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Campus Multifunctional Service System Based on BDS

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Abstract: The With the continuous advancement of science and technology and the improvement of people's living standards, convenient and smart lifestyles continue to fill our daily lives. To facilitate the new model of campus student services, a variety of service systems that facilitate campus life have emerged. This thesis designs a campus multifunctional service system based on Beidou positioning. The system is controlled by STC89C52 MCU and consists of ATGM336H module, LCD liquid crystal display, MFRC522 module and PC software module. It has acquired RFID, Beidou satellite positioning. It acquires functions such as satellite time, latitude and longitude information processing, and display of current positioning, and realizes the entrance of the personnel of the teaching building through the combination of "point positioning" of radio frequency identification technology and Beidou positioning. This design is more suitable for large numbers of people signing in at the same time than the current traditional signing and signing methods, which not only facilitates statistical recording, but also significantly reduces the time required for signing up.
Keywords: Beidou positioning, Radio frequency identification, SCM control

I. INTRODUCTION

The concept of digital campus can be traced back to the 1970s, when professor Kenneth Green of claremont university in the United States built and started a large scientific research project named "informationized campus project" [1]. The large-scale construction of informationized campus in domestic universities began in the 1990s. Since the beginning of the 21st century, with the continuous progress of science and technology, the concept of digital campus has been widely recognized. For follow up intelligence service concept, to achieve convenient and efficient way of life, we can according to the positioning technology and radio frequency identification technology a combination of design and the technology adopted bidirectional wireless data communication mode, communication technology and reliable, stable and bit error rate is extremely low, but its drawback is obvious, mainly reflected in can only be fixed point into the campus check-in service system. Sign in statistical system, currently on the market generally used RFID technology, data acquisition, thus has strong limitation, secondly, radio frequency identification technology of data acquisition equipment investment is opposite bigger, later period maintenance cost is very expensive, not universal coverage, to achieve accurate judgment students location information. To make up for shortcomings, the technology to achieve a more perfect service system, campus need to cover a wider range of beidou positioning technology, through to the two kinds of technology in the practical application of the system reliability and the analysis of the coverage, I forward design scheme of complementary advantages and disadvantages of these two technologies and radio frequency identification technology is combined with beidou positioning technology solutions.

Zhejiang university have long put forward the intelligent campus construction plan, and began to study and develop, is currently in the school has been built information service technology center, has built the campus card report data analysis system, campus card meeting attendance system, card access control management platform, campus card attendance system, and other personalized service innovation, which embodies the concept of "intelligent campus", the first to put into practice for the construction of wisdom campus. Shanghai jiaotong university, also is creating a cloud computing based intelligent campus library, jiangnan university and nanjing university of posts and telecommunications use card management services to improve school management, the university based on the concept of "intelligent campus" construction process, an important window to show not only the construction of the school, more improve school management level, the entire school teachers and students of convenient service.

Many scholars at home and abroad have studied the concept of intelligent campus[2][3]. Professor huang huailuo believes that although the concept of digital campus is progressive, there are many deficiencies[4]. The concept of "intelligent campus" fully fills the deficiencies of digital campus and provides higher quality teaching

methods and service concepts for colleges and universities. According to professor Chen cuizhu, intelligent learning places should make full use of the potential utility of advanced information technology by integrating, analyzing and analyzing the data generated by schools. Shen jie believes that people and institutions should further strengthen education and teaching combined with the Internet of things.

Since the beginning of the 21st century, the rapid development of information technology has gradually changed the form of higher education. The "Internet + action plan" has further accelerated the smart development and expanded the field of smart university education. Smart campus will become the most advanced form of education development and an inevitable choice for the development of university informatization[5][6].

This paper designs a kind of multifunctional campus based on beidou positioning system design, system controlled by STC89C52 microcontroller, by ATGM336H module, LCD display, MFRC522 module and PC software modules such as modules, with access to radio frequency identification, beidou satellite positioning, access to satellite time, latitude and longitude information processing, and display the current location, and other functions, through the way of "dot" radio frequency identification technology and the way of combining the positioning of the beidou building personnel enter checkin, by beidou positioning system state changes to staff when they leave. The positioning accuracy, stability and reliability of the system and other indicators meet the technical requirements of the system, and achieve the requirements of the various functions, is a cheap, functional and practical positioning service system, the application prospects are very broad.

