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## Study on real-time monitoring for family environment based on embedding technology and internet technology

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### ABSTRACT

The construction of real-time monitoring system for internet home environment is realized through this process on mutual transmit of networking information and effective analysis, while the effective combination of embedding technology can effectively lower the construction cost of system and the scientific research and developing period so as to enable that the system design can meet the specific demand of wider users. In the process of study, the objective of system design is further defined mainly in this paper to plan the overall structural schematic diagram of system, and the systematic study and exploration are performed for the function that the system may play. Secondly, the discussion is performed mainly pertaining to the system hardware scheme, the extension of functional module for system is served as the subject so as to enable that the function in the developing process of system can be improved constantly. Afterwards, the relevant exploration of type selection process for software scheme of system is also performed, the constitution of software structure for system can be reasonable further; meanwhile, the coordination work capability with hardware can be improved continuously so as to provide more complete study process for overall construction of system. This is the theme thought for this paper in the study process; meanwhile, it also is the key that the real-time monitoring of home environment by embedding technology and internet technology can be effectively fused. The specific purpose and practicality for study can be observed explicitly from this study thought.

### KEYWORDS

Embedding technology; Internet technology; Monitoring system of home environment; Construction study.

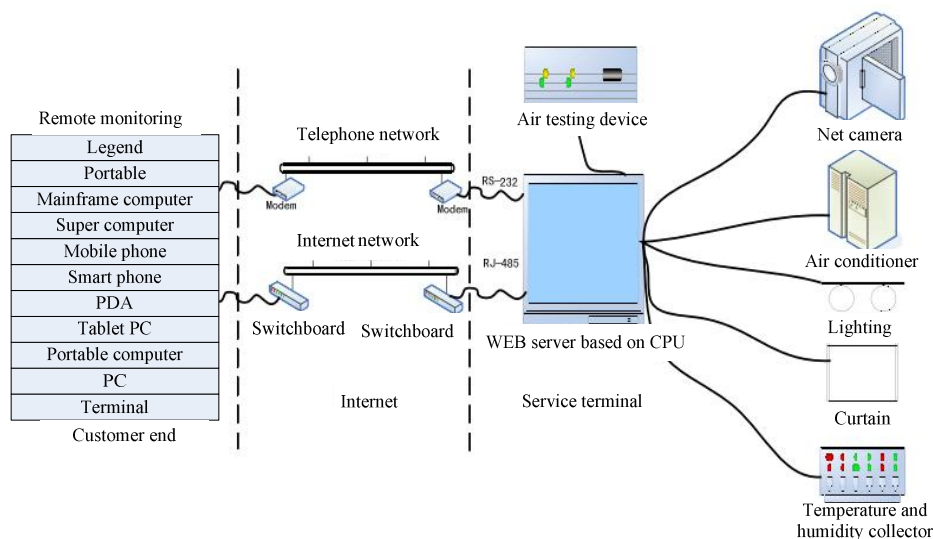


## INTRODUCTION

It is observed from the study purpose of real-time monitoring for home environment that the intuitive, convenient and effective monitoring way for home environment can be provided for the user and this application function as well as humanization characteristic should be embodied completely. However, for design process of system, the key is to continuously expand the functional module, while continuous improvement of analysis capability for software information is the base, from this, the effective pushing function is provided for the design process of this system. The corresponding exploration is performed mainly in combination with such aspects as target of system design, type selection of system hardware scheme and determination for system hardware scheme so as to demonstrate that the superiority of embedding system existed in the real-time monitoring system for home environment.

## TARGET OF SYSTEM DESIGN

In the design process of home internet monitoring system, the core idea lies in that the effective internet connection can be formed between customer end and service end so as to enable that the remote home environment monitoring can be realized and the effective analysis process can be implemented for factors to influence the home environment so as to enable these influence factors can be cleared at the first time and the home environment can be effectively purified<sup>[1]</sup>. In this process, the information can be embodied via web browser and the influence factors can be analyzed scientifically. However, the customer terminal and service terminal can effectively develop the work after receiving the signal sent by the system, thus, the monitoring process for home environment can get rid of restraint by the time and region to provide the powerful base for continuous improvement of applicability, the specific structure constituted by home internet monitoring system may be reflected explicitly as shown in Figure 1.



