Computing and Informatics, Vol. 43, 2024, 1012–1028, doi: 10.31577/cai_2024_4_1012

# INTELLIGENT COCKPIT APPLICATION BASED ON ARTIFICIAL INTELLIGENCE VOICE INTERACTION SYSTEM

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**Abstract.** With the rapid development of computer technology, intelligent cockpit has increasingly become a trend in on-board related equipment. The intelligent cockpit system can not only provide auxiliary support for users in the driving environment, but also greatly improve driving efficiency. With the advancement of technology and the improvement of people's material lives, people's demand for driving environment safety and intelligence is gradually increasing. In order to effectively enhance the interactivity of the intelligent cockpit and ensure the safety of users' driving, this article effectively analyzed the performance and functional requirements of the intelligent cockpit, and combined speech recognition algorithms to construct an artificial intelligence (AI) speech interaction system. On this basis, this paper provides an in-depth study of intelligent cockpit design. To verify the effectiveness of the intelligent cockpit application, it was tested from four aspects: system operation accuracy, command response time, system security, and user experience. The test findings showed that at the level of system command response time, the response time of driving assistance commands, entertainment media commands, and traffic information commands was basically concentrated below 300 milliseconds. From the specific test results, it can be seen that the intelligent cockpit based on the artificial intelligence voice interaction system can quickly respond to users' different command needs through precise speech recognition.

**Keywords:** Intelligent cockpit, artificial intelligence, voice interaction system, speech recognition

## 1 INTRODUCTION

Currently, many cars are equipped with intelligent driving cabins, which can effectively improve the user's driving experience and improve road traffic efficiency. With the maturity of information technology, the automotive industry has made significant progress, and users demand higher interactivity for the use of intelligent cockpit. In actual driving environments, users' attention is generally focused on driving operations. How to form intelligent interaction between users and vehicles while ensuring driving safety, and provide more convenient services for users has become an urgent task for intelligent cockpit applications. With the development of artificial intelligence technology, voice interaction systems have made considerable achievements and are widely applied in various industries, such as tourism, furniture, education, translation, and other fields. In intelligent cockpit applications, artificial intelligence voice interaction systems can provide users with a safer and more stable driving environment and respond to user needs in real-time.

The integration of speech recognition in vehicle assistance systems can not only meet the actual needs of drivers, but also it is a trend in vehicle related equipment. Nowadays, mainstream car models are basically equipped with an in-car assistance system with speech recognition function. In the future development process, the rapid development of voice recognition related technologies and on-board auxiliary technologies not only continues to promote the growth of computer technology, but also promotes the further improvement of related on-board systems. Moreover, the progressiveness of related voice recognition on-board auxiliary systems is also an important benchmark for measuring high-end vehicles.

With technological innovation in the automotive field, intelligent cockpit has rapidly developed in practical applications. Manoharan proposed an artificial intelligence processor to address the privacy, energy, traffic flow, and road safety issues of the current intelligent cockpit. He demonstrated through experiments that the proposed artificial intelligence processor can evaluate car performance in real-time through real-time data, ensuring car driving safety [1]. Guo et al. focused on user experience and closely revolve around users' usage scenarios and needs. They provided innovative solutions for the intelligent cockpit through the participation of real users, automotive industry experts, and automotive designers, and conducted functional definition and engineering development [2]. Weisswange et al. proposed an adaptive intelligent cockpit cruise control system that can calculate vehicle trajectories and select the best option for vehicle control for each possible future situation, thereby optimizing cabin safety, comfort, and practicality [3]. Cummings and Bauchwitz embedded artificial intelligence in a computer vision intelligent cockpit system using deep learning algorithms. To determine the reliability of the cockpit system in relation to the use of deep learning autonomy, they conducted a series of increasingly complex tests on three Tesla Model 3 cars. The results indicated that there were significant differences in many indicators related to driver monitoring, alerting, and basic autonomous safety operations between inside and outside the vehicle [4]. Currently, intelligent cockpit has made good progress. However, with the increasing complexity of the transportation environment, the performance of the intelligent cockpit also needs to be appropriately improved and optimized.

The growth of AI technology has provided more possibilities for improving the performance of intelligent cockpit. Zhang et al. proposed an intelligent cockpit assistance system based on deep learning, which integrated multi-source data from visual sensors, radar sensors, and cameras, improving the accuracy of intelligent cockpit perception, detection, decision-making, and control [5]. Duan et al. proposed a new scene generation algorithm for intelligent cockpit systems and applied it to a testing platform to verify its effectiveness. The results indicated that the proposed algorithm could significantly improve the integration complexity of generated test scenarios while ensuring coverage, helping to discover potential faults in the cockpit faster and more frequently, and further improving testing efficiency [6]. With the assistance of AI technology, the application of intelligent cockpit has further developed. However, most studies have not combined the specific needs of users for a more comprehensive design. The interaction between the intelligent cockpit and the user needs further improvement.

