Research on the Design and Implementation of Detection System of Nutz Framework Meteorological Metrical Device

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Abstract: In people's daily life, the role of weather forecast is self-evident. However, the accuracy of forecasting is based on the accuracy and reliability of meteorological data which depends on the sensitivity of meteorological device. Therefore, an important duty of the detection institution of meteorological metrical device is to have the effective detection of meteorological device, so as to ensure a high sensitivity of the device. However, the meteorological device used by some meteorological bureaus is not technologically advanced and the device detection mode is too old, which cannot meet the new regulations issued by the China Meteorological Administration. So it is necessary for the meteorological bureau to develop a set of devices that can easily meet the new meteorological measurement requirements, which is of great significance to ensure the accurate measurement of meteorological data.

Keywords: Nutz framework; Meteorological metrical device; Detection system design

1 Device transceiver module

1.1 Functional module design

As shown in Figure 1, the device transceiver module can be divided into six sub-functions: sending and receiving announcements, inspection registration, device handover, device information modification, device receipt and customer comments functions.
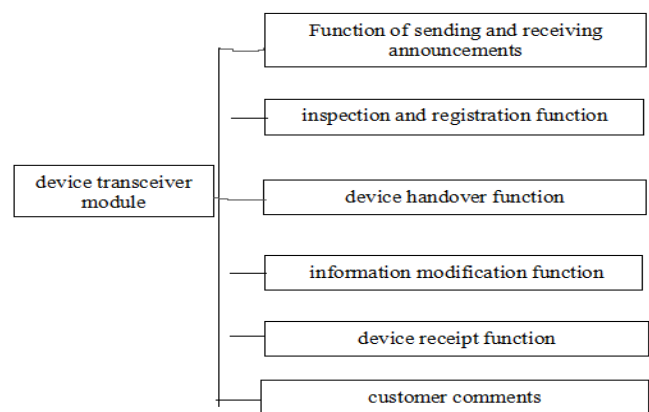

Figure 1. Functional diagram of the transceiver module

1.2 Description of functional module

(1) The description of the function of sending and receiving announcements: the main task of this sub-function is to show the information of unreceived device, unaudited device, undetected device, and untransferred device, and its content is diverse. If the inspector does not collect the samples after the information is received and registered for many days, the relevant staff will mark the undetected device with a warning. (2) The function of inspection and registration is mainly to register the relevant device information of the receiving device, and then to register and record the required device detection. The device receiver may re-detect the device that has been detected, or

directly derive relevant detection records by using the records that have been generated. (3)In the process of handover, the system will display "received" on its device after the meteorological device with handover function completes the acceptance work. The inspector only needs to check the device that shows "received", and then submit the sampling handover in the selected device. After submitting, the device will display the status of "sampling received". (4)The description of the information modification function: It mainly refers to the fact that during the reception of meteorological device, if an error is found in the information input, the relevant staff needs to enable the device to complete the modification of the information. (5)The device receipt function refers to the need for the customer to provide relevant information and names for detection during the process of receiving related device, and then the system will find out the relevant device information required by the customer through systematic retrieval and screening and submit a receipt record. At the same time,it will calculate the relevant fees and print the detail cost for the customer[1].(6)The function of customer comments means that after the entire device detection work is completed, the customer give some opinions and suggestions based on his own experience, which will be registered by the device management staff and submitted back to the system.

1.3 Transceiver module implementation

(1)Sending and receiving advertisements is that after the user logs in to the system, the system will directly jump to the sending and receiving advertisement interface, which is divided into four parts: untransferred device, undetected device, sampling device and unaudited device. When using undetected device, if there is no handover and detection after 10 days from the completion of the device detection registration, the warning system of meteorological device will be activated. (2)Detection registration means that when the staffs enter the detection registration page, there will be a button to add the information of the new customer. It is able to input the information of the customer for inspection, and then receive the submitted information list after the completion of the input. If the device sent by the customer is already detected, there is no need to create a new customer information but just select the corresponding customer from the previous entry form, and then click the checked device button to export the information directly[2]. (3)Device handover means the inspector who has the right to enter and use a device

on the system, can find his own relevant information and the device he has received on the device handover interface, and deal with the device sampling processing. (4)The device information modification interface means that if the device receiving staff has an error when filling device information, there is still a way to recover: First, click the customer list and the relevant customer information page will pop up; select the customer information to be modified and then click the registration button to screen out the devices that need to be modified for accurate correction; then the system will save the modified contents and automatically input the modified table for modification after the selection of the device. (5)The device receipt means that when the customer gets the device, the relevant staff can find the customer in the system, and then the system will search according to the relevant information, find the corresponding customer and select the appropriate device to print the charge slip and submit the received device. After the submission is completed, the information of relevant people can be completely recorded at the same time[3]. (6)The customer comments is the last link in the device system. The relevant staff opens the customer comments interface, clicks the customer list button and selects the corresponding customer, and then fills in the customer's feedback into the form to complete the work of customer comments.

