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LETTER TO THE EDITOR

Multi-target Detection of Environmental Pollution Areas in Laser Visual Recognition

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The detection of the environmental pollution area is of great practical value and theoretical value, to this end, a multi-target detection system for environmentally sensitive areas of laser vision recognition is proposed and designed. Give the overall structure diagram of the environmental pollution area detection, It consists of system user interface, system management, system configuration detection service, monitoring and storage devices of the system multi-target area. Based on the laser sensor, the two modules of pollution area information collection and pollution information detection are used to complete the system hardware design, and the ARM processor is used to process the environmental pollution area information to complete the system software design. The experimental results show that the measured results of the designed system are close to the actual values and have certain feasibility.

Laser sensor; Environmental pollution area; Detection.

1 INTRODUCTION

In recent years, as the state has increased its efforts in environmental protection, real-time monitoring of the environment is a major task related to environmental protection and the health of the people. Timely detection of pollution areas in the environment, accurate detection of environmental pollution areas is a basic function that environmental protection systems must have. With the continuous development of computer technology, some intelligent detection methods of pollution areas have become the focus of many research institutions. In the current pollution area detection methods, the detection of each small area is mainly carried out, and the final test results is compared to obtain correct pollution prevention standards, and a large number of concentrated small area pollution data is analyzed, the pollution of the entire large area is obtained through a large number of calculations. With the continuous increase of various small areas, the uneven distribution of pollution particle concentration is intensified, the pollution concentration of each area has a large difference, and there are problems such as mis-collection of pollution data and integration errors. Therefore, a Laser vision identification method for environmental pollution detection emerges as the times require. Currently widely used are optical cameras and laser range finder. Laser range finder has certain advantages for detecting and identifying image targets in scanning scenes. Compared with other types of data acquisition systems, laser acquisition is used. The system for scanning data has many advantages, such as being able to work around the clock, a small amount of data, a fast scanning speed, a large coverage, and a good price (Nowak and Myslajek 2017, Oyekale 2017, Kumar 2017).

Ruijiang Nan published an article in the journal Ekoloji's 2019 Issue 107 entitled "Rapid Detection Method of Ecological Pollution in Scenic Spot under Different Tourism Disturbance". Based on the BP neural network, the article divides the ecological pollution of the scenic spot into six factors: sewage, garbage, garbage accumulation of harmful human and air, soil nutrient content and heavy metal content. Each influencing factor can be divided into four levels: Very good, good, general and poor, established a three-layer feedforward based ecological pollution detection model. Based on the classification results of ecological pollution garbage attributes and different tourism disturbances (severe, moderate and mild) as input values, a rapid detection model of ecological pollution was established, the influencing factors, impact levels and detection values of ecological pollution in scenic spots are analyzed. For value and output value, using the Sigmoid transformation function to convert the output value into interval [0,1], realizing the rapid detection of ecological pollution in scenic spots under different tourism disturbances. The results show that the method can effectively detect soil physical properties, soil nutrient content and soil heavy metal content in experimental areas under different tourist areas.

Reference (Zhao Tie 2018) research the new key area environmental detection technology based on geographic information system, respectively gave the GIS environmental data detection system and the key area environmental pollution source detection system, analyzed the environmental quality detection content of the key areas and detection process. Carry out a detailed description and verify the feasibility of the detection technology through experiments. Reference (Wu Cheng 2017) designed a laser sensor-based environmental pollutant detection system. The system consists of a data acquisition module, a data processing module and a power management module. The acquisition module converts the optical signal containing the concentration of pollutants into an electrical signal. After filtering and amplifying the operation, the data processing module is input, the concentration value of the pollutant is calculated, and the concentration of the pollutant is detected by a light scattering method. However, the environmental pollution detection results obtained by the above two methods have certain deficiencies. To further improve the detection effect, this paper proposes a multi-target detection method for environmentally sensitive areas of laser visual recognition.

2 IDEA DESCRIPTION

In this paper, laser vision recognition is used to detect multi-targets in environmental pollution areas. Laser vision recognition is mainly based on laser sensors. In this paper, the multi-target detection system of the environmental pollution area is designed by the laser sensor.

