RESEARCH ARTICLE

Wireless Sensor Network Burning Method Based On Restful Framework

Xueyin Wen*, Ziliang Zhao**
*(China Mobile Group Henan Company Limited
Zhengzhou Henan 450000 ,China
Email:13603480047@139.com)
** (College of Software, Henan University
Kaifeng, Henan 475000 ,China
Email:zhaoziliang5@126.com)

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Abstract:

In this paper, we research a wireless sensor network burning method based on Restful architecture. With the Restful framework-based web server, users can log in to the client directly through the web page. The client sends a request by calling the put method in the Restful framework to get the data encapsulated in JSON format. The server connects multiple sensors through the USB burn-in cable, the initial state of the USB interface is set to disabled, the server opens the corresponding interface according to the request and controls the corresponding node of the corresponding sensor to complete the corresponding operation, after the burn-in process is completed, the USB interface returns to the disabled state until the next re-opening, which greatly simplifies the user's operation process and improves the burn-in efficiency.

Keywords — **Wireless Sensor,Restful Framework,USB Program**

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I. INTRODUCTION

Sensor is a detection device, it can sense the measured information, and according to certain rules will be measured information into electrical signals or other required forms of information output to meet the requirements of information transmission, processing, storage, display, recording and control. At present, the development of wireless sensor network has more and more applications in real life, and the development is very rapid. WSN(Wireless Sensor Networks)are wireless networks composed of a set of micro-sensor nodes in a self-organizing manner. Its purpose is to collaboratively sense, collect, and process information about sensed objects in the geographic area covered by the network and to distribute it to observers. Each sensor in a wireless sensor network has one or more nodes. The sensor node is usually a miniature embedded system. Each node monitors its own sensing range objects and specific behaviors. Each node must burn in the appropriate type. Hex file that triggers the node to start collecting data, transmitting the collected data to the nearest client, and then entering the aggregation phase, analyzing and processing the data collected from the off node, and then sending the results to the base station as needed, which sends the final results to the user terminal so that the user can know the information about the data he is interested in.

REST is Representational State Transfer, which refers to a set of architectural constraints and principles, and if an architecture conforms to the constraints and principles of REST, we call it a Restful architecture. HTTP is currently the only instance of REST, so the REST we describe here is also the REST implemented through HTTP. To make a resource identifiable, it needs a unique identifier, which in the Web is a URI (Uniform Resource Identifier). A URI can be thought of as either the address of a resource or the name of a resource. If some information is not represented by a URI, it cannot be considered a resource, but only some information of the resource. The Restful architecture should follow the principle of a uniform interface, which contains a restricted set of predefined operations that are accessed by using the same interface, regardless of the type of resource. The interface should use standard HTTP methods such as GET, PUT, POST and DELETE and follow the semantics of these methods.

A hexadecimal full name (Intel hex) file is an ASCII text file that consists of lines of text that conform to the Intel hex file format. In an "Intel hex file", each line contains one hexadecimal record. These records consist of hexadecimal encoded numbers corresponding to machine language codes and constant data. Intel hex files are typically used to transfer programs and data to be stored in ROM or EPROM. Most EPROM programmers or emulators use Intel hex files.

II. CLIENT

Users can log in to the restful framework-based web server through a web page, and the server returns the authentication token for subsequent sessions and subsequent data interaction processes to ensure the security of the wireless sensor network data; after successful login, the data is encapsulated in JSON format by calling the put method and sent to the restful architecture-based web server. The data request includes the following parameters: user IP, base station ID, node ID, hexadecimal file and token. Token authentication usually uses dynamic passwords. The so-called dynamic password is an improvement of the traditional static password. The numbers on the token are constantly changing and synchronized with the authentication server, which has the advantage of ensuring security, preventing theft and securing information. user IP is used for subsequent server-side return to the client task operation completion information. hex refers to the compiled executable file, which consists of some hexadecimal encoded numbers corresponding to machine language codes or constant data.

