ISSN: 2424-8460(O)
2251-2608(P)

Original Research Article

System design of new electric vehicle drive system based on artificial intelligence

Cenglin Yao[*Corresponding Author]

School of Mechanical and Electrical Engineering, Wuhan Business University, Wuhan, Hubei, 430056, China,

Abstract: In recent years, with the rapid development of artificial intelligence technology in our country, obtained the swift and violent development of automobile industry, car since entering the social life, are developing fast, due to the gradually reduce the cost of production, domestic auto prices dropped substantially, the car entered innumberable families, at the same time, the motor drive systems market is very wide also, car service time is long, hard to avoid can appear problem, artificial intelligence technology in the drive system has an important role in application, this article carries on the thorough analysis.

Keywords: Artificial intelligence; Electric vehicles; Drive system; Design

1. Introduction

Automobile repair is engaged in the design, maintenance and repair of automobile drive system, artificial intelligence technology in the design of electric vehicle drive system has an important application. That is, through a variety of technical means to the possible failure of the vehicle inspection, find out the cause of the possible failure, and timely take some measures to promote its troubleshooting, timely recovery, in order to achieve a certain performance and safety standards. From the point of view of artificial intelligence, the vehicles driving mainly includes the vehicle overhaul two parts and the whole car repairs, overhaul mainly refers to the vehicle any important components (including basic equipment) to drive, to resume the technical state of the vehicle in good condition and complete (or close to complete), and the life of the vehicle are restorative, driven to restore service life of the vehicle[1].

2. How to apply artificial intelligence to electric vehicle drive system

2.1. Automotive drive system design based on artificial intelligence

2.1.1. Internal idling stall of automobile engine

Common faults in artificial intelligence technology commissioning the above situation: Shanghai jetta 2000 gsi (Period seen Superman 2) compact electric vehicles (gasoline and diesel with internal 1. 8 lajr two) four-cylinder turbo motor type control gas in order to increase diesel engine), the common fault of the above situation can be interpreted as the car engine internal idling stall, and in the whole test process, anyone can change the maximum speed car engine. Talking about 140 km/h, after the test run, everyone noticed that when the compact pure electric car accelerates at top speed, a black smoke suddenly comes out of the exhaust pipe, which is an anomaly in the two exhaust pipes of the engine, the car is waiting to be speeded up for repair or automatic exclusion. Check common faults regularly every day. Common troubleshooting: After removing the high pressure ignition coil again, we can clearly find the high pressure ignition coil[2].

It is found that the RF signal output voltage of the λ data signal sensor basically keeps in the middle of 0.

ISSN: 2424-8460(O)
2251-2608(P)

7 ~ 0. 9 V. At this point, the data signal voltage of the λ sensor can be changed accordingly by stepping down multiple accelerator pedals, indicating that the λ sensor itself and its power supply circuit are normal. Query the temperature sensor of the refrigerant of the automobile engine, and the data test of the start and stop opening of the electronic throttle of the automobile engine is normal. Switch to 05 again, indicating that the working group checked the indicator value (total air intake) in area 4 and found that when the diesel vehicle was idling, the gas flow was the sum of the "calculated data information range", as shown in **Figure 1** below:

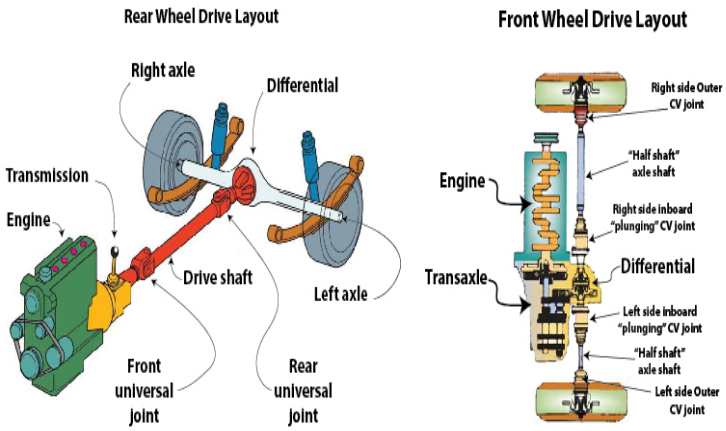

Figure 1. Concrete design of electric vehicle drive system.