In order to improve the current lack of interactivity and difficulty in meeting user needs in the intelligent cockpit, this article conducted in-depth research on the design and improvement of the intelligent cockpit in conjunction with the AI interactive voice system. To verify the effectiveness of intelligent cockpit applications based on artificial intelligence interactive voice systems, this article conducted tests from four aspects: system operation accuracy, command response time, system security, and user experience. With the support of AI voice interaction system, the operational accuracy, efficiency, and system security of the intelligent cockpit have been significantly improved, and the user experience has been effectively improved. In practical applications, the intelligent cockpit based on artificial intelligence voice interaction system has strong feasibility and can provide users with higher quality interaction services.

## 2 INTELLIGENT COCKPIT APPLICATION UNDER ARTIFICIAL INTELLIGENCE VOICE INTERACTION SYSTEM

### 2.1 Intelligent Cockpit Application Requirements

#### 2.1.1 Performance Requirements

In today's accelerating modernization process, people's requirements for the quality of driving environment are also constantly improving, and intelligent driving has become a development trend in the field of transportation driving [7]. The intelligent cockpit is a very important manifestation of the development of intelligent driving. This is also one of the important factors why many people choose to buy a car nowadays. From the specific application situation, the performance requirements of the intelligent cockpit mainly include four aspects.

1. **Easy to operate.** In the past, the performance structure of intelligent cockpit equipment was relatively single, and the performance services it could provide were relatively simple. However, the operation was cumbersome and limited by priority distance, making it difficult to fully meet the personalized needs of users. For example, users often need to use buttons to control the intelligent cockpit, and this control is highly distance dependent. If the distance exceeds the preset distance of the system, it would cause users to be unable to operate it. Therefore, in the design process, the intelligent cockpit must break the constraints of wired distance, fully consider its practical operability, and bring more convenience and comfortable experience to the driver [8].
2. **High interactivity and system operation efficiency.** The intelligent cockpit needs to ensure high human-machine interaction and operational efficiency to ensure an effective closed-loop system operation, so that the driver can quickly and effectively control the driving process according to the real environment [9]. In addition, the interaction between the driver and the vehicle must be carried out without affecting the driver's normal driving. In order to provide users with more personalized self-service and allow them to free their hands, the intelligent cockpit needs to use the most natural voice mode for human-device interaction, so that users can obtain more intelligent and accurate information and services.
3. **Stable and reliable.** A stable and reliable intelligent cockpit system is a prerequisite for ensuring the driver's driving safety. When designing the various components of the intelligent cockpit, it is necessary to comprehensively consider their reliability and stability. In terms of software design, it is necessary to design programs in an orderly manner to ensure the reliability of program operation. In terms of hardware, the function of stabilizing voltage and current should be set to ensure that the intelligent cockpit can achieve high stability in actual operation.
4. **Good scalability.** In the information age, the growth of technology is bound to break the traditional cockpit pattern of the past. The design and application of intelligent cockpit should not only focus on current practical needs, but also consider the possibility of providing more services in the future. Therefore, the intelligent cockpit also needs to ensure good scalability, so that it can be easily upgraded and expanded in the future when facing functional service updates.

### 2.1.2 Functional Requirements

1. **Speech recognition.** The speech recognition function refers to the setting of the "auditory perception" function in the intelligent cockpit, enabling the cockpit to recognize and understand human language, and to carry out relevant operations or provide corresponding services according to the user's specific voice command needs and instructions. During this process, through sound recognition technology, user language can be converted into mechanical readable language patterns. Throughout the entire driving process, the intelligent cockpit needs to ensure

real-time interaction with users to help them free their hands and complete specific operations in the simplest way and in the shortest possible time.