**Figure 1 : Schematic diagram of integral structure for system**

### Network video monitoring

The intelligent home internet monitoring equipment has been one of maximal selling points for purification of home environment and humanization service, however, the home environment can be monitored comprehensively and three-dimensionally through video means in the monitoring process of whole internet so that the specific factors to influence the home environment can be discharged effectively and enable that this system can become the patron saint and play the huge pushing function for effectively controlling the home environment. However, based on this characteristic, the video monitoring module is effectively perfected in the actual process of system in this paper so as to continuously strengthen the remote monitoring measures and meet users 'widest practical demand as well as enable that the contact existing between network and video monitoring is more close to provide the powerful power support for realizing the informatization and digitization development of home environment monitoring.

### Control for network household appliances

Through controlling the electrical appliance equipment in the family via network, the users may be enabled to manage and control the household equipment conveniently, for example, during being on duty, the air conditioner of electrical appliance equipment may be opened through mobile phone, laptop and net book to properly regulate the temperature and humidity environment indoors so as to realize the intensity regulating and switch control for lamplight in each room and also realize the automatic control for curtain as well as really realize the monitoring for all things in the home at any time and at any site.

### Monitoring for temperature and humidity as well as detection for indoor air quality

The design of temperature and humidity monitoring system is provided with very important significance for effective regulation and control of home environment. From this angle, the detection for home environment can be formed as further humanization layout; meanwhile, the positive influence on development of human body's physical and psychological health can also be produced. For example, under the condition that the indoor temperature and moderation can't meet human body's bearing scope, the system may perform the regulation automatically so that the temperature and humidity reach the appropriate level. For example, in the process of journey, in the places where there is internet, own home environment may be understood effectively and the aspects producing the harm can be eliminated for the first time through remote control means.

The important measurement indexes for constitution of indoor temperature and humidity monitoring system mainly lie such two aspects as software and hardware of system, while, in the design process of this system, the performance indexes that can be realized mainly cover following aspects.

(1) The processing speed is speedy and the data processing function is powerful, this index is an important standard to measure the data analysis capability of software data for system. It is observed from the processing speed that the rapid processing speed of system can rapidly provide the effective information feedback for system so as to enable that the operation effect of monitoring system can be guaranteed effectively, while the data processing capability is stronger, it is reflected that the processing performance of mainboard for system is more powerful to meet user's basic demand.

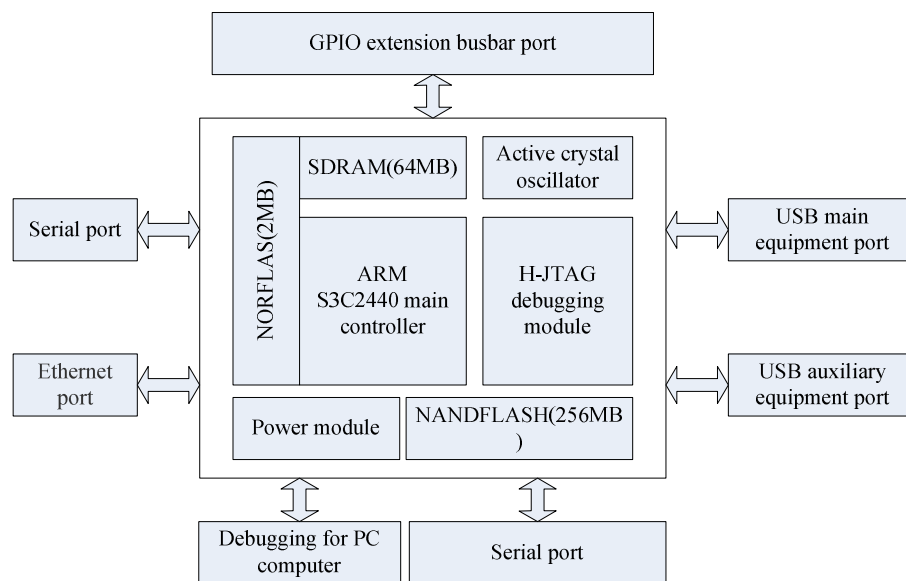
(2) The stability and reliability index for system operation is a kind of specific evaluation index whether to provide the effective monitoring information for users so as to enable that the monitoring effect of this monitoring system can be guaranteed in the application process as well as the continuity may also be embodied sufficiently.

