Practice Path of Collaborative Innovation and Promotion of 'Beidou+' Technology Application between Industrial Parks and Schools

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Abstract. As a key space infrastructure system, satellite navigation system provides high-precision spatio-temporal information services covering the whole area for human production and life, and is an important information guarantee cornerstone to support economic and social development. At present, China's satellite navigation and location services industry has entered a new development period of "Beidou+" deep integration. Under the background of this era, Hunan Automotive Engineering Vocational University closely adheres to the major strategic needs of the country and the key technical problems, and cooperates with Zhuzhou Beidou Industrial Park to actively promote the collaborative innovation process between the park and the University: through the construction of the innovation mode of "two in one mechanism", it effectively gathers the new momentum of Beidou industrial development; Plan to build an innovation platform of "two rooms and one center" to effectively promote the popularization and application of Beidou technology; Focusing on the key technology of "one image and two sensors", the university has carried out scientific research, significantly improving the output efficiency and transformation efficiency of scientific research achievements, thus greatly enhancing the industrial influence of the University in the field of Beidou.

Keywords: Satellite Navigation System; Beidou Technology Application; Collaborative Innovation.

1 Introduction

Beidou satellite navigation system is a satellite navigation system independently constructed and operated by China based on the needs of national security and economic and social development[1]. After years of construction and development, the system has become a key new infrastructure to provide users around the world with all-weather, all-time high-precision positioning, navigation and timing services[2]. With the technical iteration, the accuracy of satellite positioning continues to improve, and the resolution is gradually enhanced[3]. Although the application scale is huge, the current practical application support in natural resources, transportation, emergency, agriculture and other fields is still insufficient.

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At present, the CPC Central Committee and the State Council attach great importance to the development of Beidou system and list the Beidou system demonstration project as a major scientific and technological project[4]. The comprehensive development and promotion of satellite navigation and positioning products with independent intellectual property rights have been included in the national strategy[5]. Zhuzhou is committed to building a benchmark city of Beidou scale application demonstration park, focusing on accelerating the construction of Beidou scale applications, formulating a three-year action plan for building Beidou demonstration application scenarios, and accelerating the construction of 45 demonstration application scenarios.

Focusing on the research and application promotion of "Beidou application" related technologies, Hunan Automotive Engineering Vocational University continued to strengthen the in-depth collaborative innovation with Zhuzhou Beidou Industrial Park, and jointly established a scientific and technological research team with related enterprises such as SPACESTAR and Chuangxin Weili, built a provincial engineering research center and a Municipal Joint Laboratory, and applied Beidou technology to carry out research and promotion in the fields of smart road network, high-precision map and intelligent vehicle.

2 Practice Path

2.1 Serve the National Needs and Lay out 'Two Rooms and One Center'

Focusing on the demand of Beidou application industry, focusing on the key systems of new energy vehicles, intelligent connected vehicle testing, intelligent transportation engineering and other fields, adhering to the principle of "openness, mobility, cooperation and sharing", the "two rooms and one center" has been laid out, and a pilot test base of Beidou navigation equipment has been built to help promote the application of Beidou technology. First, build the Beidou high-precision positioning and intelligent connected vehicle joint laboratory, and cooperate with Beidou application enterprises such as Chuangxin Weili and Dabei times to fully combine Beidou Positioning and intelligent connected vehicles, so as to create a Beidou connected ecosystem of "people and vehicles cloud" in the Internet of vehicles. The second is to build a joint laboratory for the engineering application of key systems of new energy vehicles, integrate the advantageous resources of CRRC electric, jointly explore the research and development of key technologies of new energy vehicles, and actively promote the Beidou software and hardware technology to serve all links of the new energy vehicle industry chain. The third is to build the Hunan Provincial Engineering Research Center for intelligent agricultural machinery Beidou navigation adaptation technology and equipment, develop special sensors for intelligent agricultural machinery equipment with enterprises such as SPACESTAR and Chuangxin Weili, study technologies such as agricultural machinery intelligent decision-making, agricultural machinery navigation, efficient scheduling, intelligent diagnosis and collaborative operation, and promote the integration and application of technologies such as intelligent control, satellite positioning and Agricultural Internet of things with agricultural machinery equipment. Gather the

research results of "two rooms and one center" and choose the opportunity to apply for the national scientific research and innovation platform of Beidou Application Engineering Center for new energy and intelligent connected vehicles. The practice path of "two rooms and one center" is shown in Figure 1.