2. **Driving assistance.** The intelligent cockpit system needs to provide users with intelligent driving assistance services such as dynamic braking, brake assistance, lane departure, and adaptive cruise control based on changes in the car itself and surrounding driving environment.
3. **Entertainment media.** Entertainment media generally refers to the audio-visual playback function. Unlike the manual commands of traditional cockpit systems, the entertainment media function of intelligent cockpit systems needs to be achieved through voice control. Users can control entertainment systems such as music, radio, and navigation through voice commands, which can greatly improve driving comfort and user convenience.
4. **Vehicle status monitoring.** Due to the uncertainty of the driving environment, the intelligent cockpit system needs to monitor the vehicle's status in real-time during driving, including the braking performance of the vehicle, the working status of other components, and predict the maintenance time and condition of the vehicle, in order to provide objective reference for users' driving and decision-making.
5. **Real time traffic information.** In addition to providing functions such as voice recognition, assisted driving, entertainment media, and vehicle status monitoring, the intelligent cockpit system also needs to achieve real-time road condition prompts and traffic information push through data sources such as weather and traffic.

### 2.2 Artificial Intelligence Voice Interaction System

Artificial intelligence voice interaction is an important branch of natural language processing technology. It combines natural language processing technology with machine learning to enable computers to understand and respond to human natural language. With the continuous development of natural language understanding technology, voice interaction technology has been widely applied [10]. The artificial intelligence voice interaction system has promoted the intelligent development and application of the cockpit. During the driving process, the cockpit can use voice recognition technology to understand the driver's intentions and provide corresponding services. After the vehicle reaches its destination, the cockpit also provides relevant navigation services to the driver according to their needs. In addition, during the driving process, the artificial intelligence voice interaction system can intelligently search for information from the internet and local databases, and intelligently filter, classify, edit, and organize this information.

The basic principle of an artificial intelligence voice interaction system is to convert the voice signals emitted by users into machine readable modes, so that the cockpit can perceive, recognize, and understand the user's voice. Then, by obtaining corresponding instructions and providing corresponding feedback to user instructions, effective interaction between humans and devices can be achieved without affecting driving safety. Speech recognition algorithms are the foundation of speech interaction implementation [11]. As a multidisciplinary field, language recognition is intertwined with various theories such as acoustics, linguistics, and digital signal processing [12, 13]. In artificial intelligence speech interaction systems, the main task of speech recognition algorithms is to construct an independent state network during the speech signal matching process, and find and extract the path that best matches the target signal features in this network.

To perceive, recognize, and understand user speech, it is first necessary to preprocess the speech signal accordingly [14]. This process is mainly divided into two steps. One is to parameterize the input speech spectrum signal. This step is generally implemented by front-end processing. The second is to extract speech signal features.

In the intelligent voice interaction system, two speakers are set, defined as speaker $u$ and speaker $v$. At the same time, the training samples composed of two speakers are set to $x^u(t)$ and $x^v(t)$, and their speech signal results are represented as $y^u(t)$ and $y^v(t)$, respectively.

The purpose of speech recognition is to use the formed training samples $x^u(t)$ and $x^v(t)$ to calculate the speech signal results $y^u(t)$ and $y^v(t)$ emitted by two speakers. After solving for $y^u(t)$ and $y^v(t)$, they are added together. On this basis, the final fusion speech signal recognition result $f(t)$ is obtained using the non negative matrix factorization method. At the same time, combining statistical analysis methods with Markov models, in this case, by sequentially sampling the audio signal, the spectrum of the speech signal can be defined as:

$$x_t(f) \propto \|h(x(T-1)+1, \ldots, T_t). \tag{1}$$

Among them, $T$ is the total number of speech spectra. $x_t$ is the vector amplitude of the $t^{\text{th}}$ speech signal spectrum.

The probability model corresponding to the speech spectrum can be represented as:

$$\hat{x}(f) = g_t \sum_{i}^{M} p(f|i)p_t(i). \tag{2}$$

In the probability model, $g_t$ is a scalar, which ensures that the final approximate result can effectively match the input information. $p(f|i)$ is actually a normalized audio spectrum. Therefore, the set of all polynomials can be regarded as a dictionary, and $M$ is regarded as the number of factorization results. $p_t(i)$ can be considered as a weight. The value of weight $p_t(i)$ can gradually approximate the element to the input result.