(3) Low energy consumption index, in the process of system design, the lower energy consumption sufficiently shows that the energy consumption of system is lower under the equal condition for provision of electric power, while, for selection of power source, the allocation for power source with high power supply is not required, and this shall be served as one of main indexes for system performance evaluation<sup>[3]</sup>.

(4) Low cost index; lower design cost of system means that the time required in the research and development process of this system is shorter and the period also is shorter so as to meet the large-scale production and extensiveness of user's demand.

### TYPE SECTION FOR HARDWARE SCHEME OF SYSTEM

In the process of system development, in order to expect that the development progress can be accelerated continuously and can guarantee that the development cost can be lowered continuously, in the design process of this system, the effective development on 2330 experimental board has been provided mainly in combination with the laboratory, and the effective debugging shall be performed and the induction for the hardware required by the system design shall be performed, the specific hardware is as shown in the following figure (Figure 2).



**Figure 2 : Hardware configuration figure for mainboard of system**

It can be observed from Figure 2 that the specific configuration for hardware of development board in the constitution process of system is mainly composed by several parts so as to produce the positive influence on system functionality and reduction of consumption rate. In this process, the pushing function produced by the embedded development board in this system is greater so as to produce positive function on system constitution. Additionally, the

effective functional extension is performed for the minimal system in this system mainboard. Except for original system board, several functional submodules as indicating lamp, resetting circuit as well as power source circuit debugged by the user are also increased. However, in this series of extended module, the memory unit package may exist on two kinds of type; the starting system can be selected scientifically through strip line system, however, in NORFLASH, the specific system procedure is covered mainly, generally, this system procedure may not be modified frequently<sup>[4]</sup>.

While the specific hardware indexes in this system can be embodied explicitly from following aspects:

Firstly, the selection for main controller should be provided with definite compatibility, and the frequency of system mainboard can be set effectively through corresponding software, the maximal frequency can reach 533 MHz.

Secondly, the plug-in form is mainly adopted for data storage in the internal storage process, while the storage space is 64 Mega generally, the width of busbar should reach 32bit. However, the internal chip is composed in parallel by two pieces of 16 Wade chip, the maximal frequency every hour may reach 100 MHz.

Thirdly, animation memory, the constitution of memorizer mainly covers 256 Mega memory equipment and automatic outage storage system, these constitution elements are essential portions of installation process for system.

Fourthly, automatic resetting circuit of development board, the special chip is required to be provided in the design process of this circuit. After the user presses down the resetting key, remain for about 140ms effectively, thus, the pulse width can be enabled to be 200ms low level signal to be sent so as to enable that the system can form the automatic resetting.

Fifthly, effective setting for debugging interface in the development board, for downloading process of the first program, if the program is stored into the animation memory equipment, it is required to download it into the internal core and document under the condition of effective guiding.

Sixthly, clock source system of system, on the outside of system mainboard, 12 MHz liquid crystal clock is required to be used and can be realized through corresponding register so as to enable that the work clock of chip can be embodied effectively.

Seventhly, guarantee that the power source can remain at DC power supply and the current can reach 2A and the voltage is 5V.

Eighthly, effective integration and development for interface resource. Generally, in the constitution process of this system, two external USB ports are required in the constitution process of this system, therein, one port is served as the port for equipment connection, the function is to download it into the inner core and document under the condition of effective guiding pertaining to test port. The other one is main equipment port and is mainly used for linking the external equipment, such as, camera. Additionally, there also is a nine-hole serial port, the main function of this serial port is to embody the communication work of console in the research and development process so as to enable that the system can form the effective communication between hosts after operation.

### EXTENSION OF SYSTEM MODULE

In order to simulate the intelligentized home living environment, five large modules are connected via the busbar interface of extension board: two luminous diodes are used for simulating the electric lamp control in the guestroom of house; one DC electric motor is used for simulating the air container control in the network home, a stepping motor is used for simulating the curtain control in the network home, a temperature and humidity sensor is used for gathering and transmitting the indoor temperature and humidity data in real time, a gas sensor is used for detecting the condition of indoor air in real time. And all modules are connected on a busbar port of extension board for intensive control via PCB leading wire, and then, 40PIN flat cable is employed to connect the extension board onto GPIO port on the main board, the busbar port of extension board and circuit of mainboard are as shown in Figure 3. The unused pin is used for continuously extending other modules. The circuit diagram for each module is shown in drive program development below.