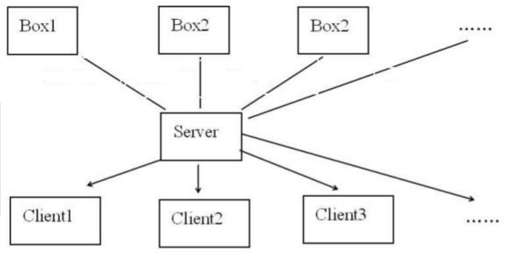

Fig. 2 Topology of wireless sensor networks based on Restful framework

As users, we do not need to care about the underlying architecture, but simply go to the login server. This can greatly facilitate the operation of the user, as can be seen from the diagram, and this method allows multiple users to burn wireless sensors at the same time, because on the server side, we want to operate the tasks, in order to arrange the FIFO ring task memory, which allows different ends of the task to be stored at the same time, according to the order of completion.

III. SERVER

The server will accept the login information from the user and verify that the username and password are correct. After verification, the algorithm generates a token based on the user name, password and current time and returns it to the client. The token is used as an authentication token for subsequent sessions and subsequent data interaction processes to ensure the security of the wireless sensor network data. When the JSON format data request is received from the client again, the request is put into the ring task memory of multiple FIFOs in the order of reception and then executed in a first-in-first-out manner.

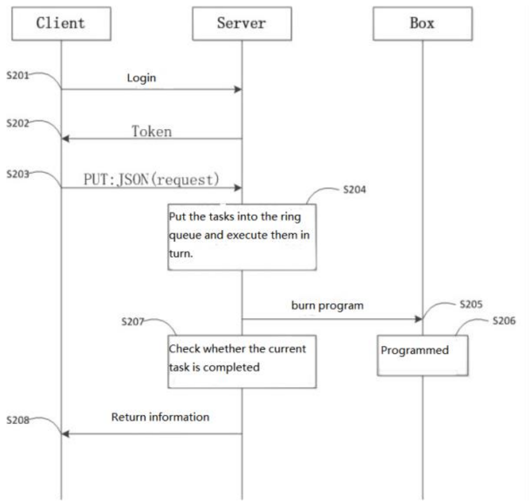

Fig. 2 Sequence diagram of wireless sensor network burning program

The current task to be executed is fetched, the JSON format encapsulated data request is parsed, and it is compiled into a batch file.The execution method is TDMA method, which specifically means dividing the time into periodic frames, and each frame is then divided into several time slots. Under the condition of satisfying timing and synchronization, the server can execute the tasks in the ring queue in each time slot separately without confusion, so that the tasks are executed rapidly, one after another, while each task uses their own time slice.The batch file is the burning program.The steps to generate a batch file are: find the corresponding USB device according to the base station ID of the parsed data request, in preparation for the execution of the burn-in later; find the IEEE address of the corresponding node using the base station ID, i.e., the node ID; write the contents of the hex file to the corresponding file and obtain the path to the file; then spell out the complete batch process according to the hex file path and IEEE address command, and write the batch command into a batch file with the .bat extension. Based on the request, the corresponding USB interface is enabled and the burning program is sent to the base station via the USB burning cable; the base station burns the received burning program data into the node corresponding to the logged-in client; then, the web server based on the restful architecture detects whether the current burning task is completed. If it is completed, the corresponding information is returned to the client and the USB interface corresponding to the USB burning cable is closed;

The server detects whether the current burn task is completed by detecting whether SmartRFProConsole.exe exits to achieve the specific steps are: build a process to execute the batch command; call SmartRFProgConsole.exe to execute the burn process; detect whether the local process exists SmartRFProgConsole. exe, if there is, and then detect whether the process exits, if the exit means that the current task is completed.then the next task is executed, and all burning tasks are completed in turn.

