

Research on Oil Valve Password Controller for Car Anti-theft

CHEN Haichu, XIONG Genliang, LIANG Fayun, LIU Lingteng

(School of Mechatronics Engineering, Nanchang University, Nanchang 330031, China)

Abstract: An oil valve and password controller for car anti-theft (PCCAT) has been developed in this research. The oil valve is equipped near the fire system of car and the PCCAT is installed on the operational platform in the car. With the valve and the PCCAT, everyone who wants to drive the car must correctly input the password to open the valve installed between the oil pump and the fire system of the car to make the oil pipe connecting firstly, and then, to start the car engine. It also designed an alarm module in the PCCAT for car to start the alarm system and lock the keyboard when wrongly inputs password over the limited times. In order to avoid being abnormally powered off of the PCCAT and being cut off mistakenly the oil pipe, the PCCAT memory unit can remember and keep the position of the step motor, which could help drivers to avoid inputting password again to restart the engine quickly after engine flameout. At last, it carried out experiments with a motorcycle engine, and the experimental results proved that the PCCAT had better effects for car anti-theft.

Key words: car anti-theft; password controller; fire system; step motor

汽车防盗油阀密码控制器的研究

陈海初, 熊根良, 梁发云, 刘玲腾

(南昌大学 机电工程学院, 江西 南昌 330031)

摘 要: 针对汽车防盗, 该文开发了一种密码控制的油路阀防盗系统, 油路控制阀安装在汽车点火器处, 密码控制器则安装在驾驶室的操作台上。利用该控制系统, 任何人进入车辆后, 都必须输入正确的密码才能打开安装在油泵与汽车点火系统之间的油路控制阀, 接通油路后, 才能启动汽车发动机。在密码控制器中, 设计了报警模块, 当输入密码错误超过规定的次数后, 控制器启动报警系统并同时锁定键盘。为了避免汽车意外熄火油路阀关闭切断油路以及密码控制器掉电而需要重新输入密码的麻烦, 控制器的存储单元能记忆步进电机的当前位置并保持阀芯的当前开口, 便于驾驶员快速重启发动机。最后利用摩托车发动机进行了实验研究, 实验结果表明该密码控制油路阀系统具有很好的防盗作用。

关键词: 汽车防盗; 密码控制器; 点火系统; 步进电机

中图分类号: TM28

文献标识码: A

0 Introduction

With the improvement of people's quality of life and the development of auto technology, car goes into family life commonly day by day, but at the same time, the ratio of car-theft crime cases increase greatly, thus, problem of car anti-theft becomes one more important and urgent technology

to be solved. In order to avoid car theft, too many factories have developed types of car anti-theft system, such as mechanical types^[1-2], electronic types^[3], remote-controlling types^[4], wireless network or telecommunication networks^[5-7], and so on, but all the abovementioned products do not execute highly efficiency for car anti-theft, and many cars also are stolen even though equipped

Received date: 2012-09-23

收稿日期: 2012-09-23

Foundation item: Natural Science Foundation of China (NSFC, 50905083 & 51265034); Zhejiang Province Natural Science Foundation (ZJNFC, LY12E05011)

基金项目: 国家自然科学基金资助项目 (NSFC, 50905083 & 51265034); 浙江省自然科学基金资助项目 (ZJNFC, LY12E05011)

Biograph: CHEN Haichu (1975-), male, professor, doctor, major research on robotics, fluid transmission and control, piezoelectric driving. E-mail: chenhaichu@126.com

作者简介: 陈海初 (1975-), 男, 教授, 博士, 主要从事机器人技术、流体传动及控制、压电驱动技术等方面的研究。E-mail: chenhaichu@126.com

with car anti-theft system. In this work, it develops a car anti-theft system based on the password controlling by using micro computer unit (MCU) AT89S52 to control an oil valve which assembled on the pipes between oil pump and fire system of cars. With the anti-theft system protection, it can open the valve and conduct pipes between oil pump and fire system only by correctly inputting the password, in another word, if cannot correctly input the password, the car engine will not be started because of no petrol/diesel, even though thief broke into the car. Moreover, if wrong inputting password more than some times, the alarm system starts to work with voice broadcasting such as "ILLEGAL INVADER". From the above protecting methods, the anti-theft password controlling system (PCCAT) with oil valve can act good enough for car anti-theft.

1 Oil valve Model and Hardware Design

The structure of the oil valve is shown as Fig. 1, gasoline flows into the valve from the in port, and flows out the valve from the out port. The case of the oil valve is installed between the in port and the out port, and driven by a step motor with a guide-screw-nut structure.

