Patents

# A kind of super microcomputer of grade belt sensor


## Abstract

The invention discloses a kind of super microcomputers of grade belt sensor.The super microcomputer is lower than the computer system of power consumption threshold value using the building of RISC-V framework, include: substrate, welds central processing unit on the substrate, Static RAM, non-volatile memory modules, D/A converter module, sensor, wireless radio frequency modules and can suspend mode power management module； The sensor includes temperature sensor, humidity sensor, acceleration transducer, acidity-basicity sensor and three-axis gyroscope sensor； The central processing unit, the Static RAM, the non-volatile memory modules and can suspend mode power management module information exchange carried out by high speed system bus； The D/A converter module, the sensor and the wireless radio frequency modules are connected by low-speed peripheral devices bus with high speed system bus.Super microcomputer provided by the present invention is small in size, is not limited by application scenarios, and it is extremely low to run power consumption.


## Classifications

G06F15/78 Architectures of general purpose stored program computers comprising a single central processing unit

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CN109271340A

China

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**Other languages:** Chinese

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**Worldwide applications**

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**Application CN201811074374.2A events**

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**Info:** Patent citations (4), Non-patent citations (3), Legal events, Similar documents, Priority and Related Applications

**External links:** Espacenet, Global Dossier, Discuss


## Claims (7)

Hide Dependent

1. a kind of super microcomputer of grade belt sensor, which is characterized in that the super microcomputer uses RISC-V Framework building is lower than the computer system of power consumption threshold value, and the super microcomputer includes: substrate, is welded in the substrate Central processor, Static RAM, non-volatile memory modules, D/A converter module, sensor, wireless radio frequency modules and It can suspend mode power management module； The sensor includes temperature sensor, humidity sensor, acceleration transducer, pH value biography Sensor and three-axis gyroscope sensor；

The central processing unit, the Static RAM, the non-volatile memory modules and it is described can suspend mode power supply Management module carries out information exchange by high speed system bus；

The D/A converter module, the sensor and the wireless radio frequency modules pass through low-speed peripheral devices bus and high speed System bus is connected.

2. super microcomputer according to claim 1, which is characterized in that the substrate is the integrated of super microcomputer Mainboard, the substrate are equipped with pin interface, the pin phase of the pin interface and the super microcomputer modules Match； The modules include the central processing unit, the Static RAM, the non-volatile memory modules, institute State D/A converter module, the sensor, the wireless radio frequency modules and it is described can suspend mode power management module.

3. super microcomputer according to claim 1, which is characterized in that the central processing unit is the micro- place of super low-power consumption Manage device； The dominant frequency range of the ultra low power microprocessor is 50~100MHz, takes and supports 2-3 grades of elongated flowing water coil holders Structure.

4. super microcomputer according to claim 1, which is characterized in that the memory space of the Static RAM Range is 8K~16K, and the Static RAM is used to support the starting of super microcomputer.

5. super microcomputer according to claim 1, which is characterized in that the non-volatile memory modules be it is magnetic with Machine memory or flash memory.

6. super microcomputer according to claim 1, which is characterized in that the super microcomputer further include: annular Antenna；

The loop aerial is arranged in the lower section of substrate, and the loop aerial is connected with the wireless radio frequency modules, the nothing The communications frequency range of line radio-frequency module is 2.4GHz~5.8GHz.

7. super microcomputer according to claim 1, which is characterized in that it is described can suspend mode power management module include 3 Kind management mode, the management mode are operational mode, standby mode or sleep pattern；

It is described can suspend mode power management module specifically include low-frequency clock generator, data backup register, reset cell and Power Management Unit；

The low-frequency clock generator is for keeping the operation of the super microcomputer in a sleep mode；

The data backup register by the high speed system bus and it is described can suspend mode power management module carry out information friendship Mutually; The data backup register is connected with the reset cell; The data backup register is for before being stored in sleep The data of the non-volatile memory modules storage, restore the data after being waken up; The reset cell is current for emptying Data, the current data include the data that several back-up registers are stored;

The Power Management Unit, for according to current state management conversion mode.

## Description

A kind of super microcomputer of grade belt sensor

Technical field

The present invention relates to computer fields, more particularly to a kind of super microcomputer of grade belt sensor.

Background technique

With the development of chip technology and the arrival of 5G technology, internet-of-things terminal equipment future can penetrate into the Fang Fang of life Face face, although current internet of things equipment has tended to minimize and be miniaturized, but still there are also need to surpass under many scenes Miniature internet-of-things terminal equipment.