II. SYSTEM HARDWARE CIRCUIT DESIGN

The design hardware of this system consists of power supply, STC89C52 single chip microcomputer, LCD1602 display module, MFRC522 radio frequency identification module, ATGM336H beidou dual-mode positioning module and so on.

A. STC89C52 main control unit

The design of the main control unit adopts STC89C52 single-chip microcomputer, which is an improved 80C51 single-chip microcomputer. Its machine cycle can be arbitrarily selected, and the instruction system is fully compatible with the traditional 80C51 instruction system. The control system adopted in this design USES STC89C52 single chip microcomputer, which has the advantages of high performance and low power consumption. It includes the following functions: I/O interface, 8K byte Flash, timer, 2 data Pointers, 256 byte ram, full duplex serial port, interrupt structure and clock circuit. In addition, it also includes stack register SP, data pointer register DPTR and other components, these components through the single-chip bus integration into a chip, thus constituting a complete single-chip microcomputer system.

B. ATGM336H beidou positioning module

The central function design of this design adopts dual-mode positioning module ATGM336H GPS/BD, which supports two kinds of satellite navigation systems, beidou and GPS, and can be combined with various common positioning receiver modules at will. The circuit diagram of this module is shown in figure 1.

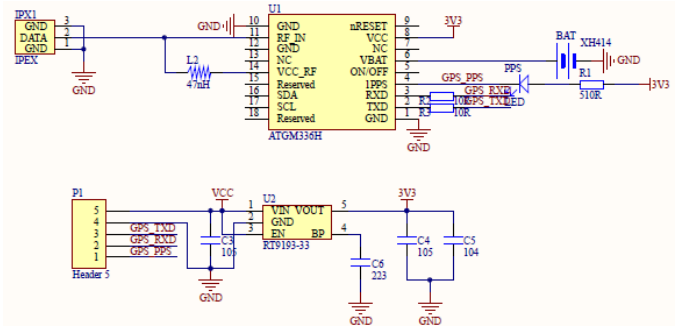

Figure 1 The circuit diagram of ATGM336H

The main interface of the antenna of this module is pin-pin interface. The advantages of this module are as follows: it supports beidou positioning and GPS satellite positioning in dual-mode system, and USES 3.3v-5v power supply, which makes it more convenient to connect to other microcontrollers and set baud rate and frame

data. Loading rechargeable electronic, which is used to accelerate the warm start search process, the default baud rate 9600, TTL level UART interface, users connected to the microcontroller serial port TTL level or USB to TTL module test, both with SMA and IPEX antenna interface, convenient to choose their own need to external antenna, with PPS timing output pin, convenient for various applications such as clock synchronization.

C. LCD1602 LCD module

LCD1602 LCD display module, as shown in figure 2, itself can be done according to scan, microcontroller only need to send LCD1602 used to display content indicates that the command and the ASCII code, in the LCD module 1602 character generated storage, storage on behalf of the Arab, upper and lower case Numbers and commonly used symbols, such as Japanese kana difference matrix mode of more than one hundred characters, and each fixed code indicates a fixed code or character. For example, on behalf of the capital letter "A" code of 01000001 b h (41), when the display module, will be shown in address 41 h point character graphics, so that we can see that the letter "A", table 3.5 register select control table, since 1602 to identify ASCII value, so constant or variable characters can also be used for microcontroller programming [12], read data, before the first reads A list of values, and then starting on the left side of the line value, figure 3.7 is the hexadecimal ASCII 1602 yards.

