

Implement an Emergency Rescue Device for Vehicles

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Abstract The purpose of this study is to design a device that can handle emergency situations when the vehicle is overturned, abnormal gas is generated, or it is accidentally flooded by water. The device is fixed in the corner of the front passenger seat, uses the vehicle power supply as the device power, and uses Bluetooth to connect to the mobile phone. Once one of the above three situations occurs, the device will open the window glass and urgently call for rescue operations. The sensor is divided into two stages to prevent errors in detecting the water level or abnormal gas concentration. The first alarm is a basic judgment that enables the personnel in the car to react to the situation. Once the second alarm occurs, the system will determine that the signal has reached the warning value, the personnel in the vehicle are in danger and the window glass should be opened immediately. This design ensures the safety of the people in the car in the event of a dangerous or unexpected situation, and also prevents unnecessary damage to the car.

Keywords: automatic window glass opening device, emergency rescue, sensor, water level detection, abnormal gas detection

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1. Introduction

In recent years, there have been reports of cases where a car accidentally overturned, drove into the sea, or accidentally broke into a submerged waterway, and the driver was unable to escape smoothly for some reason, resulting in an irreparable accident and the circulation of air-conditioning gas in the car. The generated dangerous gas causes the driver or passenger to inhale too much dangerous gas and cause permanent injury to the driver or passenger. Therefore, considering the above problems, if there is a device that can automatically open the window when the car overturns, drops of water and gas leakage

occurs, and makes an emergency call, so that the driver or passenger can be in the first place Escape can effectively increase the safe escape opportunities for drivers and passengers.

2. System Design

This research focuses on the combination of sensor integration and switch, with simple operation and stability as the first consideration, and after confirming all the hardware architecture, you can start to design the circuit, with the Arduino Nano board as the main core during integration testing, errors and problems can be avoided. The system design steps are shown in [Figure 1](#).