In order to parameterize the speech spectrum signal, the training process can be adjusted appropriately. Firstly, the probability value of each state needs to be calculated. Since the calculation process is actually a maximum likelihood estimation process, the median of the optimal weight vector can be estimated using

Formulas (3) and (4):

$$p_t(i|f) = \frac{p_t(i)p(f|i)p(f|i)}{\sum_{i'} p_t(i')p_t(f|i')}, \tag{3}$$

$$p_t(i) = \frac{\sum_f p_t(i|f)x_t(f)}{\sum_{f,i'} p_t(i'|f)x_t(f)}. \tag{4}$$

When adding two signal sources using the established model, the advantages of the proposed model can be reflected. Let signal sources $x_t^u(f)$ and $x_t^v(f)$ be two data sequences, respectively. These two data sequences are obtained based on the selection model. The final obtained voice information is:

$$x_t(f) = x_t^u(f) + x_t^v(f). \tag{5}$$

Then, the posterior state probabilities of each independent state of the two signal sources in the model are calculated:

$$p(s|x_t^n) = \sum_{i \in i_s} p_t(i). \tag{6}$$

$x_t^n$ represents the $n^{\text{th}}$ source at the $t$ time point, and $s$ represents the signal source state on the model. $i_s$ is the basic set of state selection.

After analyzing the preprocessing and calculation of the signal source, the required speech feature values can be obtained, which serves as a reference template for speech feature recognition. In the process of speech signal processing, it is necessary to match the constructed speech reference template with the speech feature parameters to be tested [15]. Based on the algorithms and rules of speech recognition, the optimal template and matching path that match the input speech features are identified, and the recognition results are obtained. According to the algorithm concept, the artificial intelligence speech interaction system is shown in Figure 1.

In the artificial intelligence speech interaction system shown in Figure 1, the collector collects speech signals from the speakers to form a speech signal dataset, and then processes the speech signals according to pre set rules in the system to form corresponding speech features. Then, the speech features are extracted and matched, and finally the speech recognition results are obtained. The main feature of artificial intelligence voice interaction systems is centered around user instructions. In practical applications, artificial intelligence voice interaction systems can provide more humanized human-machine interaction methods and more convenient and accurate services [16].

Unlike traditional voice interaction systems, supported by artificial intelligence algorithms, the interaction context in voice interaction systems is more user-friendly, and the system's voice design is more colloquial and emotional. The specific steps of voice interaction include awakening, listening, analysis and processing, and feedback. It breaks the gap between the machine and the driver, making intelligent speech more

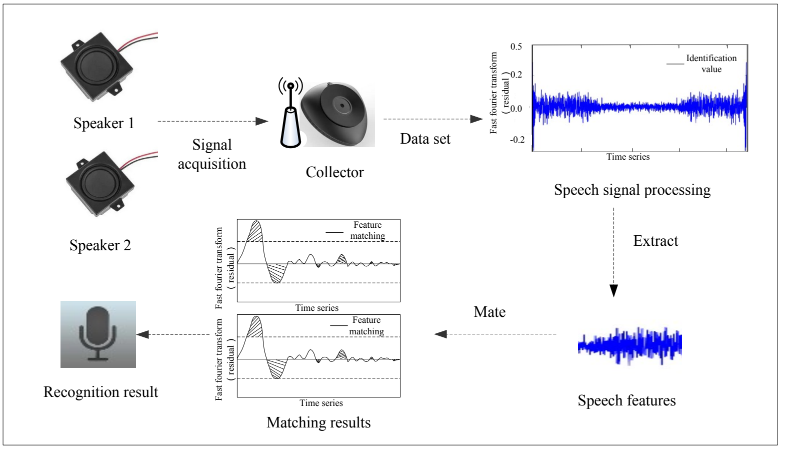


Figure 1. Artificial intelligence voice interaction system

naturally integrated into the human voice communication environment, as shown in Figure 2.

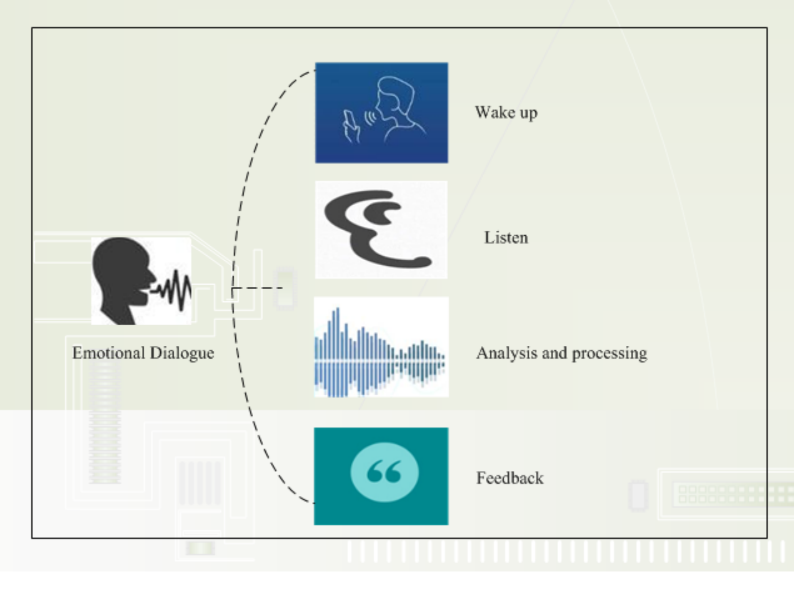


Figure 2. Voice interaction of the system

### 2.3 Intelligent Cockpit Design

Based on the characteristics of the actual driving environment and the functions of the artificial intelligence voice interaction system, the intelligent cockpit system is shown in Figure 3.

