

Research on the development of modern Navigation technology

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Abstract: In recent years, the demand for Marine transportation is strong, navigation technology continues to develop, artificial intelligence, automation technology and big data technology have become the development trend of modern navigation technology, which is conducive to ensuring the safety of ship navigation, reducing the pollution of Marine environment, and promoting the rapid development of Marine industry. This paper analyzes the development trend of modern navigation technology, and puts forward the application of AIS technology in navigation practice to improve the accuracy of ship positioning and reasonable route planning; The digital simulation technology is applied to the navigation practice to detect the ship's operating condition intelligently and eliminate the ship's fault in time; The application of artificial intelligence technology in navigation practice can improve the stability of ship power plant, realize automation and intelligent driving, and promote the sustainable development of navigation.

Key words: Modern navigation technology; Development trend; Information technology; Application strategy

Introduction:

Under the background of economic globalization, transnational trade develops rapidly. More and more countries carry out economic trade through maritime transport, which promotes the development of maritime industry. As the maritime environment is full of uncertainties and the navigation environment is harsh, ships will inevitably encounter safety problems in the course of navigation. In order to ensure maritime safety and improve maritime transport efficiency, enterprises should attach importance to the development of modern maritime technology, actively introduce artificial intelligence, digital virtual simulation and AIS technology, help ships to monitor Marine wind and hydrology data in real time, help crews to adjust routes in time, understand ship operating conditions, realize automation and intelligent driving, and improve the safety factor of ship navigation. To promote the healthy development of the maritime industry.

I. Development trend of modern maritime technology

1. Network navigation technology

With the rapid development of network information technology, GPS, GIS and other positioning technology, network navigation technology gradually mature, change the navigation industry working mode, intelligent, information, network has become the inevitable trend of modern navigation technology development. Network navigation technology replaces the traditional manual monitoring method, by the computer network automatic monitoring, analysis and calibration of ship routes, the implementation of computer network automatic diagnosis, so as to improve the level of ship navigation technology. Ships are faced with complex environmental changes in the course of sea navigation, such as tornadoes, wind waves and reefs, which threaten the safety of navigation. Seafarers can use satellite network navigation technology to plan sea routes, keep abreast of sea information in different regions and climate changes, draw dynamic charts, and adjust ship routes in a timely manner to ensure their own navigation safety.

2. Autonomous cruise system

Ships should not only pay attention to the natural environment at sea at all times, but also pay attention to the navigation of other ships to avoid ship collisions. The traditional maritime industry relies on artificial means such as signal flares and signal lights for communication and early warning, which not only consumes manpower, but also is affected by the maritime environment, making it difficult for ships to avoid other ships in time. Modern navigation technology uses satellite signals to accurately locate ships, monitor their speed and navigation course, and update the location information of nearby ships in real time to improve cruise safety. For example, ships can install automatic identification system AIS transponder to monitor the ship's own sailing speed, position, route orientation and other data, timely transmission and sharing of ship navigation information, to avoid accidents caused by collisions between ships.

3. Development of Marine automation

Modern navigation technology has also improved the control technology of the turbine itself, using new technologies such as mechanical automation and artificial intelligence to improve the control mode of the turbine and realize the development of turbine automation. The ship can be equipped with mechanical remote control technology to realize the automation of cargo loading and unloading and daily maintenance, and timely discover the hidden trouble of equipment, improve the efficiency of transportation loading and unloading, troubleshoot in time, and ensure the automatic operation of the turbine. At the same time, ocean-going vessels should also improve supply equipment and oil storage equipment, expand storage space, reduce ship consumption through turbine automation, prepare for ocean-going navigation and ensure the safety of ocean-going navigation.