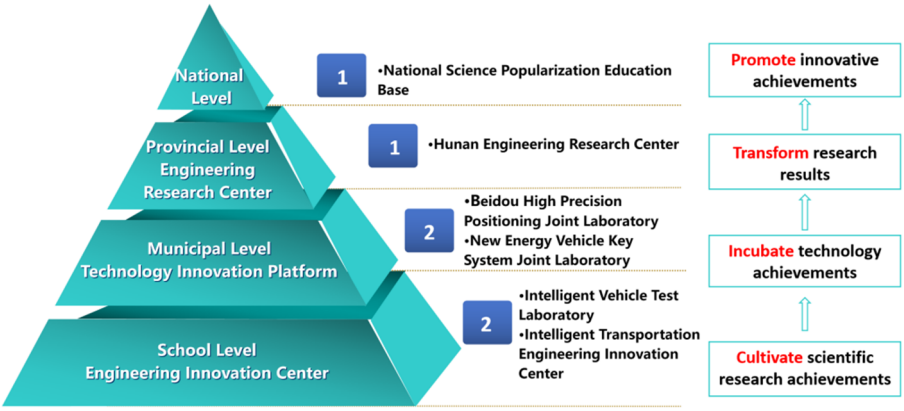

Fig. 1. Practice path map of 'two rooms and one center'

2.2 Focus on Application Technology and Tackle the Key Problem of 'One Image and Two Sensors'

Focusing on the "Beidou navigation" application, the University and enterprise jointly build a scientific research team, carry out joint research and collaborative innovation on high-precision maps, automatic driving, vehicle road collaboration, etc., actively apply for the special subject of Beidou application, and strive to improve the level of technical research and achievement promotion. First, focus on the fine "map" map network, collect the spatial three-dimensional coordinates of laser point cloud based on Beidou satellite positioning coordinates, and use software analysis technology to complete the repair and generation of high-precision map three-dimensional model, providing support for urban intelligent transportation, airport vehicle scheduling and other scenes. The second is to focus on the smart "car" sensor network, adopt the "Beidou Positioning+integrated inertial navigation" positioning mode, and combine the "lidar sensor signal" of the smart car to transform the vehicle into an autonomous driving platform for driverless sightseeing cars, non pedestrian vehicles, etc. Third, focus on the smart "road" sensor network, optimize the Beidou Positioning ground infrastructure, integrate v2x sensing base station, intelligent vehicle terminal, vehicle road coordination controller and other equipment, build an intelligent vehicle road coordination system, carry out technical exploration and test of multi-sensor fusion information perception, accurately identify and predict the movement trajectory of traffic participants within the sensing range, and realize functions such as intelligent return and multi vehicle coordination. The practice path of "one image and two sensors" is shown in Figure 2.

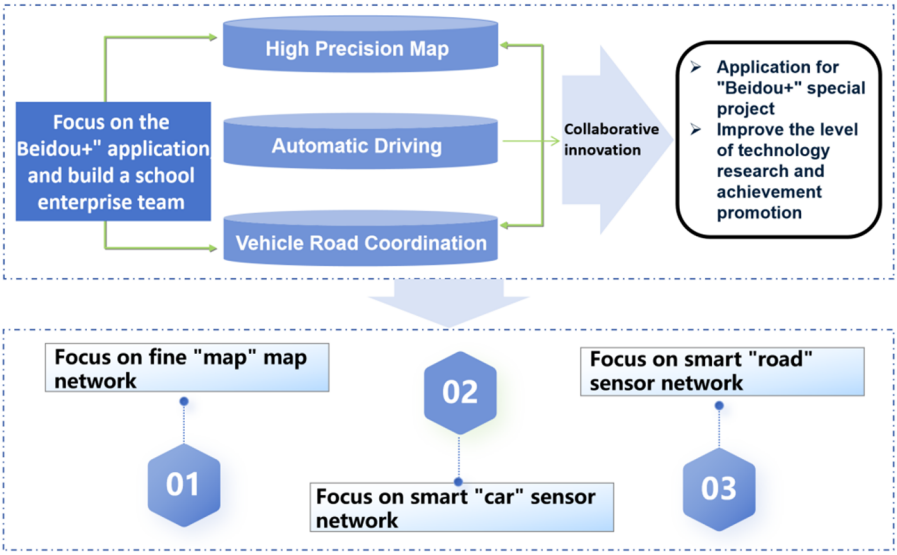

Fig. 2. Practice path map of 'one image and two sensors'