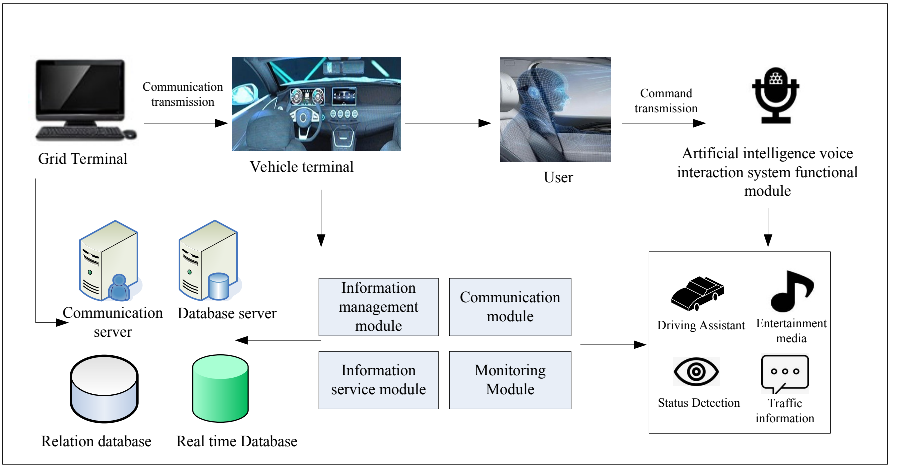


Figure 3. Intelligent cockpit system

The main components of the intelligent cockpit system include: grid terminal, vehicle terminal, artificial intelligence voice interaction system functional module, server, and database.

1. **Grid terminal.** The network terminal is mainly responsible for remote maintenance of the intelligent cockpit system, migration of work scenarios, and security management. In the smart cockpit system, the operation management and user registration of the cockpit can be achieved through network terminals, which to some extent improves the operational efficiency and data security of the cockpit system. At the same time, network terminals can also achieve cross platform interaction, making the use of the network more flexible, convenient, and efficient.
2. **Vehicle terminal.** The vehicle terminal is the front-end management device of the entire intelligent cockpit system, which mainly includes four modules: information management module, communication module, information service module, and monitoring module. The information management module can achieve functions such as user management, vehicle information management, identity verification, account activation, system configuration, and data collection. Overall, the information management module mainly interacts with relational databases and does not have strict requirements for real-time performance. However, it can meet the overall operational efficiency requirements of the cockpit system and also has a certain degree of scalability, which can effectively

expand and extend functions according to practical needs. The communication module can provide communication connection management services. The information service module is connected to a real-time database and is mainly responsible for data reading, calculation, and logical control. The monitoring module is mainly responsible for vehicle monitoring. Monitoring cars not only involves monitoring their driving conditions, but also monitoring geographic and traffic information related to their location. The monitoring module has a large data volume detection box alarm processing function, which can provide abnormal information alerts based on different values of each point to ensure real-time, intuitive, and convenient implementation of user instructions [17].

3. **Artificial intelligence voice interaction system functional module.** With the support of artificial intelligence voice interaction system, users can achieve driving assistance, entertainment media, status monitoring, traffic information, temperature control, and voice assistant functions through voice command transmission. The perception of road condition information is the foundation for achieving driving assistance functions. Through visual sensors, the intelligent cockpit can collect surrounding road condition information, analyze it using artificial intelligence algorithms, and provide objective data support for user decision-making in real-time. In addition, artificial intelligence voice interaction systems can obtain driver's road conditions and habits data, and through big data analysis, appropriate voice prompts can be provided to improve driving scenario efficiency. For example, based on the user's historical navigation data and habit data, the voice interaction system will implement active language recommendations before the user drives, such as "navigating to the previous place"; For coffee shops that users frequently visit, the language system will prompt them with "now we need a cup of mellow coffee to refresh our minds" during their usual time.