II. Challenges Faced by modern navigation technology

1. The professional quality of seafaring personnel varies greatly

With the rapid development of modern navigation technology, artificial intelligence technology, mechanical technology and modern

information technology have reduced the workload of the crew, but they are still inseparable from manual operation, which puts forward higher requirements for the professional quality of navigation personnel. Under the background of modern navigation technology, seafarers should have good technical level, information literacy, strain ability and psychological quality, and be able to skillfully operate AIS system, digital virtual system and automatic driving system. However, in practice, many seafarers have weak information literacy, cannot operate the automation system independently, do not analyze positioning data, maritime environmental monitoring data, route data, etc., and cannot flexibly adjust routes, which has buried hidden dangers for ships sailing at sea. China's modern navigation industry started late, and the lack of experience in training seafaring personnel has affected the development of seafaring personnel's professional ability. For example, some seafaring personnel pay more attention to the learning of ship navigation control, maintenance, maritime management and other skills, but ignore the learning of AIS technology, network navigation technology and maritime distress rescue and other knowledge, professional ability needs to be improved.

2. Environmental protection faces many challenges

The long cycle of navigation operations requires the consumption of a large amount of fuel, steel and other resources. Once a ship is in distress at sea, it may lead to the leakage of oil and harmful substances, causing great damage to the Marine environment and threatening Marine life and human health. Modern ships mostly adopt the formation mode of double side body, which can improve the stability and firmness of the ship body, but the maintenance of this structure is difficult, once an oil spill accident occurs, a large amount of fuel will leak into the sea, causing Marine pollution of the route. In order to protect the Marine ecological environment and reduce Marine pollution, seafarers should enhance the awareness of environmental protection and responsibility, regulate the storage and management of harmful substances, timely maintenance of ship fuel storage equipment, avoid leakage accidents, do a good job in ship garbage management, and strictly prohibit dumping garbage into the sea.

3. The popularity of artificial intelligence technology is not good

The new type of ship has high cost, high maintenance cost, and relatively high requirements for the professional quality of seafarers, which is not a small challenge for many maritime enterprises. Due to limited funds, some enterprises can not timely carry advanced AIS technology, digital simulation technology and artificial intelligence technology for ships, and modern navigation technology is difficult to popularize, which has virtually affected the development of China's Marine transportation industry. Some enterprises have not established a complete modern navigation technology training activities, did not systematically explain the AIS system, autonomous cruise system and Marine engine automation technology for the crew, even if the ship is equipped with advanced artificial intelligence technology, it is difficult to play its due role.

III. The application strategy of information technology in modern navigation technology

1. The application of AIS technology in navigation practice

AIS technology is widely used in navigation practice. It realizes real-time transmission and sharing of navigation information through the joint operation of sensors, positioners and communication equipment, and further improves ship position report information. First of all, ships can use AIS technology to carry out communication, timely ship sailing speed, Marine environment, route and other data transmission to the reporting station, and then the information into the computer system, the establishment of ship position report database, intelligent analysis of ship sailing cycle, route and route sea weather and other information, according to their own needs to adjust the data, scientific development of ship sailing route. In addition, AIS technology can also help ships to carry out accurate positioning, real-time view of the ship's navigation trajectory, especially other ship routes around the ship route, to avoid collisions between ships, but also to carry out ship search and rescue work, improve maritime traffic safety. Secondly, AIS technology is widely used in the field of navigation. An Internet platform is established by means of beacon telemetry and remote control technology, so as to facilitate the navigation data real-time monitoring by beacon authorities, reasonable scheduling of ships, and rescue services for faulty ships and ships in distress. For example, ships can be equipped with AIS transponder, beacon facilities, no longer need to install a dedicated communication network, through the AIS system to connect to the Internet platform, timely transmission of ship maritime navigation data. In addition, AIS technology can also be used in the virtual beacon system to build a non-physical beacon system, reduce hardware equipment investment, realize intelligent simulation operation, and further improve the accuracy of ship telemetry data at sea.

