

Portable Environmental Parameter Monitor Based on STM32

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Abstract : Introduction: According to statistics, people spend 80% to 90% of time indoor, so indoor air quality, either at home or in the office, greatly impacts the quality of life, health and work efficiency. Therefore, indoor air quality is very important to human activities. With the acceleration of urbanization, people are spending more time in indoor activity. The time in indoor environment, the living space, and the frequency interior decoration are all increasingly increased. However, housing decoration materials contain formaldehyde and other harmful substances, causing environmental and air quality problems, which have brought serious damage to countless families and attracted growing attention. According to World Health Organization statistics, the indoor environments in more than 30% of buildings in China are polluted by poisonous and harmful gases. Indoor pollution has caused various health problems, and these widespread public health problems can lead to respiratory diseases. Long-term inhalation of low-concentration formaldehyde would cause persistent headache, insomnia, weakness, palpitation, weight loss and vomiting, which are serious impacts on human health and safety. On the other hand, as for offices, some surveys show that good indoor air quality helps to enthuse the staff and improve the work efficiency by 2%-16%. Therefore, people need to further understand the living and working environments. There is a need for easy-to-use indoor environment monitoring instruments, with which users only have to power up and monitor the environmental parameters. The corresponding real-time data can be displayed on the screen for analysis. Environment monitoring should have the sensitive signal alarm function and send alarm when harmful gases such as formaldehyde, CO, SO₂, are excessive to human body. System design: According to the monitoring requirements of various gases, temperature and humidity, we designed a portable, light, real-time and accurate monitor for various environmental parameters, including temperature, humidity, formaldehyde, methane, and CO. This monitor will generate an alarm signal when a target is beyond the standard. It can conveniently measure a variety of harmful gases and provide the alarm function. It also has the advantages of small volume, convenience to carry and use. It has a real-time display function, outputting the parameters on the LCD screen, and a real-time alarm function. Conclusions: This study is focused on the research and development of a portable parameter monitoring instrument for indoor environment. On the platform of an STM32 development board, the monitored data are collected through an external sensor. The STM32 platform is for data acquisition and processing procedures, and successfully monitors the real-time temperature, humidity, formaldehyde, CO, methane and other environmental parameters. Real-time data are displayed on the LCD screen. The system is stable and can be used in different indoor places such as family, hospital, and office. Meanwhile, the system adopts the idea of modular design and is superior in transplanting. The scheme is slightly modified and can be used similarly as the function of a monitoring system. This monitor has very high research and application values.

Keywords : indoor air quality, gas concentration detection, embedded system, sensor

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