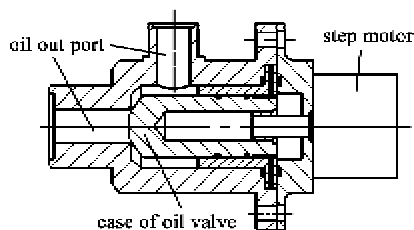


Fig. 1 Simple structure of oil valve

The block diagram of PCCAT is shown as the red dash block in Fig. 2, part schematic circuit of PCCAT is shown as Fig. 3, and the photo of the PCCAT is shown as Fig. 4. When the PCCAT is powered on and finished initialization, the controller begins to remind driver to input password by voice, after checks the password with the password stored in the memory of the controller, and if the input password meets the stored password entirely, the controller will output signals to drive

the step motor and open the oil valve case, and make the oil pipe connect, then, drivers can fire the engine. Otherwise, the valve will be closed and oil will be forbidden to flow into spark plug if the password is wrong.

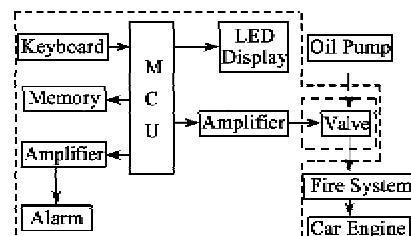


Fig. 2 Block diagram of oil valve password controller

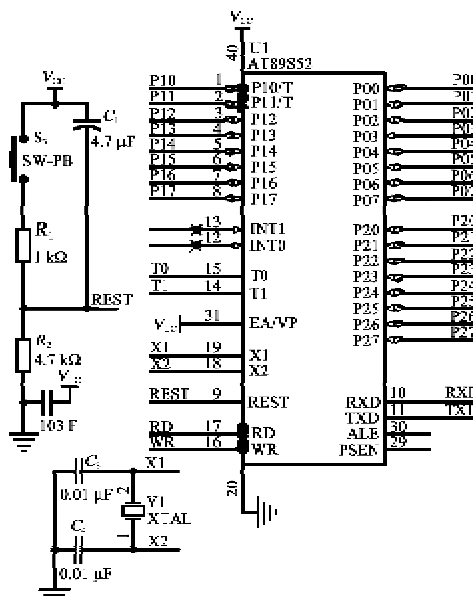


Fig. 3 Part schematic circuit of car PCCAT

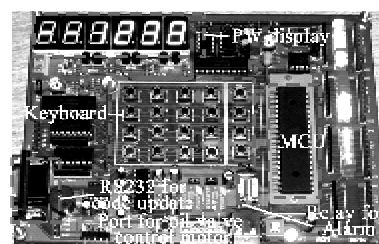


Fig. 4 Photo of the password controller for car anti-theft

In order to avoid inputting password again when the car engine is flameout abnormally, the memory unit of the PCCAT can remember and keep the position of the step motor, which can help driver quickly restart the engine again.

When driver parks the car, it only needs to press the "LOCK KEY" on the keyboard of the PCCAT, the controller will output signals to drive

the step motor and lock the case of oil valve and close the valve, which realizes anti-theft.

2 Software Design

When driver normally enters into car, inserts the key and turns it to power on the car, the car cannot be fired right now because the oil pipe is stoppage by the oil valve and no oil can flow into the spark plug. After PCCAT finishes initialization, it will remind driver to input user password of the PCCAT. The flow chart of the engine start is shown as Fig. 5.

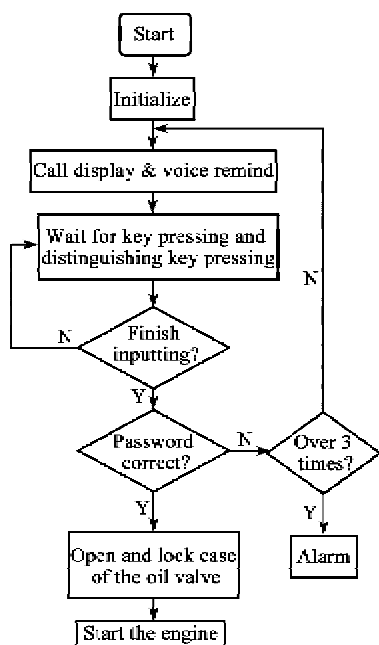


Fig. 5 Car anti-theft password control flow chart

In Figure 5, when the driver finishes inputting the password and presses the confirmation key, the controller begins to check the inputting password. If the inputting password is correct, the PCCAT will output signal to drive the step motor and open the valve to make the oil pipe connect. At the same time, the speaker will remind the driver "YOU CAN START THE ENGINE NOW!" by voice. In order to strengthen anti-theft level, the PCCAT will give the driver three times to input password again in 3 minutes, over three times or 3 minutes wrongly inputting password, the PCCAT will start the alarm system automatically to remind the passers to pay attention to the car perhaps there are car

thieves.

In order to make drivers set personal password conveniently, the PCCAT provides password modifying function to users, and the flow chart of password modifying is shown as Fig. 6. In order to avoid illegal changing the password, the PCCAT need correctly input the super password firstly. After checked out the inputting initial password correctly, the controller will remind the driver to input the new password twice, and if the twice inputting password are the same to each other, the controller will save the new password in the memory unit and replace the old password, and then remind the driver "PASSWORD MODIFY SUCCESS!", otherwise, it will remind the driver to input the new password again, and also, if wrongly input the new password every twice not matching to each other over three times, the controller will forbid modifying the password again in 24 hours.