2. The application of digital simulation technology in navigation practice

Digital simulation technology is widely used in modern navigation. On the one hand, Marine instruments and equipment can be used to carry out analysis and calculation work, which is convenient for seafarers to extract, analyze and sort out effective information in the log, and use professional digital simulation system to build digital simulation models for scientific calculation of ship route design, sailing speed, supply amount, fuel amount, etc. To formulate the best sailing plan. For example, ships can be equipped with intelligent acquisition equipment such as sensors and scanners to achieve dynamic detection, obtain basic data such as ship speed, direction and turbine operation parameters, and use the Internet of Things technology to transmit the data to the simulation system, which is convenient for seafarers to carry out data analysis and further adjust the route. In addition, big data technology can also widely collect various data during the voyage of ships, and carry out intelligent and accurate analysis of the data. The structure of ship navigation instruments is complicated and easy to damage, which affects the accuracy of data. Digital simulation technology can solve this problem. Big data mining technology can be used to analyze the original data in ship manufacturing, accurately calculate ship routes, fuel and cargo carrying capacity, etc., so as to improve

the accurate insight and efficient decision-making ability of navigation work. With the rapid development of big data, blockchain, cloud computing and artificial intelligence and other technologies, the development of modern navigation technology is becoming more and more intelligent, information and precision. The best route is calculated through digital simulation technology, and the data such as speed, position and weather are intelligently analyzed through data mining. The route is flexibly adjusted according to the Marine environment. To further improve the safety of ship navigation at sea.

3. The application of artificial intelligence technology in navigation practice

Artificial intelligence technology has been widely used in modern navigation practice, which can not only improve the stability of the ship's power plant, but also realize the automatic steering of the ship, and further improve the navigation safety and speed of the ship. First, the stable driving force is an important guarantee for ship navigation safety, and artificial intelligence technology can improve the stability of ship power plant. Due to the special Marine environment, once a ship breaks down at sea, it is difficult to repair it in time. In order to avoid ship failure at sea and ensure ship navigation safety, ships can build intelligent fault monitoring system to monitor the ship's power system in real time, monitor the ship's turbine, engine and other key power devices, monitor the turbine temperature, speed and other data, and carry out maintenance work according to the data to avoid the failure of the power system. Second, artificial intelligence technology can enable ships to achieve intelligent navigation and unmanned driving, ensuring the correct running of the ship and avoiding deviating from the scheduled course. Due to the special maritime environment and the lack of ground reference objects, navigation is crucial to ship routes. In order to improve the accuracy of ship guidance, navigation equipment, communication facilities and electronic maps can be equipped with artificial intelligence technology for data analysis, so as to provide more accurate radar survey images for ships, help seafarers plan routes and control sailing speed. To ensure that the ship is in the best navigation route on the sea, which is conducive to reducing the energy consumption of the ship's voyage. At the same time, the ship can also build an automatic driving system, input the best route and sailing speed of the ship into the ship control system to realize intelligent driving. The ship driver can monitor sailing conditions through the data platform, reduce the burden of work, and accurately control ship routes. This is also the future development direction of modern navigation, and further promote the development of navigation. Improve the development level of modern navigation technology in our country.

IV. Conclusion

In a word, the rapid development of modern navigation technology has not only improved the navigation stability of ships, cargo carrying capacity and navigation safety, but also reduced pollution to the Marine environment and other aspects, which is conducive to the further development of international trade. China should actively carry out research on modern navigation technology, further move toward deep blue, promote the integration of information technology, artificial intelligence, virtual simulation, intelligent manufacturing and other technologies with modern navigation technology, use AIS technology to improve the accuracy of ship positioning, implement real-time data transmission and sharing, improve the accuracy of ship routes, avoid deviating from the best routes, and provide accurate data for maritime rescue. The use of digital simulation technology to plan ship routes, scientific control of ship energy consumption, and actively research and develop ship automated driving technology, fault detection and maintenance technology, to improve the level of modern navigation technology. China should actively carry out Marine trade, promote the development of Marine transportation industry, improve the training model of modern Marine technology personnel, and promote the continuous advancement and development of modern navigation technology, so as to promote the development of Marine transportation industry in our country.

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