Such as in commodity manufacturing field, ultramicroscopic equipment is attached in commodity, it is possible to reduce is set to original exterior of commodity The influence of meter, while can also guarantee the quality of product using the useful information of sensor collection, such as temperature sensitive Commodity can utilize the super microcomputer with temperature sensor to realize the monitoring to temperature; The existing temperature and humidity to product is surveyed Amount, monitoring device size is all bigger and power consumption is big, and application scenarios are limited, can be to entire refrigerator car generally in Cold Chain Logistics Compartment or refrigerator are that unit carries out temperature measurement.

Summary of the invention

The object of the present invention is to provide a kind of super microcomputers of grade belt sensor, to solve existing belt sensor The problem that monitoring device size is big, power consumption is big and application scenarios are limited.

To achieve the above object, the present invention provides following schemes:

A kind of super microcomputer of grade belt sensor, the super microcomputer are constructed low using RISC-V framework In the computer system of power consumption threshold value, the super microcomputer includes: substrate, be welded on the substrate central processing unit, Static RAM, non-volatile memory modules, D/A converter module, sensor, wireless radio frequency modules and can suspend mode electricity Source control module; The sensor include temperature sensor, humidity sensor, acceleration transducer, acidity-basicity sensor and Three-axis gyroscope sensor;

The central processing unit, the Static RAM, non-volatile memory modules and can suspend mode power supply Management module carries out information exchange by high speed system bus;

The D/A converter module, the sensor and the wireless radio frequency modules by low-speed peripheral devices bus with High speed system bus is connected.

Optionally, the substrate is the integrated mainboard of super microcomputer, and the substrate is equipped with pin interface, described to draw Foot interface and the pin of the super microcomputer modules match; The modules include the central processing unit, It is the Static RAM, the non-volatile memory modules, the D/A converter module, the sensor, described wireless Radio-frequency module and it is described can suspend mode power management module.

Optionally, the central processing unit is super low-power consumption microprocessor; The basic frequency of the ultra low power microprocessor Range is 50~100MHz, takes and supports 2-3 grades of elongated pipelined architectures.

Optionally, the memory space ranges of the Static RAM are 8K~16K, and the Static RAM is used In the starting for supporting super microcomputer.

Optionally, the non-volatile memory modules are magnetic RAM or flash memory.

Optionally, the super microcomputer further include: loop aerial;

The loop aerial is arranged in the lower section of substrate, and the loop aerial is connected with the wireless radio frequency modules, institute The communications frequency range for stating wireless radio frequency modules is 2.4GHz~5.8GHz.

Optionally, it is described can suspend mode power management module include 3 kinds of management modes, the management mode be operational mode, Standby mode or sleep pattern;

It is described can suspend mode power management module specifically include low-frequency clock generator, data backup register, reset cell And Power Management Unit;

The low-frequency clock generator is for keeping the operation of the super microcomputer in a sleep mode;

The data backup register by the high speed system bus and it is described can suspend mode power management module carry out letter Breath interaction; The data backup register is connected with the reset cell; The data backup register is slept for being stored in The data of the non-volatile memory modules storage, restore the data before sleeping after being waken up; The reset cell is for emptying Current data, the current data include the data that several back-up registers are stored;

The Power Management Unit, for according to current state management conversion mode.

The specific embodiment provided according to the present invention, the invention discloses following technical effects: the present invention provides one kind The super microcomputer of grade belt sensor is lower than the computer system of power consumption threshold value using the building of RISC-V framework, and super Low-power microprocessor use 2-3 grade elongated pipelined architectures, while use relatively low basic frequency, with reduce power consumption and Chip area; For the biggish non-volatile memory modules of area occupied, by using the mode for reducing memory capacity, to reduce The area occupied of chip; For can suspend mode power management module, converted by management mode, be further reduced power consumption.The present invention Provided super microcomputer can be with mounting arrangements in any position (such as product surface, package interior etc.), to single production Product are accurately measured; It can be

interacted simultaneously with outside as computer, allow retailer or consumer that can not destroy production Product are communicated by smart mobile phone application with super microcomputer under the premise of packing, and understand product index.

Detailed description of the invention

It in order to more clearly explain the embodiment of the invention or the technical proposal in the existing technology, below will be to institute in embodiment Attached drawing to be used is needed to be briefly described, it should be apparent that, the accompanying drawings in the following description is only some implementations of the invention Example, for those of ordinary skill in the art, without any creative labor, can also be according to these attached drawings Obtain other attached drawings.

Fig. 1 is super-microcomputer structure figure provided by the present invention；

Connection figure of the Fig. 2 between super microcomputer modules provided by the present invention.

Specific embodiment

Following will be combined with the drawings in the embodiments of the present invention, and technical solution in the embodiment of the present invention carries out clear, complete Site preparation description, it is clear that described embodiments are only a part of the embodiments of the present invention, instead of all the embodiments.It is based on Embodiment in the present invention, it is obtained by those of ordinary skill in the art without making creative efforts every other Embodiment shall fall within the protection scope of the present invention.