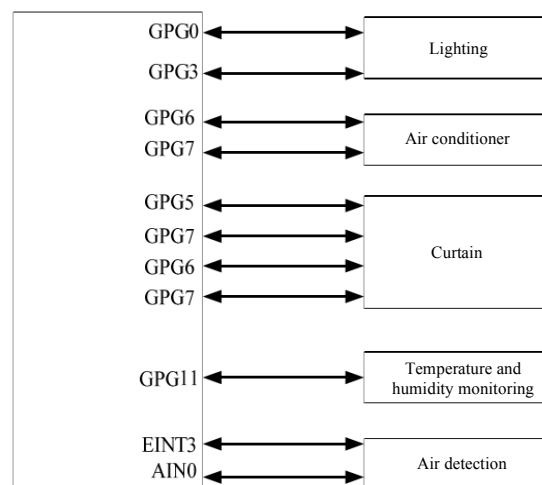
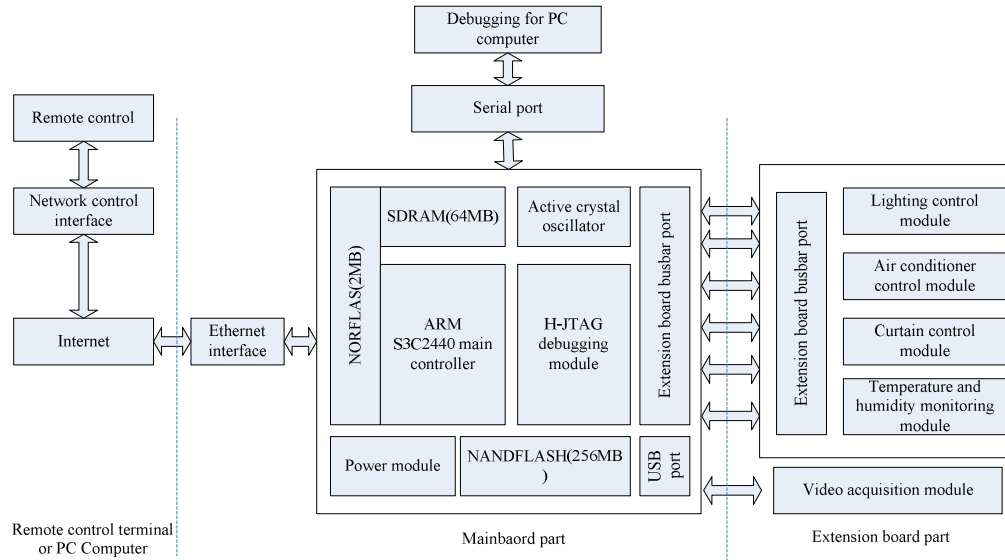


