IMPLEMENT AN EMERGENCY ESCAPE DEVICE FOR VEHICLES

[1]CHING-SUNG WANG, [2]CHIEN-WEI LIU, [3]BO-YI ZHOU

[1,3]Departmennt of Electronic Engineering, Oriental Institute of Technology, New Taipei City, Taiwan.
[2]Department of Information Management, St. Mary's College, Taiwan
E-mail:[1]ff020@mail.oit.edu.tw

Abstract- This study is to design a device to deal with an emergency situation in which abnormal gas produced or vehicle is accidentally drown in to water or driven into a sewer. The device is connected to mobile phone through Bluetooth interface. Once the situation is happened, it would open the windshield and, at the same time, make an emergency call to call on the following rescuing action. The device operated are divided into two steps to prevent making mistakes on detecting water level or abnormal gas concentration. The first alarm is the primitive judgement condition, which enables the driver to react the situation. Once the second alarm is happened, the system would recognize the primitive reaction is invalid or inefficient, the driver is in danger and the windshield should be open immediately. This design is to ensure the safety of the driver and passengers.

Keywords- emergency escape device, vehicle, water detection, gas detection.

I. SYSTEM DESIGN

The design procedure of the system is showed in Figure 1.

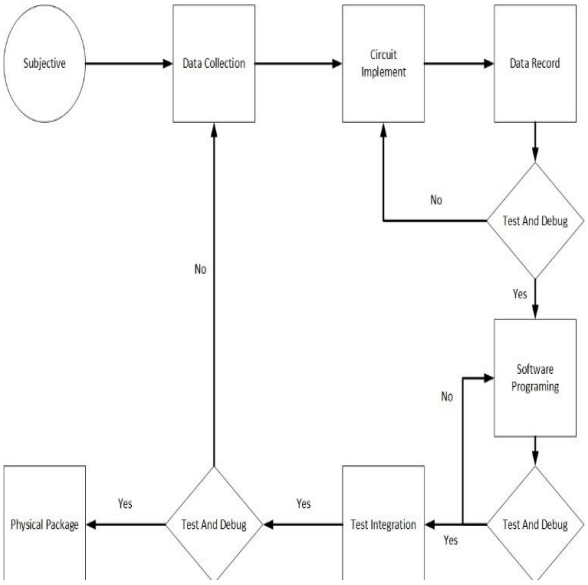


Figure 1. Flow Chart of System Design

This study focuses on the collocation and application of sensors and chips [1],which feature easy and stable operation

II. SYSTEM ARCHITECTURE

The core feature of the complete system is the windshield-opened device [2],which includes detecting the water level and carbon monoxide concentrations to determine the danger. The system has four functions: an automatic control device, a manual button, a warning system, and an emergency calling. The overall system architecture are shown in Figure 2.

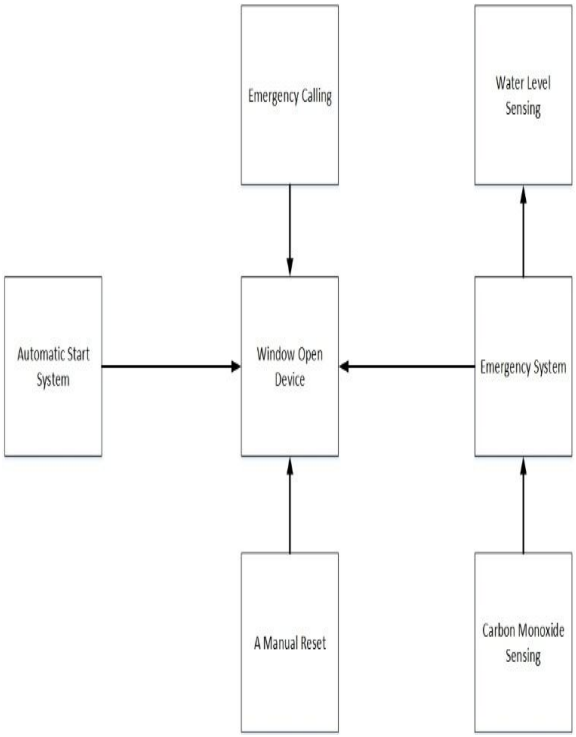


Figure 2. The system block diagram

III. OPERATION PROCEDURE

The main procedure of the overall functions is, as follows: when the sensor detects danger, the device will automatically activate the windshield-opened device [3][4][5] and make emergency phone calls. The sensor operation procedure is showed in Figure 3. Its features are the abilities toopen the windshield and automatically make emergency calls, which facilitate follow-up rescue actions.

