Research and Development of Multifunctional Mobile Phone Class Roll Call Management System

Yijie Wang, Yuedong Yuan, Liangpeng Gao, Guoquan Zhao, Qingdian Li, Xu Zou and Tingjun Wang

ABSTRACT

The domestic and foreign existing methods and techniques for class roll call are analyzed. Aiming at the existing problems, this paper designs a combination of Bluetooth and gravity detection of class roll call mobile phone management system. The basic working principle of the management system is analyzed. Its structure, functions and procedures are analyzed and designed. The system's technical architecture and the corresponding steps are given. And through the actual class proves the practicability of the system. Under the actual background, the method of accurate call by mobile phone is studied. Multifunctional class roll call management system for mobile phone has real-time transmission, accurate data. It avoids the students watching the phone in class.

INTRODUCTION

With the progress of science and technology, people's lives cannot be separated from mobile phones[1]. Some students in the class focus on mobile phone and ignore the classroom[2]. Class roll call is a waste of time and fish in troubled waters. Not only failed to live up to the teacher, but also reduced the efficiency of the classroom. And it leads to the weariness of learning and the fear of learning. Mobile phone management and attendance problems become two big problems in today's classroom[3]. Meanwhile, the universality of Bluetooth technology is on mobile
phones[4]. Therefore, a low cost and high efficient attendance management system is designed based on Bluetooth wireless communication and gravity sensor.

**SYSTEM OVERALL DESIGN**

Multi-function classroom mobile phone management system includes the following modules: system control module, mobile phone storage module, gravity sensor module, Bluetooth detection module, display module, and data processing module. The system’s overall architecture is shown in Figure 1.

The system is the use of mobile phone storage box in class time to store students' mobile phones, based on Bluetooth and gravity sensors to achieve attendance and management in the classroom. The Bluetooth module is connected with the students' mobile phones Bluetooth, which can avoid the use of other items to start the sensor instead of the mobile phone, and also can read the Bluetooth name through program. It can realize the processing, storage and management of the original information by programming, and realize the intelligent management of the attendance information.

The display module displays the class attendance in real time through the single chip microcomputer program, and shows class number, actual number, absentee number. Teachers and students can visually understand the students' attendance.

![Figure 1. Classroom mobile phone management system overall diagram.](image)

Making full use of that the gravity sensor with real-time detection and Bluetooth technology in mobile phone[5], the management system achieves real-time, fast and efficient the attendance information management and display. At the same time, teacher in classroom can centrally manage mobile phones of his students. The centralized management of mobile phones in classroom effectively solves the problems of teaching order and improves the learning efficiency.
DESIGN OF MOBILE PHONE STORAGE MODULE

The mobile phone storage module includes a number of cell mobile phone boxes. One mobile phone only places in one cell mobile phone boxes and every gravity pressure sensor are installed in each box.

The cell mobile phone boxes are marked according to the order. Students put their mobile phones into the corresponding mobile phone box according to the number of students before class. The storage box is equipped with four universal wheels, which is easy to move and use. The boxes are equipped with guide rails to easy to put in and retrieve mobile phones. The storage module centralized management of mobile phones effectively avoids the students playing mobile phones in class. The mobile phone storage module is shown in Figure 2.

![Figure 2. Model diagram of mobile phone storage module.](image_url)

1. mobile phone storage box  2. mobile phone box  3. gravity sensor  4. universal wheel  5. slide rail

DESIGN OF GRAVITY DETECTION MODULE

Pressure sensor adopts double hole cantilever parallel beam strain type weighing sensor. The strain gauges are bonded to the force sensitive elastic elements. When the elastic elements are deformed, the strain gauges produce the corresponding strain and change into the resistance changes. The strain gauge is connected to the bridge, and the resistance change caused by the pressure will be converted to the voltage change of the measuring circuit. The weight of the measured object can be obtained by measuring the value of the output voltage and then by converting it.

In order to avoid the interference of other heavy objects to gravity sensor, the device uses Bluetooth detection signal to ensure that the mobile phone is placed in the mobile phone storage box. System identification uses the phone number Bluetooth named by student number and the feedback information of the corresponding gravity sensor to complete the attendance work. Before class, the
students put the cell phone into the cell phone box according to the number of students. Gravity sensors receive the signal feedback to judge whether a student is late, leave early or absent. When the gravity signals are not detected in the prescribed period of time, the students are absent. The starting time of gravity signals later than the class time is late. And the end time of gravity signals earlier than the class time is leave early.

DESIGN OF SYSTEM CONTROL MODULE

The system adopts single-chip microcomputer control unit. It has MCU[6], gravity sensors (pressure sensors), display module, keyboard, Bluetooth receiver and so on. It is provided with the real time clock information of peripheral assist, scan cycle time monitoring of each storage space within the Bluetooth sensor and other information, and collected information, synchronous processing. The results are transmitted to the system display module.

With some simple human-computer interaction control button, it can realize the designated press buttons. The control system will match the data information after processing, through the general USB interface, convenient teacher in break or after class through the U disk to directly copy the student attendance information.

CONCLUSIONS

The system combines gravity sensor and Bluetooth detection technology, not only to achieve high efficiency classroom call, but also better avoid the students play mobile phones in classroom to affect the quality of lectures and other issues. Attendance process greatly reduces the interference of normal teaching order, saves teaching times. The centralized management of classroom mobile phones improves the learning efficiency. This system has obvious advantages of convenience and shortcut, especially for large class of fifty or more people. The portable box can also be applied to the small and medium community activities and the on-site attendance of the party competition.

REFERENCES

1. Lingjie Xia, 2013, “The status and influence of college students to use the mobile phone of two universities in Wuhan” [D], Huazhong University of Science and Technology:30-32. In Chinese
2. Zhiguang Dai, 2015, “Design of class automatic naming device”. Electronic Production, (08): 59-60. In Chinese
3. Niantian Lin, Sen Chen, Lihong Zhao, Renwei Ding, Pengyao Zhi, 2015, “Design class naming system based on students”. Modern Education Technology, (07): 113-119. In Chinese
4. Nanye Yao, Linping Wang, Shijue Zheng, Lijiu Tao, 2014, “Mobile phone attendance management system in university classrooms based on bluetooth communication”. Computer and Digital Engineering, (10): 1986-1990. In Chinese
5. Yu Zhu, JingLi, Yong Yue, 2014. “Design and implementation of device communication scheme based on Bluetooth 4”. Electronic Design Engineering. (19):150-152. In Chinese
6. 2013.06, “special high precision 24 bit AD converter chip HX711 explanation”. https://wenku.baidu.com/view/bd1963d04028915f804dc233.html, In Chinese