Figure 3 : Busbar interface diagram of extension board

**DETERMINATION FOR SYSTEM HARDWARE SCHEME**

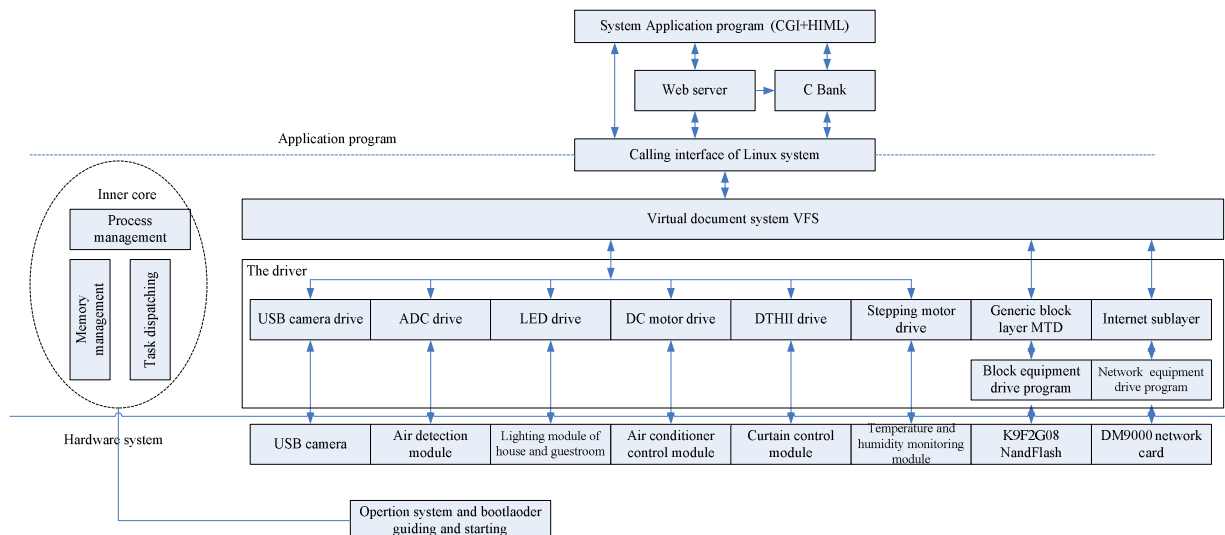
The system hardware framework is composed by the mainboard and extension board. The mainboard mainly covers a S3C2440ARM main controller and is the operating pivot of whole system, true executor of system order and the most basic condition required by ARM embedding system<sup>[5]</sup>. The extension board mainly covers some peripheral circuits to be used for simulating the intelligentized home living environment. The overall hardware framework is as shown in Figure 4.



**Figure 4 : Structural diagram of system hardware**

**DETERMINATION ON SYSTEM SOFTWARE SCHEME**

On the initial stage of entering into embedding system construction, the concept and definition for operation system in the process of development are unclear, for the program in the system; the corresponding language encoding is performed in accordance with the characteristic of system structure so as to realize the program construction process. Many shortcomings exist for this system, mainly showing non-powerful compatibility, the university can't meet user's requirement. However, the effective introduction for embedding system can effectively avoid these shortcomings so as to effectively predict the development period by own software function and enable that the basic framework of whole system can be definite, in addition, it will be divided into two levels, including the drive level and user level, to enable that the design thought of this system forms the layering transformation<sup>[6]</sup>.



**Figure 5 : Structural diagram of system hardware**

In the framework of this system, Linux software operation system is a style of operation system within the scope of bottom-layer embedding software, while, this system is closely contacted with hardware equipment (as shown in Figure 5 specifically). This is own characteristic of this operation software, however, the difference existing at the bottom layer for hardware can be shielded effectively, in the research and development process of this system, too much consideration for hardware at the bottom layer is unnecessary, the design process applied for reaching different hardware procedures can be effectively applied in the same operation system, in addition, more effective hardware support can be obtained<sup>[7]</sup>. In the design process of this hardware, the corresponding modification is not required, and in the process of running, another kind of framework type can be based to be effectively applied on the hardware platform. For this embedding-type operation system, the construction process of simple embedding-type software can provide the powerful support for journey of complicated operation system to provide good advantageous conditions for effective lowering of cost in the process of system research and development.

From above analysis and discussion process, it can be observed that the design process of system software and hardware is simpler; the selected main controller manufactured by Samsung Company is served as the hardware platform of development board, while, on the base of design for this company's development board, its functional module is further expanded. Such relevant modules as air conditioner control and illumination are added effectively so as to enable its functionality to be more powerful. On the aspect of software, pertaining to the superiority existing in the operation system, this is served as an important platform of software research and development to embed the corresponding monitoring operation system, and the corresponding drive program is designed for hardware module, in addition, the application program is extended effectively to enable that the perfectness of construction process for this system can be embodied sufficiently.

### CONCLUSIONS

Above is the relevant study and discussion process pertaining to real-time monitoring of family environment for embedding technology and internet technology. The study for such three aspects as type selection for hardware scheme of system, determination on system hardware scheme and determination on system software scheme are served as the emphasis so as to enable that the objective of system construction can be defined further. This research process can embody the corresponding rationality and scientificity, meanwhile, the advantages of embedding technology existing in the construction of real-time monitoring system for home environment can be further exerted.

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