   The entertainment media of the intelligent cockpit mainly includes functions such as navigation, music, video, and phone. This function can be combined with auxiliary driving assistance to provide users with diversified entertainment services in different usage scenarios of the vehicle. For example, when users park for a long time, the artificial intelligence voice interaction system can provide users with soothing and relaxing music; When the user receives a call reminder during driving, it can automatically connect to the user and turn on the speaker. Based on specific usage scenarios, artificial intelligence voice interaction systems can automatically provide users with different entertainment services, thereby improving their driving and service experience.

   Condition monitoring refers to vehicle dynamic monitoring services, which mainly include motor vehicle power monitoring and operational stability monitoring. Combined with vehicle status information, the artificial intelligence voice interaction system can provide temperature control services. When the vehicle temperature is too high or too low, the voice interaction system will automatically control and combine weather and climate information to reduce the temperature inside the vehicle to a suitable range for the human body. The traffic information function module can provide functions such as satellite positioning and historical trajectory query.

The voice assistant function is built on artificial intelligence. Compared with traditional voice interaction systems, voice assistants based on artificial intelligence voice interaction systems are more nurturing, making the search process and results more personalized and closer to the communication process between people. It also has the ability to answer questions and clarify doubts, engage in entertainment interactions, and provide emotional companionship. Users can define and choose their voice style, continuously optimize their voice skills, and achieve full range companionship in their driving environment.

4. **Server and database.** In the intelligent cockpit, servers include communication servers and database servers, while databases include relational databases and real-time databases. The communication server is connected to the grid terminal through fast channels such as optical fiber, and is mainly responsible for sending and receiving data from the vehicle terminal. This step is mainly completed by a real-time database application programming interface. This application programming interface enables efficient management of internal network communication and is connected to process communication mechanisms for automatic maintenance. It can also achieve functions such as caching, compression, and fault detection of user data. To ensure effective transmission of monitoring data, the communication server implements an intelligent clustering strategy. When the current network throughput exceeds the limit that the communication server can carry, the intelligent cockpit can restart other unused communication servers to achieve balanced network throughput processing [18].

   The database server is mainly responsible for ensuring the stable operation of real-time databases. The intelligent cockpit database server based on artificial intelligence voice interaction system adopts a data compression method, which converts voice signals into digital signals and performs compression processing at the same time. This method can perform lossy and lossless efficient compression on different types of real-time voice data, significantly reducing data redundancy and providing an effective storage method for massive data.

## 3 INTELLIGENT COCKPIT APPLICATION TESTING BASED ON ARTIFICIAL INTELLIGENCE VOICE INTERACTION SYSTEM

To verify the effectiveness of the intelligent cockpit application based on artificial intelligence voice interaction system, this article tested it from four aspects: system operation accuracy, command response time, system security, and user experience.

1. **System operation accuracy.** In the application of intelligent cockpit systems, the accuracy of system operation has greatly affected the effectiveness of system

implementation. This article verified the accuracy of intelligent cockpit speech recognition, status monitoring, and program decision-making based on artificial intelligence speech interaction systems by setting different test cases (represented by serial numbers 1–10 in this article). Among them, speech recognition requires the intelligent cockpit system to correctly recognize different speech instruction test cases. Condition monitoring requires the intelligent cockpit system to provide accurate vehicle condition monitoring data and environmental perception data. Program decision-making requires the intelligent cockpit system to accurately execute decisions and operations according to actual needs based on instruction recognition. The accuracy results are shown in Figure 4.