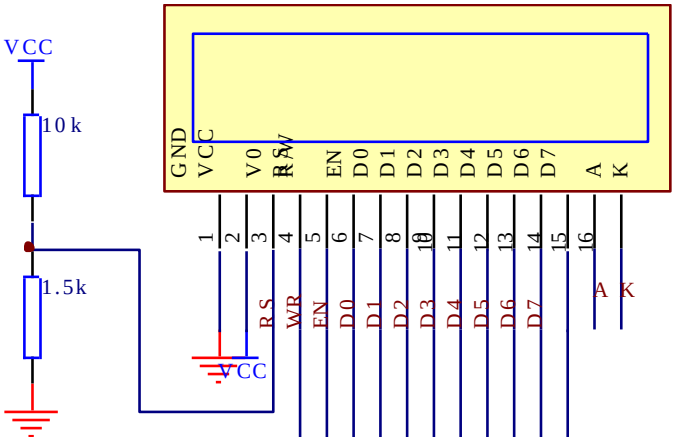

Figure 2 The circuit diagram of LCD1602

D. MFRC522 RFID module

MFRC522 radio frequency identification module is adopted in the functional part of the design simulation scene, and the corresponding functions are realized through the reading operation of IC card. MFRC522 is a highly integrated contactless read/write chip. The transmission module USES modulation and demodulation principles to integrate it into various contactless communication technologies and protocols (13.56 MHz). The MFRC522 RFID module adopted in this design is designed with low voltage, which needs to be externally connected with 3.3v voltage, supports SPI, I2C and UART interfaces, and can ensure that it does not take up the serial port of STC89C52, which is convenient for development, small in size, less in connection, and adopts serial communication with the host, which is very suitable for system integration. The two-way transmission rate of the module reaches 424kbit/s, and the card reading distance is about 30cm. The antenna can be replaced or modified as required. Compared with ACR122U, PN532 and other modules, the writing function of this module has a slow decoding rate and insufficient operation authority for IC card partition structure. Therefore, if the RFID part needs to be improved in the design of this system, the above two wireless reading and receiving devices are recommended.

III. SYSTEM SOFTWARE DESIGN

This design USES C language programming, compared with assembly language, C language has obvious advantages in function and structure, the program is easy to read and easy to maintain. This design is mainly based on the main program, the beidou positioning program, LCD display program, radio frequency identification procedures of several modules, such as complete module positioning, judgment and radio frequency information

read processing, geographic information in the LCD1602 display location information as well as radio frequency identification module of processing information, can see on the PC test software accurate location information.

A. ATGM336H data reception and analysis process

After ATGM336H receives the returned data, the program can judge whether the returned data is valid or not. As can be seen from the above positioning process, when ATGM336H is activated, more than one satellite needs to be communicated, plus weather and signal interference, the initial positioning will take several minutes or even longer.

B. Read IC card process of MFRC522

MFRC522 can be divided into the following steps: to the operation of the IC card for card, prevent conflict, select the card, the card read/write CARDS, this design using the IC card read operations, only when in IC card read, don't need a password to connect to the card can operate, but if you want to write, to rewrite of IC partition, you need to correct the card password to operate, generally is the default password, but involves the financial, privacy will accordingly encryption, in spite of this, we can still use the more advanced rf chip to replicate or crack. Therefore, the security performance of IC CARDS is actually very poor, far less than the data can be stored in the database ID card. Therefore, my design is to store the check-in or check-out status in a corresponding array, storing a small amount of data instead of setting up a database and other operations.

IV. SYSTEM DEBUGGING AND PHYSICAL DRAWINGS

This design procedure part USES the keil software environment to compile, will ATM336H beidou /GPS dual-mode positioning module, LCD1602 LCD, MFRC522 rfid module its underlying driver and other library functions integration, through the call compilation, to achieve the basic functions of the system, and modify the wrong program.

In the process of debugging, I met the following difficulties. After continuous testing and debugging, I finally overcame the difficulties and realized the basic functions of the system design. The beidou positioning module has strict requirements on signals, so a good outdoor environment is needed in the debugging process of this module to ensure uninterrupted signals. In the practical application, it is necessary to improve the antenna part of this module to achieve indoor signal reception. In the process of data processing returned after connecting the beidou positioning module, I found that although the returned data contains the required information, its display is not complete, so data processing becomes an obstacle through the program. Therefore, I saved the data in the corresponding variable through code for output display. In the debugging process of the radio-frequency identification module, I adopted method is for IC card REFID operation carries on the preliminary reading and judgment, as a result of the IC card ID save form for 16, difficulty to distinguish with other partitions saved data, so I went to the structure of the IC card has carried on the thorough research, finally realized functions.