This is more than a normal windshield-opened device can achieve [6][7][8][9]. The functions are described,as follows:

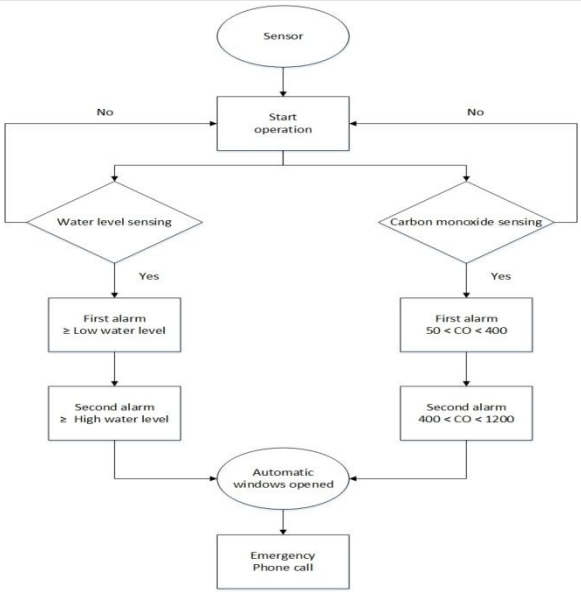


Figure 3.The sensor operation procedure

3,1.Automatic opening:

When the sensors detect danger, the core via the control of the chips. In emergencies, the device can react immediately on behalf of the vehicle occupants to open the windshield then dial the emergence phone call [10][11][12].

3,2.Warning system:

When the concentration of carbon monoxide is detected at50-400ppm, meaning a nonfatal level, a warning sound will remind the driver of the situation for proper handling. When the concentration of carbon monoxide is detected at400-1200ppm, the warning sound will immediately remind the driver of the higher danger level. Otherwise, the water level sensor will give a warning sound to the driver when the lowest water level is reached. The water level detector circuit implementation is showed in Figure 4.

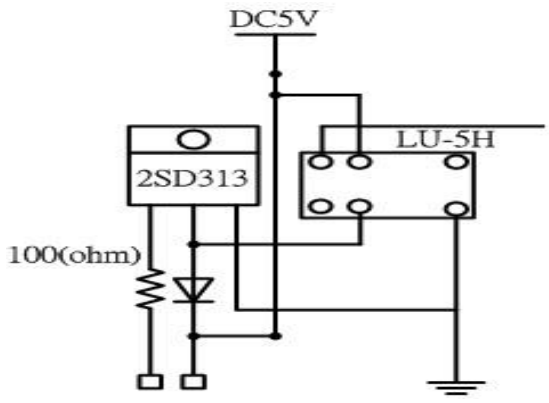


Figure 4.The water level detector

CONCLUSION

This research aims to improve the existing products on the market that are not able to automatically open the windshield, detect dangers, or immediately provide the best chance of rescue during emergencies. The completion of this study shortens the escape time and increases the chance of escape. The final goal of this study is to cooperate with car manufacturers to promote this device as a standard or optional accessory, thus, maximizing its effects to ensure the safety of the occupants of the vehicle.

REFERENCES

[1] [1] Huang, W.F., (2013), Circuits study of digital-to-analog converter, Department of Computer Science and Information Engineering of National Changhua University of Education.
[2] [2] Ho, Y.H. ((1982). Safety of Window Glass, Journal of Taiwan architecture credit investigation.
[3] [3] Chen, E.H. ((2010). Tempered glass-breaker of center punch. Liberty Times.
[4] [4] Ho YH, Yap DFW, Rahman MFA, Kok SL (1982) Bandwidth widening strategies for piezoelectric based energy harvesting from ambient vibration sources. IEEE International Conference on Computer Applications and Industrial Electronics.
[5] [5] Knysh SI, Chen EH, Durkin GA (2010) True Limits to Precision via Unique Quantum Probe. Quantum Physics.
[6] [6] Tsai YH, Chang MJ, Chen WZ, Wang JB, Lai JC (2011) Muti-functional escape window. Department of Electrical Engineering, Technology and Science Institute of Northern Taiwan.
[7] [7] Chen C, Liu Z, Zhang Y, Chen CLP, Xie SL (2017) Asymptotic Fuzzy Tracking Control for a Class of Stochastic Strict-Feedback Systems. IEEE Transactions on Fuzzy Systems 25: 556-568.
[8] [8] Chang JC, Hsiao FZ, Huang JC, Kao SP, Li HC, et al. (1993) Finite Element Analysis on Helium Discharge from Superconducting RF in the Storage Ring Tunnel. JACoW.
[9] [9] Huang WF, Hung KJ, Huang DC, Huang CC, Tseng PK (2000) Positron spectroscopy of base-adsorbed Y-zeolite. Phys Lett 266: 430-434.
[10] [10] Shi WM (2015) Android app design textbook. Flag.
[11] [11] Kumar S (2008) Design and fabrication of micro-controller based 120Hz earth tester. Electrical and Instrumentation Engineering, Thapar University.
[12] [12]Zhao YJ (2015) Arduino interactive design. Flag. 10. Chang HS (2013) Computer auxiliary circuit design by using CADSTAR. Taiwan Tech Press, Taiwan.

★★★