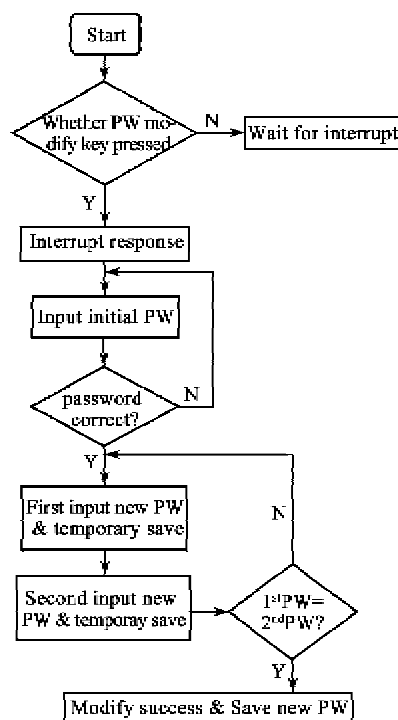


Fig. 6 Password modifying flow chart

3 Experiments and Conclusion

With the PCCAT, an experiment on a SUZUK motorcycle engine is carried out, and the valve is installed on the oil pipe between the oil box and the

in port of the motorcycle engine (shown as Fig. 7). When PCCAT is powered on and finished initialization, the speaker will remind to input password by voice, after input the correct password, the controller will output driving signals to open the oil valve, and gasoline flows cross the valve to the input port of the engine with the oil pipe from the oil box, now, it can fire the engine easily. In the experiments, it deliberately cuts off the power of PCCAT and then power on it when the engine is working, the case of the oil valve is also kept at the same position and the valve is still opened. In another experiment, it deliberately wrongly inputs the password over limited three times, the oil valve is still closed and the alarm speaker begins to broadcast by voice "SOME ONE IS STEALING



Fig. 7 Photo of car anti-theft password controlling system

THE CAR" continuously. The experimental results prove that it can protect the car to be stolen with the PCCAT and the oil valve.

References:

- [1] JU Hao, MA Yin, DENG Fei. Research of test system of vehicle steering guard against theft device[J]. Industrial Control Computer, 2010, 4: 32-33.
- [2] CHEN Hongsheng, PENG Guanming. The design of a new kick stand lock for motorcycle[J]. Motorcycle Technology, 2010, 1: 44-45.
- [3] CUI Gengshen, HUANG Yanhui. A study on the auto guard against theft system of network based on S3C44B0X[J]. Microcomputer Information, 2006, 11: 146-148.
- [4] KHANGURA K S, MIDDLETON N V, OLLIVIER M M. Vehicle anti-theft system uses radio frequency Identification[J]. Vehicle Security Systems, 1993, 8: 1-7.
- [5] WEI Zhenlin, WANG Xifu. Design of real-time monitor system for electric vehicles based on GPS[J]. Journal of China Safety Science, 2006, 4: 136-140.
- [6] WAN Lili, CHEN Tiejun. Automobile anti-theft system design based on GSM[J]. International Conference on Advances Computer Control, 2009, 551-554.
- [7] FAN Zhenfang, PENG Aihua, ZHOU Jian. Design of auto guard against theft and alarm system based on GSM network[J]. Application of Electronic Technique, 2006, 3: 14-16.

(上接第943页)

- [9] 王圣礼. 超高频射频识别(RFID)阅读器的设计与实现[D]. 浙江: 浙江大学电磁场与微波技术系, 2008.
- [10] 高瞻. 基于CORBA的RFID仓储信息系统集成研究[J]. 重庆邮电大学学报: 自然科学报, 2010, 22(4): 464-467.

- [11] 吴泽海, 赖声礼, 张建明, 等. 一种UHF频段RFID读写器的硬件设计与实现[J]. 电子技术应用, 2005, 31(1): 50-52.
- [12] 董树义. 微波测试技术[M]. 北京: 北京理工大学出版社, 1990.

《压电与声光》广告免费咨询卡

姓名: _____ 职务: _____ 职称: _____ 单位: _____
 地址: _____ 邮编: _____ 电话: _____
 您对本刊 _____ 年 _____ 期的 ☐ 彩色 ☐ 黑白 ☐ 刊花广告
 _____ 公司(厂家) _____ 产品/技术感兴趣
 希望: ☐ 索取公司资料 ☐ 索取产品资料 ☐ 询问价格 ☐ 建立业务联系 ☐ 其他 _____
 请将卡片寄往(或传真): 《压电与声光》编辑部 读者服务部
 通讯地址: 重庆南坪 2513 信箱(400060) 电话: 023-62919570 传真: 023-62805284

复印有效