Drink-driving monitoring system based on single chip microcomputer and sensor

Yong Chen¹, Shudong Wang¹, Hao Wang¹, Shen Liu¹ and Runqing Li¹

¹College of Electrical and Information Engineering, Lanzhou University of Technology, Lanzhou, Gansu, 730050, China

*Corresponding author’s e-mail: 201410230032@stu.shmtu.edu.cn

Abstract. This paper describes the design of hardware and software for alcohol concentration detection, which is mainly used to identify whether a driver is driving after drinking. The design can adjust the set value, and it can also be used in other fields. The drink-driving monitoring system is based on the single-chip microcomputer AT89C52, and the sensor detects the alcohol concentration. After some complicated processing, if the set value is exceeded, the buzzer will send out an alarm and the LED red light will twinkle, and the specific data will be displayed on the monitor. If the set value is not exceeded, the buzzer does not respond and the value is displayed on the display. The design has the advantages of high security, portability, intelligence and low cost.

1. Introduction
In recent years, with our country economy and technology development, the number of cars is also growing rapidly. However, there are more traffic accidents than before. According to the investigation of relevant organizations, the occurrence of traffic accidents is increasing gradually and they point out that a considerable part of the traffic accident has some correlation with drunk driving. Drunk driving has been identified as the main factor that most of the accident. This dangerous driving drunk driving, we need to alert, so need to be done within the car on the air inside the cab necessary alcohol concentration detection and appropriate warning prompt, do a AT89C52 MCU as the main body of the gas monitoring system, intelligent ethanol is detected gas alcohol concentration in the display on the LCD, when the ethanol concentration reached set value buzzer sounded the alarm.

2. The purpose of the study and the significance of the design
Since the beginning of the industrial revolution, science and technology have been gradually accelerated, especially to today, the development of science and technology is very rapid, widely used, very mature technology sensors have been widely used in our life, sensors are widely used, and the cost is low, extremely important in the actual life. Gases go with us everywhere. Gas sensors are used to sense all kinds of gases in the air. With such a large number of cars, traffic accidents are on the rise. According to the statistics of relevant agencies, 30% of the traffic accidents on the side have a certain correlation with drunk driving. Aware of this problem, the state has issued a series of laws and regulations and even introduced the criminal law. To increase safety awareness and take responsibility for their own lives and the lives of others, the design of drunk driving monitoring is necessary.
3. Design of whole scheme based on single chip microcomputer and sensor

3.1. Based on the overall functional requirements of C52 system
Overall functional requirements of the design is in order to detect drivers breath alcohol gas indirect check whether the alcohol content of the body more than the set value, if not, need to have a display to display the numerical, alcohol if overweight with sound and light alarm to remind, must also has the function of setting threshold value to applied to detect the concentration of alcohol other occasions, a design of a variety of purposes.

3.2. Design of drunk driving monitoring based on C52 system
Drunken driving monitoring system overall design of the design as shown in figure 1 tested gas input MQ - 3 of the alcohol sensors, ADC0809 analog-to-digital conversion chip will MQ - 3 output voltage signal is converted into digital signal into the single chip microcomputer AT89C52, if not to exceed bid, displayed by LCD, if more than set threshold, the buzzer alarm to alert the driver. The key circuit is used to start the detection. If the key is not pressed, the device is in a stagnant state waiting for processing.

4. About the design of the hardware circuit

4.1. A brief description of the microcontroller's minimum system
MCU minimum system, also known as the MCU minimum application system, refers to the use of the least components of the MCU can work system. The three elements of SCM minimum system are power supply, crystal vibration and reset circuit. AT89C52, power supply, crystal oscillator circuit (operation needs pulse signal with timing circuit) and reset circuit. The C52 microcontroller is the core of the design, and the power supply is the premise of the whole circuit operation. The crystal oscillator circuit provides stable and accurate single frequency oscillation, and the reset circuit increases fault tolerance and improves electromagnetic compatibility.

4.2. Brief overview of C52 microcontroller
The system adopts AT89C52 single-chip microcomputer as the core processor, which is responsible for computing and processing the data collected by the alcohol sensor. After processing, it controls the LIQUID crystal display screen for display. When the collected alcohol concentration value exceeds the
initial value, the sound and light alarm will alarm. AT89C52 is a low voltage, high performance CMOS 8-bit microcontroller, it contains 8k bytes can wipe again and again. The Flash read-only program memory data and 256 bytes of random access memory (RAM), the device adopts high density of ATME company, nonvolatile storage technology production, compatible with standard MCS - 51 instruction system, built-in general 8-bit CPU and Flash memory cell, powerful AT89C52 single chip microcomputer can provide many complex system control applications.

4.3. Selection and principle of alcohol sensor
Alcohol sensors are components that convert the concentration of alcohol in the air into an analog signal which can be received by A/D converter. I chose the MQ-3 sensor, the most widely used and low-cost sensor on the market, because it has the following advantages: sensitivity, rapid response, quick recovery, high durability, reliable stability, and simple drive circuits.

Basic principle: the concentration of the detected gas is converted into an acceptable electrical signal. The concentration of the gas is proportional to the electrical signal.

4.4. A brief introduction to liquid crystal displays
LCD1602 is an industrial character LCD capable of displaying 16x02, or 32 characters, at the same time. LCD1602 LIQUID crystal display principle LCD1602 liquid crystal display principle is to use the physical characteristics of liquid crystal, through the voltage to control its display area, there is electricity there is display, so that can display the graphics.

LCD1602 LIQUID crystal display module can be directly interface with single chip microcomputer, the circuit connection is simple. Advantages: LCD1602 is character liquid crystal, display letters and Numbers more convenient, simple control and low cost.

4.5. Keyboard input
Features: a set of button switches, using a contact mechanical elastic switch, press down the conduction, release disconnect. The key is used to start, no key is pressed, the whole is static, waiting to be operated. The connection between keyboard input circuit and MCU is shown in figure 2.

Used to set the required values for drink-driving alarms, three buttons, concentration setting, increase and decrease. When the setting key is pressed down, the pin level corresponding to the I/O interface changes from high to low, and the SCM controls the display to display the threshold value at this time. In addition, the circuit can also be applied to other designs. The key is used to start the detection. Without pressing the key, the whole system is static and waiting to be operated.

Figure 2. Keyboard input simulation
4.6. Sound and light alarm circuit design
When the data received by the single chip AT89C52 reaches or exceeds the threshold value which has been set, the BUZZER will be driven to emit an alarm sound and a led scintillation simulation diagram, as shown in figure 3 in the acoustooptic alarm circuit simulation.

The main program design of the alcohol concentration detection system should firstly initialize the system, set the threshold value by pressing the button, and then start to detect the gas to be measured. If it is greater than the set value, the buzzer will alarm and want to display the value; if it is less than the set value, the buzzer will not respond, and the diode will not emit light and display the alcohol concentration.

5. Proteus simulation
Proteus simulation, from the simulation, easy to use, can identify most of the SCM, there are a variety of tools can. However, from the perspective of power electronics, proteus' circuit calculation is not accurate, and the component library is backward. The advantage is that you don't need a real hardware environment to learn MCU programming.

Diagram is drawn on Proteus and then simulated for testing. Since there is no alcohol sensor in the simulation, a sliding potentiometer is used instead. The results are shown in figure 4.
Figure 4. The overall simulation diagram of the design

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