The object of the present invention is to provide a kind of super microcomputer of grade belt sensor, can simplify monitoring device, Operation power consumption is reduced, and solves the problems, such as that application scenarios are limited.

In order to make the foregoing objectives, features and advantages of the present invention clearer and more comprehensible, with reference to the accompanying drawing and specific real Applying mode, the present invention is described in further detail.

Fig. 1 is super-microcomputer structure figure provided by the present invention, as shown in Figure 1, a kind of grade belt sensor Super microcomputer, the super microcomputer is lower than the computer system of power consumption threshold value using the building of RISC-V framework, described Super microcomputer includes: substrate 101, be welded on the central processing unit of the substrate 101, Static RAM 103, it is non-easily The property lost memory module 104, D/A converter module 105, sensor 106, wireless radio frequency modules 107 and can suspend mode power management mould Block 108.The sensor 106 includes temperature sensor, humidity sensor, acceleration transducer, acidity-basicity sensor and three Axis gyro sensor.The central processing unit is ultra low power microprocessor.

RISC-V framework (pronouncing " RISC-FIVE ") is that the opening established based on reduced instruction set computing (RISC) principle is referred to Collection framework (ISA) is enabled, V is expressed as the 5th generation RISC (Reduced Instruction Set Computer).

Connection figure of the Fig. 2 between super microcomputer modules provided by the present invention, as shown in Fig. 2, in described Central processor, the Static RAM 103, non-volatile memory modules 104 and can suspend mode power management module Information exchange is carried out by high speed system bus.

The D/A converter module 105, the sensor 106 and the wireless radio frequency modules 107 pass through low-speed peripheral Device bus is connected with high speed system bus.

In practical applications, the substrate 101 is the integrated mainboard of super microcomputer, and the substrate 101, which is equipped with, to be drawn Foot interface, the pin interface and the pin of the super microcomputer modules match； The modules include institute State central processing unit, the Static RAM 103, the non-volatile memory modules 104, the D/A converter module 105, the sensor 106, the wireless radio frequency modules 107 and it is described can suspend mode power management module 108.

Substrate 101 is the integrated mainboard of super microcomputer, using silicon substrate, etch super microcomputer wiring and The connecting interface of modules； When assembling, modules are welded in the reserved pin interface of substrate 101 i.e. according to pin It can.

101 integrated data bus of substrate, bus use dual channel mode, are command channel and data channel respectively, support One master and multiple slaves mode does not support more main more slave patterns.

In practical applications, the central processing unit is super low-power consumption microprocessor 102； The ultra low power microprocessor 102 dominant frequency range is 50~100MHz, takes and supports 2-3 grades of elongated pipelined architectures.

102 dominant frequency of super low-power consumption central processing unit is taken in 50~100MHz and supports 2-3 grades of elongated assembly lines, (elongated stream Waterline has different pipeline lengths according to the difference of instruction type, if instruction execution finishes needs for the result of execution Memory is write back, then takes 3 level production line length, if you do not need to then taking 2 level production lines, therefore can be according to the finger obtained Enabling and some instructions that will execute judge to need to take 2 level production lines or 3 level production lines) longest assembly line is 3 grades, It is fetching, decoding+execution, write-back respectively, part instruction does not need write-back, using fetching, 2 level production line of decoding+execution, uses Specific static branch prediction technology, the method that processor inside is separated using instruction buffer and data buffer storage.

In practical applications, the memory space ranges of the Static RAM 103 are 8K~16K, it is described it is static with Machine memory 103 is used to support the starting of super microcomputer.

103 size of Static RAM is 8K-16K, for supporting the starting of super microcomputer； Through calculating, if Using RV32MC instruction set, memory headroom needed for the startup program of computer is about 3K； If taking RV32I instruction set, meter Memory headroom needed for calculation machine startup program is about 4K, therefore 8K-16K is enough to support the starting of super microcomputer.

" M " in RV32MC indicates that multiplication of integers division standard extension, " C " indicate that compression instruction standard extension, RV are The abbreviation of RISC-V； " I " in RV32I indicates basic integer instructions collection.

In practical applications, the non-volatile memory modules 104 are magnetic RAM or flash memory.

The magnetic random of about 0.4 square millimeter implantable of size of non-volatile memory modules 104, memory space about 1MB Memory or flash memory.

In practical applications, the super microcomputer further include: loop aerial； The loop aerial is arranged in substrate 101 lower section, the loop aerial are connected with the wireless radio frequency modules 107, and the wireless radio frequency modules 107 are wirelessly to penetrate Frequency module, the communications frequency range of the wireless radio frequency modules 107 are 2.4GHz~5.8GHz.