2 Device detection module

2.1 Functional module design

As shown in Figure 2, the device detection module can be divided into five sub-modules, which are detection notice, device selection, original record entry, device re-detection and device return.
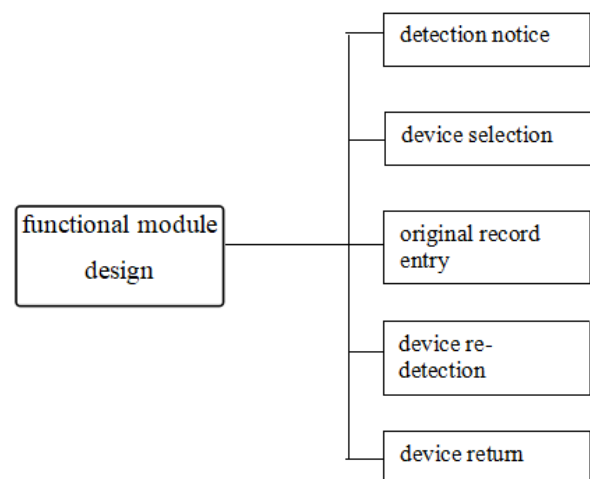

Figure 2. Functional diagram of the detection module

2.2 Description of functional module

(1)The description of the detection notice function: The main function of this module is to list the information of the devices that have not been detected, which mainly includes the device name and device code. (2) The description of device selection function: Based on the information provided by detection notice, the inspectors of the laboratory select the device, screen the standards, detection specifications, measurement standards, etc. based on the actual situation and the type of device, and then generate a certificate number. (3)The original record entry function: When the authentication data generated by the device is modified, the device detection staff needs to open this page for modification. (4)The function of device re-inspection: When the device is affected by various factors during the detection process, it is necessary to re-detect the device. In this case, the system of device re-detection needs to be started. When re-detecting, the reason shall be explained, a blank record table and the re-detection procedure shall be generated. (5)The device return function: When the device fails or the identified result is unavailable, the device return function shall be started to submit the device and restore the previous record.

2.3 Device detection module implementation

(1)Device selection: The relevant device inspector click the list box, select the corresponding detection type from the list, and then click the start button to complete the detection type of device. Then the relevant detector selects the device to be detected from the list of undetected device and puts it in the radio box on the left. In the list on the left, after selecting specific measurement standards and etalon for each device and submitting it, the system will create the corresponding blank record form and certificate number for the detected devices. (2)The relevant staffs need to enter the original data as required. During detection, relevant device staffs need to select this page to get the original detected data, and then click the device selection interface to select the standard detection requirements such as appropriate measurement standards and detection regulations to determine the device detection result. If the result is qualified, the corresponding detection certificate can be given[4].

3 The audit and approval module

3.1 functional module design

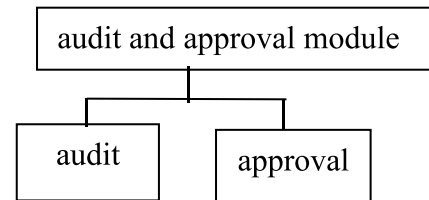As shown in Figure 2, after the meteorological device

Figure 3. Functional diagram of the audit and approval module

detection is completed, two checking levels will be shown, namely approval and audit authority. Customers can use the raw data information during the device detection process for auditing and approval.

3.2 Description of functional module

(1)Audit function description: Users with audit authority in the system can use their own permissions to query the records of the unaudited device. During the audit, an audit decision can be made based on the device's original records and other information. Once the audit fails, the device will show a failed status. (2)Approval function description: Related users with approval authority can find the detection records of the audited device. During the approval process, the audit and judgment are made based on the original information of the device detection. If it does not meet the requirements, the equipment will be in a failed state.

3.3 Audit and approval module implementation

Users with audit authority can query the unaudited detection information through the system and click the button to enter the audit approval page. In the audit process, they can also view the original records and make audit decisions based on the detection records. The approval process is the same as above. The system will record information such as auditor and audit time.

4 Certificate printing module design

4.1 Functional module design

After the device is detected and approved, the verification staff can print the detection certificate

through this module. If there is an error in the relevant information of the certificate, it can also be recomposed through this module.

4.2 Functional module description

Certificate printing function description: after the user (detection staff) with the permission of certificate printing operation enters the certificate printing operation interface, the detection certificate can be printed by selecting the corresponding device.

4.3 Certificate printing module implementation

The device management staff or the detection personnel make inquiries according to the detection type of the device. After the system searches in the background, a list of certificates that can be printed is shown. It is able to click the download button and download the certificate to the local machine and print.