In **Figure 1**, the "inlet flow rate" is 6-9g/s (standard value range is 2. 4g/s to 5. 0g/s). Input 01 to indicate the area control module and then find that the second indicating area's specific ratio value (the output load of the car engine) indicates that this particular ratio value is longer than the normal 2. 5ms, which occurs immediately indicated. The motor control module on the engine of the vehicle again receives the quality check data signal of the vehicle gasoline intake volume is too large, and then begins to fill the vehicle gasoline composite inlet. Basic analysis of common fault Inspection: Based on the basic analysis results of the above common fault inspection, everyone can basically determine that the common fault that is likely to occur again in the near future is the new air index pressure detection sensor system software. There is a soft failure (data signal is missing and checked incorrectly). If the new air index pressure sensor is removed and replaced in good condition, the common faults will disappear completely[4].

2.1.2. Artificial intelligence in various idling stall phenomena of automobile engine

A common standby speed failure could be a small BMW 5 Series Malaysia 1. 8 sedan running after the engine is still running steadily. After five minutes of driving, the engine started from scratch and idled to a stop. The speed ratio of inverter working range is between 480 ~ 980r/min. For reasons of common faults, please check common faults regularly: use the front λvag1552 to check whether common faults exist in the front and rear λ temperature sensors and in the engine's front and rear crankcase natural ventilation valves, and observe the position of the front and rear λ temperature sensors before and after temperature adjustment. The average of the front and rear lamda temperature sensors, the average temperature adjustment is -25%, the operating voltage range is 1. 25 to 1. 35 V. All temperature changes are not allowed. After eliminating this common fault warning code, the system software of the car engine will operate stably and can also adjust λ in the sensor. Comply with all normal operation and standby conditions of the diesel engine, and its structure is shown in **Figure 2** below:

ISSN: 2424-8460(O)
2251-2608(P)

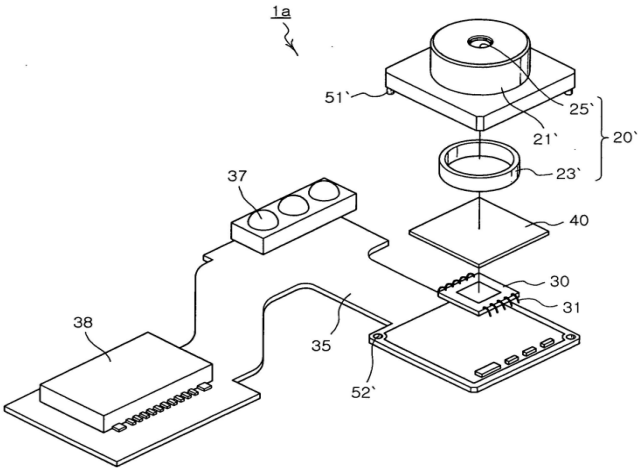

FIG. 5A

Figure 2. Drive design of electric vehicle based on ARTIFICIAL intelligence.

After about 5 minutes, the temperature value of the λ sensor's standby speed adjustment slowly changes from ± 10% to -15%, and the standby speed gradually occurs, and there is an obvious idling stall. And the standby speed of 480 ~ 980r/min swing. After turning off the idling speed of the diesel engine, the engine is re-started at standby speed and the engine runs steadily at idling speed. Five minutes later, the abnormal vibration at standby speed appeared again. Check if the carbon deposition in the ignition coil is large and if the 4-cylinder is more important. Removing and replacing the four ignition coils and starting the car engine did not improve the common failure situation. The engine control company reduces the ignition advance Angle, prompting the engine speed ratio to be set too low, which ultimately prevents the engine idling speed from swinging significantly[5, 6].

3. Application of artificial intelligence in rate data analysis of automobile drive system

3.1. Comparative analysis of driving system rate of top 10 brands in 2020

Table 1 below is a comparative analysis of the vehicle drive system rates of dongfeng Nissan, Changan Ford, FAW Toyota, Changan Automobile and other ten brands based on the data consulted on the Information website of China Report Hall in 2020, and an in-depth discussion of the importance of combining the theory and practice of vehicle drive system. The detailed information is shown in Table 1.

Table 1. Comparative analysis of driving system rate of top 10 brands in 2020 (unit: %).

Car brand	Dongfeng nissan	Changan ford	Shanghai Volkswagen	Beijing Benz	Dongfeng Peugeot	Changan automobile
Drive rate	1. 0%	1. 1%	1. 2%	1. 3%	1. 4%	1. 6%

As can be seen from **Table 1** above, among the ten auto brands investigated by us, Dongfeng Nissan has the lowest rate of vehicle drive system, only 1. 0%. However, Yueda Kia had the highest drive rate at 2. 4 percent, more than double that of Dongfeng Nissan.