2.1 Overall system design

The overall structure of the multi-target detection system based on laser sensor for environmental pollution area is shown in Figure 1. The control core of the system is the ARM processor, which cooperates with the operation of each module to realize the detection of environmental pollution areas.

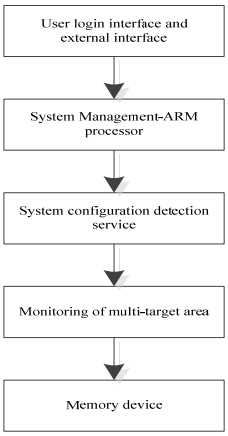

Figure 1 Overall structure of the system

System user interface: Mobile signal processing platform terminal server, to provide cloud computing request service interactive interface. Managers and users can register, log in, verify, manage users, and customize services through a browser.

System Management: Manage and service network users. It can manage the administrator, authenticate, log in, etc., and manage the user's computing resources. After the user obtains and cancels the corresponding service authority, the user interface can generate and cancel the corresponding icon. When a user sends a request, it can forward to the corresponding signal detection program and service according to the user's request, mobilize and deploy the corresponding resources, and dynamically deploy, configure, and recover the signal resources (Wang et al. 2018).

System configuration detection service: It is a process of delivering the collected environmental pollution area information resources to the upper cloud application through an automated modeling service, that is, the process of promoting the environmental pollution area information resource detection service becomes available. At the beginning of the detection platform, when all hardware resource environments are ready, configuration services are required (Yu et al. 2018). In addition, during the operation of the detection platform, a secondary signal verification service is often performed to meet the requirements of the upper layer service for detection accuracy.

Multi-target area monitoring: Monitor and measure the use of environmental pollution area information resources. Monitoring of the platform is a prerequisite for accurate alarms. If multiple target areas cannot be effectively monitored, management cannot be performed. Monitoring for different types of sub-cloud signal detection platforms is different: The CPU usage is usually monitored by the CPU; For memory and storage, in addition to monitoring usage, it also monitors read and write operations as needed; For the network, real-time input, output and routing status are required for monitoring. If the resource utilization of the nodes is reasonable, even if their load is uneven to some extent, it will not cause serious problems. When too many node resources utilization is too low or the load difference between nodes is too large, it will cause a series of problems. This requires an automated load balancing mechanism for the infrastructure to shift the load, and react quickly to node synchronization configurations and load balancing configurations to ensure that resources are distributed to the right users (Hernandez-Vargas et al. 2018).

Storage devices: The cloud includes virtual and physical servers. Managed by the management system, responsible for detecting request processing, computing resources, and storage resources for alarms. When storing, use the corresponding data algorithm to upload and download large-capacity data in parallel.

2.2 System hardware design

When the system detects the environmental pollution area information, it will be interfered by the temperature and the light source. In order to improve the pollution detection accuracy, the high-precision laser sensor is used to detect the pollution information. In the hardware design of the system, the hardware modules that need to be used are the environmental pollution area information collection module and the environmental pollution area detection module, as shown in Figure 2 and Figure 3, respectively.