5 Query and statistics module

5.1 Functional module design

As shown in Figure 3, the query and statistics module mainly includes three sub-modules: original record query, certificate query and detection status query.
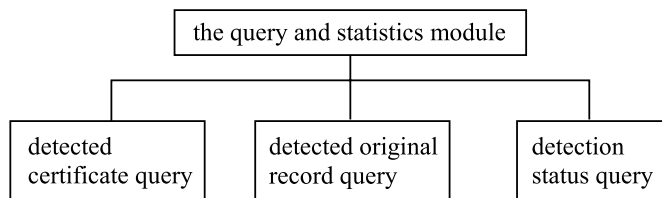

Figure 4. Diagram of query and statistics module function

5.2 Functional module description

(1)Description of the certificate query function of detected device: As the literal meaning says, this sub-function can query the detection certificate that has completed the device detection. During the querying, the customer information sent for device detection can be used for inquiry, and the basic information and detection certificate of the device can be recorded. (2) The original record query function of the detected device refers to that this module conducts the original record inquiry to the device that has been detected, and it can also perform retrieval based on the customer of the device detection. After the completion of device retrieval, the relevant staff should record the basic information and the original detailed data of

the device[5]. (3)Description of detection status query function: Related staffs use this module to check the detection status of the device. The basic information of the device and the details of the original record will be listed after the query. (4)Description of detection status query function: The function of this module is mainly to identify and query the status of the undetected device. It is needed to query according to the detected customers. After the detection status query is completed, the information device will be recorded and the detection progress of the device will be indicated.

5.3 Query and statistics module implementation

(1)Query of the certificate of the detected device. Users with corresponding authority can query the certificate of the detected device on this interface. Before querying, it is needed to find the registered customers in the customer list, and then select the customer information and fill in the corresponding name and time. After the system completes the search, it is needed to find out the basic information such as the name of the detection company and the device, certificate number, and original record number, and then click the button of the certificate to view the device verification certificate. (2) Original records of detected device. The user can query the original records of the detected device on this page. When query, click on the customer list to pop up the registered customers, select the name of the customer, fill in the query time and the name of the person, and list the basic information the name of the detection company and the device, certificate number, original record number and its link, and then click the View Details button to view the original data record. (3)Device detection query. The user queries the device being detected on this interface. When querying, click the customer list button to pop up the registered customers, and then select the customer name. After the system background search is completed, the detection status such as basic information is recorded as above[6].

6 System management module

6.1 Functional module design

As shown in Figure 4, the system management module mainly includes five modules: user management, customer management, measurement standard management, etalon management, and detection procedure management.
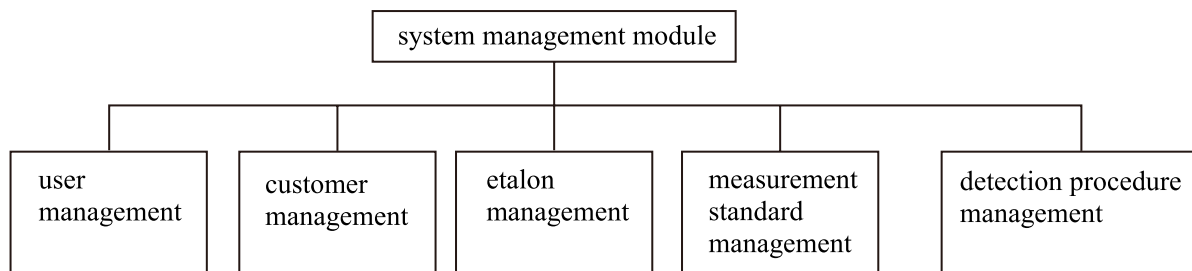
Figure 5. Functional diagram of system management module

6.2 Description of functional module

(1)A brief description of the user management function: users can add, modify, and delete system user information with this module, so as to set the user's use permissions, such as detection permission, sending and receiving permission, management permission, audit permission and approval permission. (2)Customer management function description: The function of this module is mainly to add, modify and delete customer information. (3)Introduction to the etalon management function: This module mainly performs a series of operations for adding, subtracting, deleting and modifying the etalon. (4)Functional description of measurement standard management: In the detection of different device, certain specific measurement standards need to be adopted for detection in accordance with relevant requirements[7]. (5)Functional description of detection procedure management: The detection device can be entered, and then different detection procedures can be regularly maintained and updated through this function.

6.3 System management module implementation

(1)During the detection of the device, the system user management module interface can be used to switch the user-creation button to the user-addition page, and then enter the relevant user information,and specify the relevant operation permissions through the check boxes, such as detection permission, sending and receiving permission, management permission, audit permission, and approval permission, etc. It is also available to modify and delete information in the user list. (2) Management of detection procedures. The relevant detection staffs have added buttons for detection procedures to complete the update and other operations[8].

In a word, with the continuous development of society and economy, people pay more and more attention to the impact of weather on life, which has promoted the change and update of meteorological device, and the requirements of the relatively backward autonomous regional meteorological detection institution have also increased. A variety of meteorological observation equipment exists on the market, and the national meteorological detection procedure and requirement are continuously improved with device updated, which places higher requirements on the meteorological detection institutions of the autonomous region. Under the new situation, relevant technical personnel must continuously improve the efficiency and quality of device measurement and detection, and make important contributions to the development of the motherland.

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