3.2. Comparative analysis of drive rate of brand cars in previous years

According to the above, we can clearly understand that the drive system rate of Dongfeng Nissan is rela-

tively low, while that of Dongfeng Yueda Kia is relatively high. According to the information available in the industry information network, we can get the detailed changes of the driving rate data of the two brands in the past five years. See **Table 2** below[7-9].

Table 2. Comparative analysis of drive rates of brand automobiles over the years (unit: %).

year	Dongfeng nissan	Saic Gm Chevrolet
In 2016,	1. 7%	3. 3%
In 2017,	1. 4%	3. 0%
In 2018,	1. 3%	2. 4%
In 2019,	1. 1%	2. 3%
In 2020,	1. 0%	2. 2%

As shown in **Table 2** above, the driving rate of Dongfeng Nissan shows a decreasing trend year by year from 1. 7% in 2016 to 1. 0% in 2020. Similarly, even saIC-GM Chevrolet, which has a high driving rate, saw a gradual decline from 3. 3% in 2016 to 2. 4%. This group of data vividly shows that the automobile manufacturing quality of each automobile enterprise is getting better and better, and the comprehensive strength of the enterprise is getting stronger and stronger. On this basis, automobile manufacturing enterprises will pay more attention to the better combination of theory and practice, complementary concept applied to the workshop to manufacture cars and drive cars. For example, according to relevant information content, during 2016-2017, SAIC-GM Chevrolet only paid attention to practical activities in the whole process of the vehicle drive system, blindly let the driver to operate the actual operation, but still did not summarize the basic theoretical knowledge. As a result, the company has resulted in such high maintenance rates. In fact, since 2018, after the saIC-GM-Chevrolet high-rise residential management election, people have realized the principle of "firmly hold hands and try to do it" and a higher level. The close combination of theory and practice, while shaping the high theoretical and basic quality of the driving personnel, improves the practical operation level of the staff, improves their technical level for the enterprise to recover a good reputation[10].

4. Conclusion

From the development trend of the automobile industry to now, countries around the world have long developed a set of automobile drive system. Basic theory, but vague basic theory is not enough. What everyone should do is to apply basic theories to practical activities, give full play to the role of basic theories combined with the actual situation, and authenticate basic theories through practical activities. No matter how automotive drive systems companies upgrade their way of doing business, automotive drive system professionals have enabled everyone to master the key to the theory and practice of automotive drive systems.

References

[1] Wang W W, Lin C, Cao W K, et al. Design of New Dual-Motor Independent Drive System for Electric Vehicle [J]. Advanced Materials Research, 2012, 591-593: 251-258.

[2] Feng H Z, You Y G, Huang Z Y, et al. Study and Realization of Test Bench for Electric Vehicle Drive System Based on HIL [J]. Applied Mechanics & Materials, 2013, 401-403: 1255-1259.

[3] Chen K, Zu Y, Ren W. Research and Design of Knowledge System Construction System Based on Natural Language Processing [J]. International Journal of Pattern Recognition and Artificial Intelligence, 2019.

[4] Nasri A, Gasbaoui B. Artificial Intelligence Application's for 4WD Electric Vehicle Control System [J]. Intelligent Control and Automation, 2012, 03(3): 243-250.

[5] Trepagnier P G, Nagel J, Kinney P M, et al. KAT-5: Robust systems for autonomous vehicle navigation in

challenging and unknown terrain [J]. Journal of Field Robotics, 2010, 23(8): 509-526.
[6] Yildirim U, Campean F, Williams H. Function Modelling using the System State Flow Diagram [J]. Artificial intelligence for engineering design analysis and manufacturing, 2017, 31(4): 413-435.
[7] Najafi S, Shafie-Khah M, Siano P, et al. Reinforcement learning method for plug-in electric vehicle bidding [J]. IET Smart Grid, 2019, 2(4): 529-536.
[8] Rigas E S, Ramchurn S D, Bassiliades N. Algorithms for Electric Vehicle Scheduling in Large-Scale Mobility-on-Demand Schemes [J]. Artificial Intelligence, 2018, 262.
[9] Santoso F, Redmond S J. Indoor location-aware medical systems for smart homecare and telehealth monitoring: state-of-the-art [J]. Physiological Measurement, 2015, 36(10): R53.