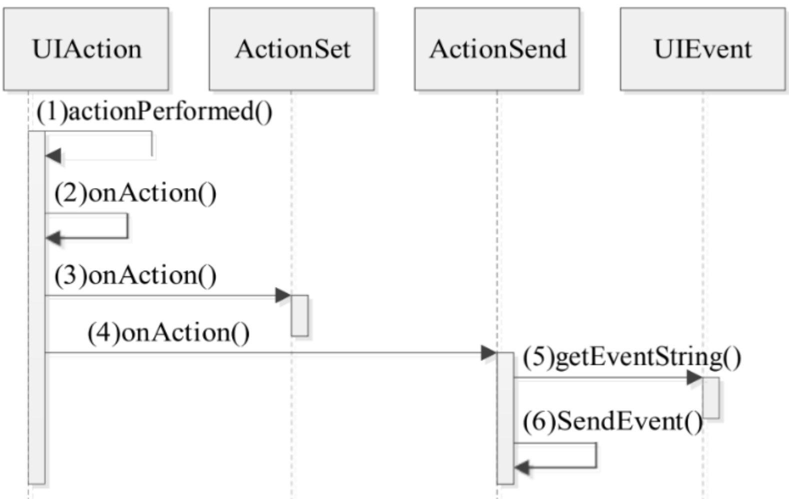

Figure 6: Dynamic service loading process

VI. CONCLUSION

The wearable computer, which serves as the wireless sensor network's (WSN) intelligent interface, is a good way to enable network user freedom of movement, fully utilize the network's resources, and provide services that can be tailored to the needs of the user. This enables computer applications to truly be "people-oriented.".

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