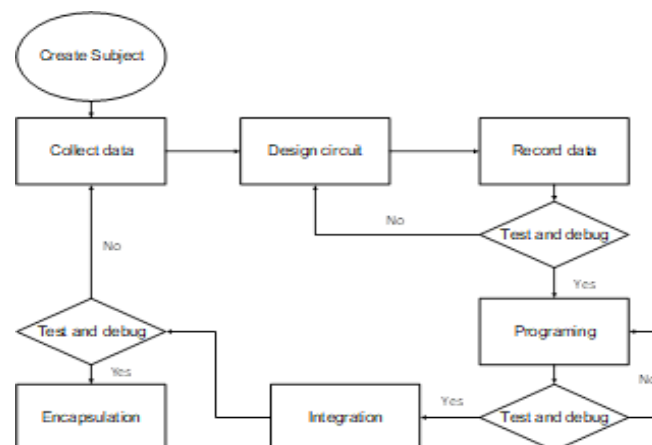


Figure 1. System design flowchart

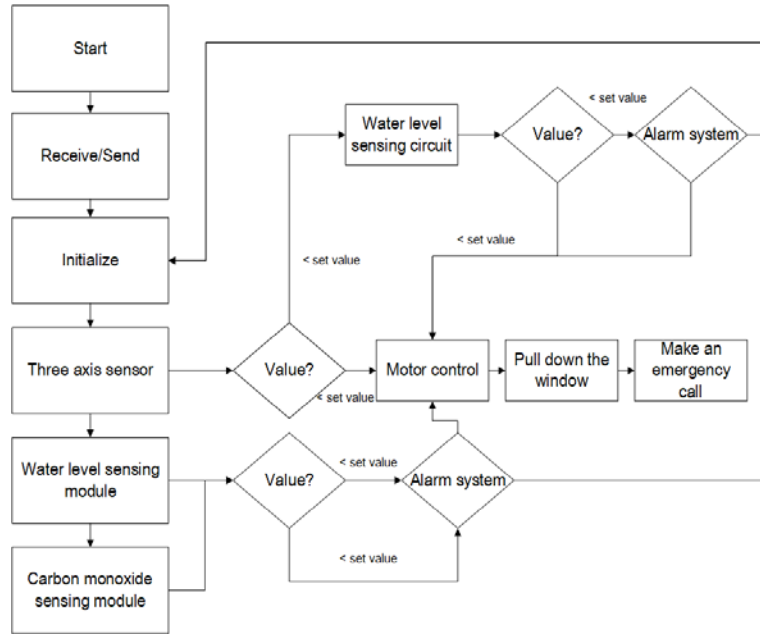


Figure 2. Software architecture

3. Software Architecture

The control board used in this institute mainly uses digital and analog feet for sensor control, and connects to mobile phones through Bluetooth modules to achieve

integration. When a dangerous situation occurs, there will be an alarm sound to remind you that the device will not be activated at this time. When the danger level increases, it will automatically start and immediately call the emergency rescue phone. The overall program flowchart is shown in Figure 2.

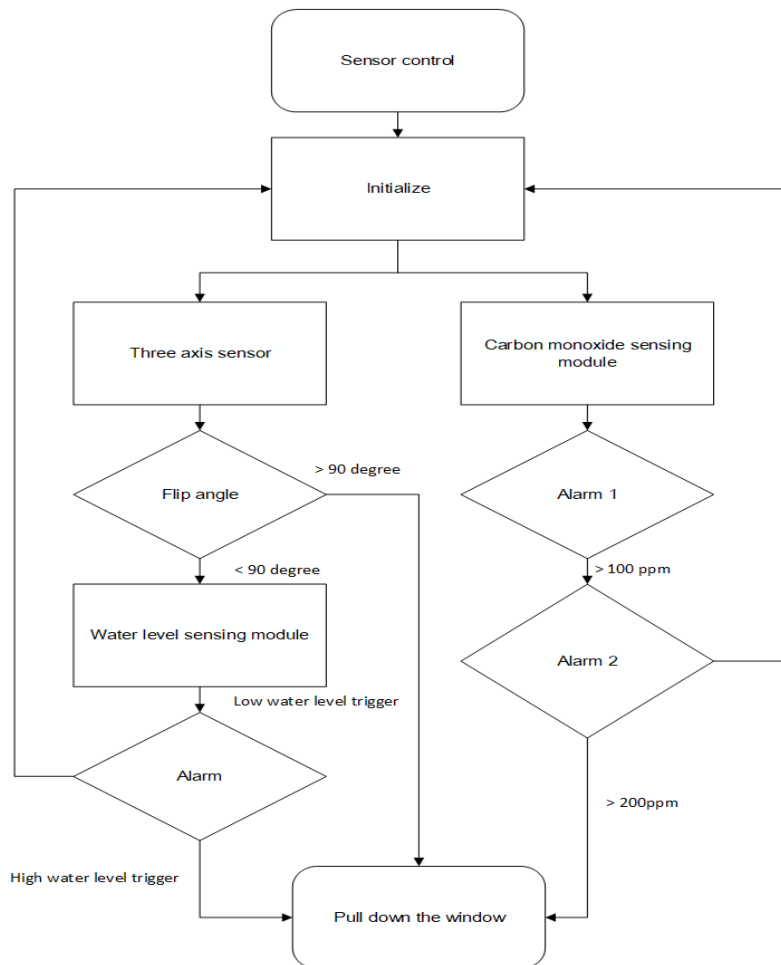


Figure 3. Sensor systems

4. Sensor Systems

In sensor system, carbon monoxide detection is divided into two stages, the first stage is 20 ~ 300ppm, the second stage is 300 ~ 1000ppm. Both are different prompt sounds, and the automatic start device will only be performed if it exceeds 1000ppm. The water level is divided into a low water level and a high water level. The low water level is used as an alarm and the device is activated when the high water level is reached. The flow chart is shown in Figure 3.