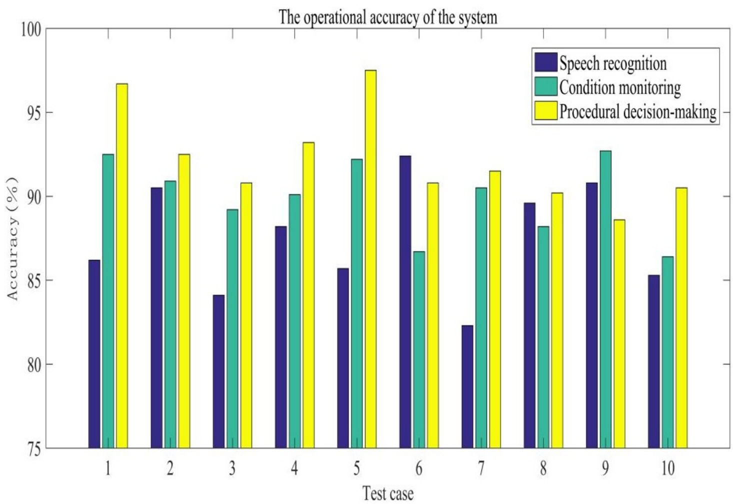


Figure 4. System operation accuracy results

From Figure 4, it can be seen that the accuracy of system operation under different test cases presented different results. However, overall, the accuracy of the intelligent cockpit system based on artificial intelligence voice interaction system was relatively good. In terms of speech recognition, the average recognition accuracy of the intelligent cockpit under different test cases was about 87.5 %, and its highest recognition accuracy reached 92.4 %. In terms of status monitoring, the average monitoring accuracy of the intelligent cockpit was about 89.9 %, with the highest monitoring accuracy reaching 92.7 %. At the level of procedural decision-making, its average accuracy was about 92.2 %, with the highest accuracy reaching 97.5 %. From the specific results, the operational accuracy of the artificial intelligence based voice interaction system is relatively high.

2. **Command response time.** For the intelligent cockpit system, the response time of user commands has greatly represented the level of system operation efficiency. This article tested the response time of the system's driving assis-

tance commands, entertainment media commands, and traffic information commands under different test cases (represented by numbers 1–10 according to the complexity of the commands) designed for different functional categories of the intelligent cockpit system. The results are shown in Figure 5.

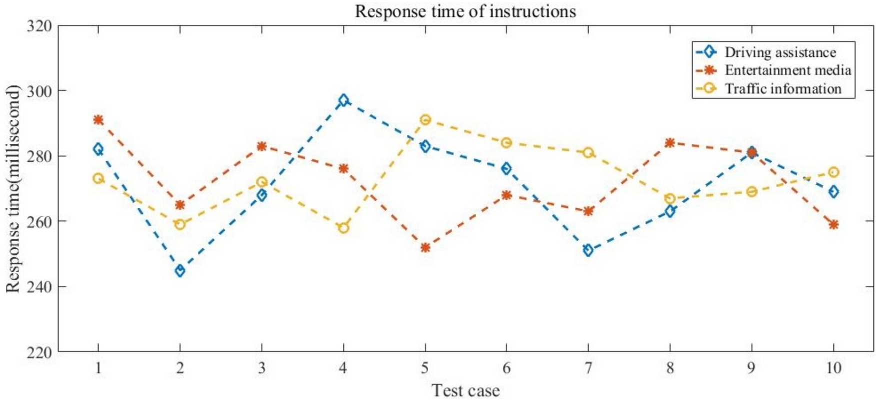


Figure 5. Command response time result

From Figure 5, it can be seen that the response time of driving assistance commands, entertainment media commands, and traffic information commands was basically concentrated below 300 milliseconds. In the driving assistance command, its response time reached 245 milliseconds at the fastest, and the average response time reached 271.5 milliseconds. In entertainment media commands, the fastest response time was 252 milliseconds, with an average response time of 272.2 milliseconds. In traffic information commands, the fastest response time was 258 milliseconds, with an average response time of 272.9 milliseconds. From the overall results, the intelligent cockpit system based on artificial intelligence voice interaction system can ensure fast response speed under different command requirements.

**3. System security.** In addition to ensuring the accuracy and efficiency of system operation, the physical security (device security), operational environment security, and information security of the system are also very important in its practical applications. This article tested the physical security, operational environment security, and information security of the system under test cases in different network environments (also represented as 1–10 by serial numbers). The results are shown in Figure 6.

In Figure 6, under different network environment test cases, the security levels of the intelligent cockpit system at the physical, operational, and information levels also varied. From the specific results, the safety level of the intelligent cockpit at the physical level was the highest at 98.5 % and the lowest at 90.2 %. The highest level of safety at the operational environment level was 97.6 %, while