When the beidou satellite is correctly received, the longitude and latitude data received. By the chart we can see clearly of beidou satellite data, the first line starts with an asterisk, the second row data mainly includes the latitude and longitude information, designed.the GN here on behalf of the dual mode, namely beidou positioning and two, so that when A data cannot accept but can receive another satellite data, can still work, letter A representative valid data to the data of the third line represents the UTC time, namely satellite atomic clock time. By using the positioning and debugging software to display the current location on the electronic map, the latitude and longitude can be adjusted in a small range according to the picture to ensure more accurate latitude and longitude in the program.

This paper designs a kind of multifunctional campus based on beidou positioning system design, system controlled by STC89C52 microcontroller, by ATGM336H module, LCD display, MFRC522 module and PC software module module, beidou satellite positioning, access to satellite time, latitude and longitude information processing, rfid read the IC card, etc. The positioning accuracy, stability and reliability of the system and other indicators meet the technical requirements of the system. The physical diagram of the hardware is shown in figure 3. The first row of LCD1602 displays the current check-in status, "PLEASE SIGN in" if not, "OK" if yes, and the second row shows the current location, as shown in FIG. 4. When the location is in teaching building no. 1, "AcademicBuild1" is displayed in the location. In terms of hardware module choice, I was using a STC89C52 MCU, because its only a group of TXD/RXD, thus has certain defects on the function, used in the initial design phase I assume some of the data transmission module, such as bluetooth, GSM, such as the shortage of its serial

number to expand a serial port and needs more work, so chose to give up, I feel very sorry for this, the inadequacy of ability of feeling deeply.

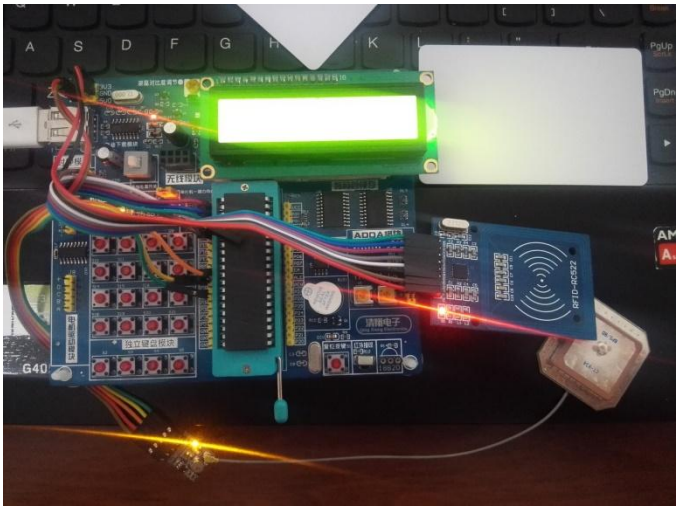

Figure 3 Real object

Figure 4 Display chart

V. CONCLUSION

In this paper, the author studies on based on beidou positioning to the campus multi-functional service system, the use is convenient, cheap, accurate location, applies to the new campus is convenient and efficient service model, not only can be used in the building signed in, in the number of restaurants, the library resource usage statistics, etc, also can have outstanding performance, has the advantages of low cost high benefit. This paper designed a kind of multi-functional service system based on beidou positioning of the campus, the system is controlled by the STC89C52 microcontroller, using ATGM336H beidou/GPS dual-mode positioning module for positioning, LCD1602 LCD module display information display, MFRC522 module is responsible for the radio frequency identification to check-in, make up for in harsh environment under special circumstances, such as signal increase the reliability of the system, PC debugging software is responsible for the electronic map display positioning module receives the data, in the commissioning phase to ensure the reliability of positioning module. The positioning accuracy, stability and reliability of the system meet the technical requirements of the dynamic positioning system. The test results show that the system's positioning, real-time and other indicators meet the technical requirements and realize the functions of the subject. According to the test, this system can meet some

extended functions based on the positioning system, with low cost, accurate and reliable positioning, convenient and fast operation. Only by installing positioning equipment in campus CARDS and data receiving devices in places that need to be applied, can the basic functions of the system be realized, which has a broad development prospect.

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