5. Android Planning

The mobile phone will first connect with the device to perform the initialization action. When the device detects a danger and opens the window glass, it will transmit a signal to trigger the mobile phone to automatically make an emergency call. There are three main function keys on the phone interface: speed dial, contact list, test and other buttons. Through the contact list button, the phone of the emergency contact can be selected and displayed on the main screen. The speed dial button is used to dial the emergency contact. The test button can actively send signals to the device to confirm whether the device is properly connected. The block diagram is shown in Figure 4.

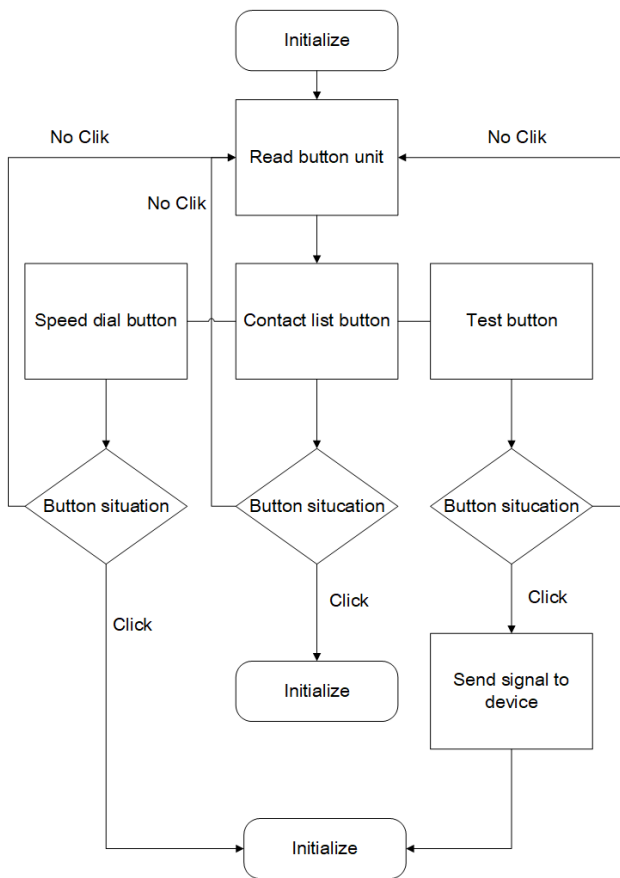


Figure 4. Android

The overall function, the main execution process is that when the sensor detects a dangerous situation, the device automatically activates the device and makes an emergency call. It is characterized by the ability to

automatically sense and dial emergency rescue calls for subsequent rescue actions. The following descriptions are described in terms of:

5.1. Automatic Start

When the sensor detects the dangerous value, the window device is activated through the control of the chip. When a dangerous situation occurs, it can replace the human reaction at the first time, and quickly achieve the effect of opening the window.

5.2. Alarm System

When carbon monoxide senses 20 ~ 300 ppm, which is not fatal. There will be an alarm sound to remind the driver of the situation, so that the driver can do the necessary treatment. When the alarm is changed from 300 to 1000 ppm, the device is directly activated to dilute the gas. Water level sensing means that when the low water level is reached, a warning sound is given to alert the driver, and when the dangerous water level is reached, the window is activated immediately.

5.3. Emergency Rescue Phone

When the device system automatically starts the car window, it connects with the mobile phone via Bluetooth, dials the emergency contact number selected in advance, and notifies the fire department. Even if the driver loses consciousness, the rescue team can learn the first-hand news and use the most Quickly arrived at the rescue site. The schematic diagram of the system device installed on the vehicle is shown in Figure 5.



Figure 5. Schematic diagram of device placement

6. Conclusion

This research mainly focuses on an integrated application of sensor control and mobile phone Android, and automatically opens the window as the research direction to create a rescue opportunity when the vehicle is in danger. The products sold in the market do not have automatic control and risk detection. When an accident occurs, the best rescue cannot be done in the first place. Therefore, the completion of this study can effectively shorten the escape time, increase the escape probability, and enable the driver and passengers to get the most help.

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