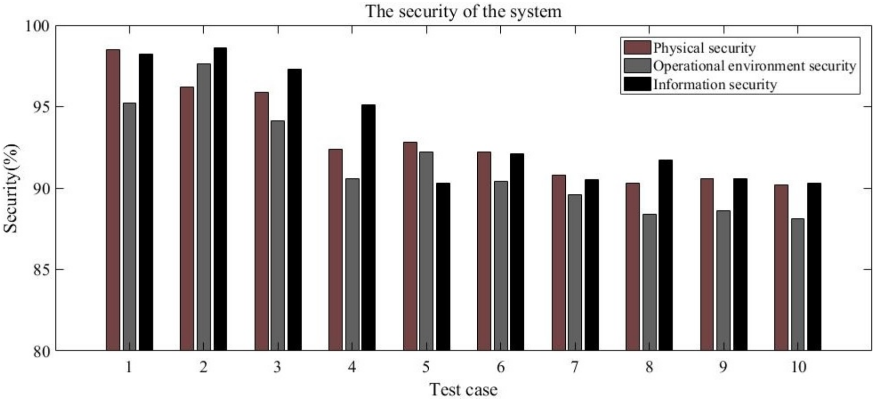


Figure 6. System security results

the lowest level was 88.1 %. The highest level of security at the information level was 98.6 %, and the lowest was 90.3 %. Overall, although there were some fluctuations in the physical security level, operational environment security level, and information security level of the intelligent cockpit, and its overall security level remained above 88 %. It can be seen that it can ensure high reliability and security in different network operating environments.

4. **User experience.** User experience refers to the level of performance of a system in terms of operability, performance, and functional services from the perspective of user needs. This article randomly invited 10 users with over 5 years of driving experience to experience the application of intelligent cockpit based on artificial intelligence voice interaction system, and rated its operability, performance, and functional services, with a score range of 1–10 points. The higher the score, the better the user experience. The basic user information is shown in Table 1, and the user experience results are shown in Figure 7.

| User sequence | Gender | Driving Experience (Years) |
|---:|---|---:|
| 1 | Male | 6 |
| 2 | Female | 6 |
| 3 | Male | 8 |
| 4 | Male | 10 |
| 5 | Male | 8 |
| 6 | Female | 10 |
| 7 | Male | 12 |
| 8 | Female | 9 |
| 9 | Male | 6 |
| 10 | Female | 10 |

Table 1. Basic user information

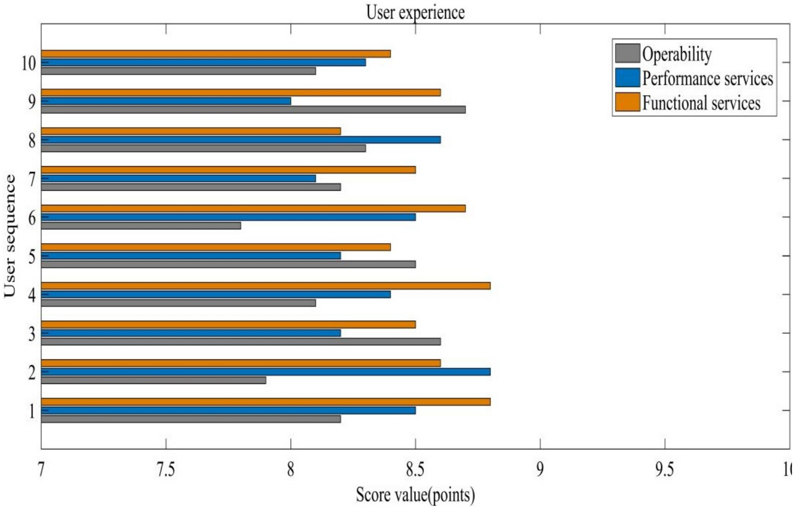


Figure 7. User experience results

From the rating results in Figure 7, it can be seen that the average user experience score for the operability of the intelligent cockpit based on the artificial intelligence voice interaction system was about 8.2 points. The average user experience score for the performance service of the intelligent cockpit was about 8.4 points, and the average user experience score for the functional service of the intelligent cockpit was about 8.6 points. The overall average score of the intelligent cockpit based on artificial intelligence voice interaction system has reached over 8 points, indicating that it can meet the needs of different users and provide a good user experience.

## 4 CONCLUSIONS

As the pace of social modernization continues to accelerate, the impact of technology on human life is becoming more and more pronounced. In the field of driving, people's demand for intelligent driving environments is constantly increasing. Developed under the theory of artificial intelligence, human-computer interaction technology provides drivers with more convenient and safer assisted driving services. If a voice interaction system is installed in the cockpit, it can help users free their hands and enable the car to operate intelligently according to user needs and instructions, which plays an essential role and value in enhancing driving safety. To achieve this, this article conducted in-depth study on the design and application of intelligent cockpit under the artificial intelligence voice interaction system. With the support of artificial intelligence voice interaction system, the operational accuracy and efficiency of the intelligent cockpit have been effectively improved, and its safety and user experience have also been significantly improved. Although the intelligent cockpit based on artificial intelligence voice interaction system can promote the development of driving intelligence to a certain extent, there are still some areas that need to be improved in the research process of this article. In future research, it is necessary to continuously improve the existing problems and broaden the research scope to promote the better application and growth of voice interaction systems in intelligent cockpit.

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