2.3 Focus on Long-Term Development and Explore the 'Two in One Mechanism'

Focusing on the major strategic needs of the country, we have carried out in-depth cooperation with Zhuzhou Beidou Industrial Park in professional construction, teacher training, base construction and other aspects, improved the technology innovation and achievement transformation mechanism of "production, learning, research and application", and accumulated new momentum for the development of Beidou industry. The first is to explore the "five tongs" cooperation mode between kindergartens and schools, strengthen the top-level design and linkage at all levels, jointly formulate professional talent training programs and teaching standards, jointly establish the mutual employment of kindergartens and schools' staff and the "double qualified" teacher training mechanism, jointly build the technical skills training and certification base, jointly promote the order class students' internship and employment in the park, and jointly study the technical transformation projects and technical problems. The second is to improve the technological innovation mechanism. The park and school jointly set up a team for the integration of industry and education and the integration of science and education, formulated the management measures of scientific research and innovation platform, the evaluation and assessment mechanism of scientific research work and other systems, defined the quantitative standards, rewards and accounting methods of scientific research, increased the investment in the construction of scientific research equipment and laboratories, encouraged the declaration of various scientific research achievements, and created a collaborative innovation ecology of dedicated research. The third is to optimize the transformation mechanism of scientific and technological achievements. Parks and universities jointly set up a reform implementation team for the

transformation of scientific and technological achievements, strengthen the guarantee of the transformation system of scientific and technological achievements, improve the income distribution system of scientific and technological achievements, improve the income distribution of scientific researchers in the transformation of scientific and technological achievements, deepen the cooperation in technology transformation, technology trading and authentication, and build a regional service community for the transformation of technological achievements. The practice path of "one mode and two mechanisms" is shown in Figure 3.

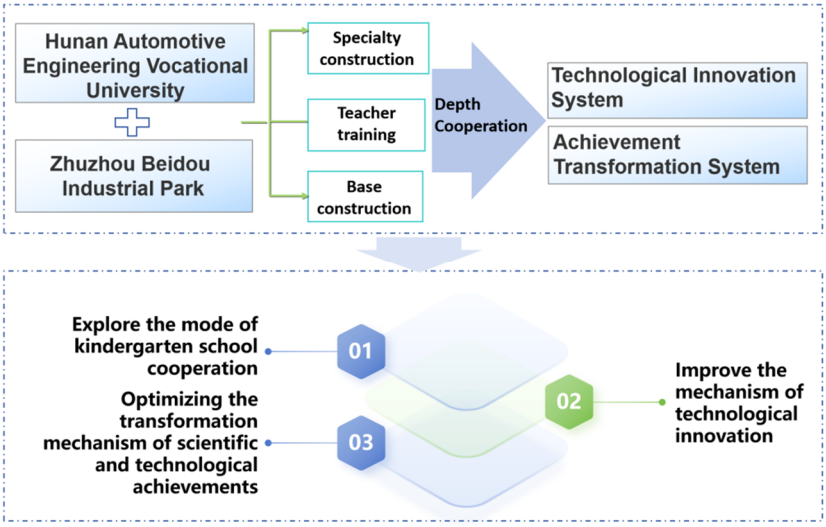

Fig. 3. Practice path map of 'one mode and two mechanisms'

3 Practical Results

1. Two level scientific research platform has been built. It has cooperated with CRRC electric to build a joint laboratory for engineering application of key systems of new energy vehicles, and has cooperated with Liufen technology, SPACESTAR, Chuangxin Weili and other enterprises to build the Hunan Engineering Research Center for intelligent agricultural machinery Beidou navigation adaptation technology and equipment, which has strongly supported the innovation and output of Beidou technology achievements.

2. A number of scientific research achievements have been produced. Scientific research innovation and technical services are abundant, and the authorized invention patents are increasing year by year, with a total of 50 authorized patents. It has signed patent transfer contracts with more than 40 enterprises such as Shenzhen zhizunbao and Hunan Lianke, and has converted 68 invention patents in total. Relying on the technical skills platform, the company has carried out enterprise training, technical services and technical consulting, with a total payment of more than 21million yuan for scientific and technological services.

3.A number of scientific research backbones have grown up. It has introduced and cultivated 1 national model worker, 2 national technical experts, 1 National Award for scientific and technological invention, 1 provincial award for scientific and technological progress, and 2 famous teachers of Furong teaching. It has created a high-level talent team with both morality and technology and integrated innovation.

4 Conclusion

At present, the Beidou industry is in a period of historical opportunity of rapid expansion. The broad market puts forward higher standards and urgent needs for technology, talents, products and business models, and the time window is urgent. Vocational colleges should actively link up the "Beidou+" multiple application scenarios, fully release the advantages and effectiveness of disciplines, talents, scientific research and platforms, further deepen the integration process of industry, University and research, build a high-level scientific research team through resource integration and optimal allocation, jointly build a technology innovation center, cooperate to carry out key technology research, promote the precise connection between production and education supply and demand, accelerate the transformation of scientific research achievements into actual productivity, and cultivate high-end skilled talents with "Beidou+" industrial characteristics and school professional characteristics.

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