In practical applications, it is described can suspend mode power management module 108 include 3 kinds of management modes, the management mode is Operational mode, standby mode or sleep pattern.

It is described can suspend mode power management module 108 to specifically include low-frequency clock generator, data backup register, resetting single Member and Power Management Unit.

The low-frequency clock generator is for keeping the operation of the super microcomputer in a sleep mode.

The data backup register by the high speed system bus and it is described can suspend mode power management module 108 carry out Information exchange, the data backup register are connected with the reset cell； The data backup register is for being stored in The data that the non-volatile memory modules 104 store before sleep, restore the data after being waken up； The reset cell is used for Current data is emptied, the current data includes the data that several back-up registers are stored.

The Power Management Unit, for according to current state management conversion mode.

The present invention provides a kind of super microcomputers of grade belt sensor to construct low function using RISC-V framework Consumption, have complete computer.Simultaneously sensor data interface is provided, can by common temperature, humidity, acceleration, The sensors such as pH value and super microcomputer are integrated.Manufacturing process is based on Ge Luofangde semiconductor limited liability company (Global Foundry) or Taiwan Semiconductor Manufacturing Co.'s (TSMC) sophisticated semiconductor manufacturing process (7nm or 14nm), every megahertz of power consumption of processing unit It hereby can control in 1~10 microwatt, it is small in size, it is not limited by application scenarios, in the case where not destroying product packaging, is passed through Super microcomputer is that can be appreciated that the current criteria of product in product, while using the memory of low storage and low basic frequency Processor can be effectively reduced the power consumption of super microcomputer.

Each embodiment in this specification is described in a progressive manner, the highlights of each of the examples are with other The difference of embodiment, the same or similar parts in each embodiment may refer to each other.

Used herein a specific example illustrates the principle and implementation of the invention, and above embodiments are said It is bright to be merely used to help understand method and its core concept of the invention； At the same time, for those skilled in the art, foundation Thought of the invention, there will be changes in the specific implementation manner and application range.In conclusion the content of the present specification is not It is interpreted as limitation of the present invention.

## Patent Citations (4)

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| CN102222258A * | 2011-05-18 | 2011-10-19 | 复旦大学无锡研究院 | Ultra-low-power-consumption intelligent wireless sensor tag for intelligent package |
| CN206563963U * | 2017-02-28 | 2017-10-17 | 美的智慧家居科技有限公司 | System-in-package module and intelligent terminal |
| CN206834175U * | 2017-02-27 | 2018-01-02 | 美的智慧家居科技有限公司 | System in package chip and the equipment with the system in package chip |
| Family To Family Citations | | | | |

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## Non-Patent Citations (3)

| Title |
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| 邓佳佳: "终于有人把RISC-V讲明白了",《HTTPS://WWW.BAIDU.COM/LINK?URL=88_FCP0-ASYI121VO87KDXKKL25NID1CHK7SG1-C2UAABNYAMQZK_YG3ZTBZDTLHMAU0X0FN6OS424DUTIL2DQ&WD=&EQID=B4AD95A70012CCF6000000025CC57098》 * |
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* Cited by examiner, † Cited by third party

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## Priority And Related Applications

### Priority Applications (1)

| Application | Priority date | Filing date | Title |
|---|---|---|---|
| CN201811074374.2A | 2018-09-14 | 2018-09-14 | A kind of super microcomputer of grade belt sensor |

### Applications Claiming Priority (1)

| Application | Filing date | Title |
|---|---|---|
| CN201811074374.2A | 2018-09-14 | A kind of super microcomputer of grade belt sensor |

### Legal Events

| Date | Code | Title | Description |
|---|---|---|---|
| 2019-01-25 | PB01 | Publication | |
| 2019-01-25 | PB01 | Publication | |
| 2019-02-26 | SE01 | Entry into force of request for substantive examination | |
| 2019-02-26 | SE01 | Entry into force of request for substantive examination | |
| 2021-01-22 | RJ01 | Rejection of invention patent application after publication | **Application publication date**: 20190125 |
| 2021-01-22 | RJ01 | Rejection of invention patent application after publication | |

### Concepts

machine-extracted

Download Filter table

| Name | Image | Sections | Count | Query match |
|---|---|---|---|---|
| substrate | | claims,abstract,description | 21 | 0.000 |
| static | | claims,abstract,description | 10 | 0.000 |

| | | | |
|---|---|---|---|
| static | claims,abstract,description | 19 | 0.000 |
| acceleration | claims,abstract,description | 5 | 0.000 |
| peripheral | claims,abstract,description | 4 | 0.000 |
| storage | claims,description | 4 | 0.000 |
| chemical reaction | claims,description | 3 | 0.000 |
| water | claims | 1 | 0.000 |

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Show all concepts from the description section