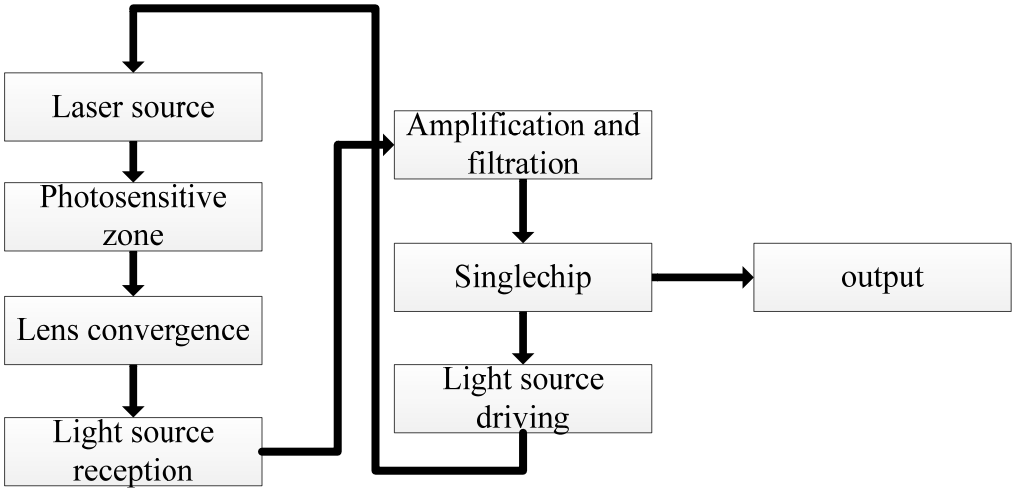

Figure 2 Information acquisition module for environmental pollution area

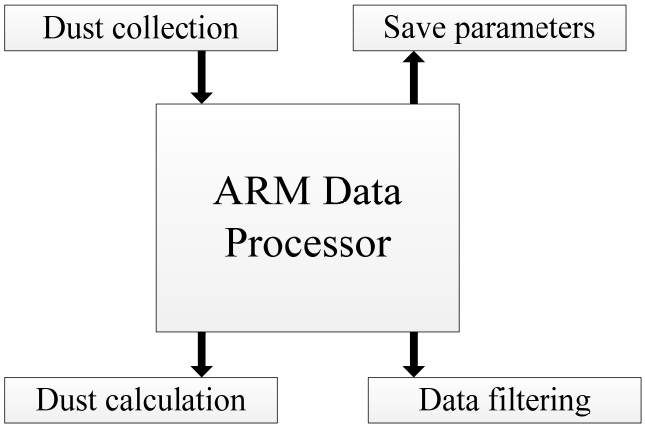

Figure 3 Environmental pollution area information detection module

2.3 System software design

The process of collecting pollution area information by the system is as follows: Referring to the characteristics of Ruijiang Nan's published article in the journal Ekoloji's 2019 Issue 107, the ARM processor is used to process the information acquired by the environmental pollution area information collection module, and the environmental pollution area information is filtered and processed in a fixed time set to acquire to get high-quality pollution area information. The environmental pollution area information multi-target detection system outputs the detected pollution area information through the low pulse information width output, and the small-range pollution area output signal is a narrow pulse or a mixed continuous pulse waveform, and the output signal of the large-scale or large-scale pollution area is wide. Pulse or independent continuous pulse waveform (Gao et al. 2018).

3 RESULTS

In order to verify the effectiveness of the design system of this paper, the experimental test analysis is carried out. The experimental parameters are set as shown in Table 1:

Table 1 system parameter settings

lab environment	parameter	Ranges
hardware	PC	Intel(R) Xeon(R)5110 1.60GHz
	RAM	DDR 2G
	hard disk	Hard disk
software	operating system	Windows XP
	Language	Microsoft Visio C++
	Database management system	Sql Server

According to the above experimental environment, the performance of the detection system is tested and analyzed. The experimental results show that the system designed in this paper is used for multi-objective detection of environmental pollution areas. The obtained detection results are close to the actual values and have good performance. The use of this system for environmental pollution area detection is highly feasible.

4 DISCUSSION

Based on the laser visual recognition angle to complete Multi-objective detection of environmental pollution area, it has the advantage of powerful system information update capability and powerful system information update capability. With the ARM processor, the pollution information has the ability to automatically evolve and develop. The managers of the pollution monitoring center will interpret, discuss and develop the pollution information according to their own situation while accepting the pollution information of each region. This is actually the ability to update information.

5 CONCLUSIONS

Pollutants can cause serious harm to people's living environment and physical health. Effectively detecting environmental pollution areas is of great significance for improving environmental quality. In order to improve the accuracy and stability of environmental pollution detection, a multi-target detection system for environmentally sensitive areas of laser vision recognition is designed. The advantages of this system are verified by experiments and it has certain practical application value.

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