IV. FLOW CHART

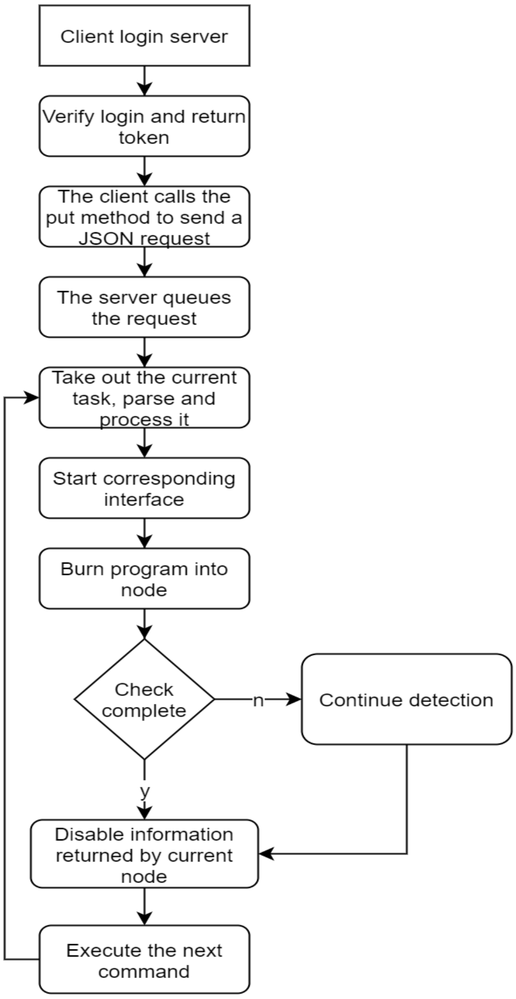
Client login server
Verify login and return token
The client calls the put method to send a JSON request
The server queues the request
Take out the current task, parse and process it
Start corresponding interface
Burn program into node
Check complete
n
Continue detection
y
Disable information returned by current node
Execute the next command

Fig. 3 Flow chart of the framework

Through the flow chart, we can clearly see the specific interaction process between the server and the client. The client sends a login request to the server, the server returns the authentication token to the client, the client sends an operation request to the server by calling the PUT method, where the data operation request is encapsulated in JSON format before sending for easy translation and identification by the server, the server puts the received request into the ring task queue, the server takes out the current task and executes it.

V. CONCLUSION

Through the Restful framework based wireless sensor network burning method, users can log in to the client directly through the web page, the client sends a request for data encapsulated in JSON format by calling the put method under the Restful framework, the server connects multiple sensors through the USB burning cable, the initial state of the USB interface is set to disabled, the server opens the request according to the According to the request, the server opens the corresponding interface and controls the corresponding node of the corresponding sensor to complete the corresponding operation. After completing the burning procedure, the USB interface returns to the disabled state until it is reopened next time, which greatly simplifies the user's operation process and improves the burning efficiency.

REFERENCES

[1] Duan Xiaoyang, Ma Huifang, Han Zhijie, Wang Guannan. Overview of intrusion detection system in wireless sensor networks [J]. Computer knowledge and technology, 2011,7 (13): 3004-3006

[2] Li Jie, Liu Xiansheng, Han Zhijie. Research on traffic prediction model of wireless sensor networks based on ARMA [J]. Journal of electronics and information, 2007 (05): 1224-1227

[3] Han Zhijie, Zhang Weiwei, Chen Zhiguo. Intrusion detection mechanism for wireless sensor networks based on Markov [J]. Computer engineering and science, 2010,32 (09): 27-29 + 68

[4] Ren Fengyuan, Huang Haining, Lin Chuang. Wireless sensor networks [J]. Journal of software, 2003 (07): 1282-1291

[5] Li Jianzhong, Gao Hong. Research progress of wireless sensor networks [J]. Computer research and development, 2008 (01): 1-15

[6] Shen Bo, Zhang Shiyong, Zhong Yiping. Clustering routing protocol for wireless sensor networks [J]. Journal of software, 2006 (07): 1588-1600

[7] Liu Q., Cui L., Chen H. M. Key technologies and applications of Internet of things[J]. Computer Science,2010,37(06):1-4+10.

[8] Yu H-B, Zeng P, Wang Z-F, Liang Y, Shang Z-J. Research on communication protocols for distributed wireless sensor networks[J]. Journal of Communication,2004(10):102-110.

[9] Ma Huadong,Tao Dan. Multimedia sensor networks and their research progress[J]. Journal of Software,2006(09):2013-2028.

[10] Ren Yan,Zhang Sidong,Zhang Hongke. Coverage control theory and algorithms in wireless sensor networks[J]. Journal of Software,2006(03):422-433.