Hindawi
Journal of Control Science and Engineering
Volume 2023, Article ID 9872504, 1 page
https://doi.org/10.1155/2023/9872504

Retraction

Retracted: Control Optimization Design of Radio Frequency Identification Technology in IoT Express Logistics Distribution System

Journal of Control Science and Engineering

Received 28 November 2023; Accepted 28 November 2023; Published 29 November 2023

This article has been retracted by Hindawi, as publisher, following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of systematic manipulation of the publication and peer-review process. We cannot, therefore, vouch for the reliability or integrity of this article.

Please note that this notice is intended solely to alert readers that the peer-review process of this article has been compromised.

Wiley and Hindawi regret that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their agreement or disagreement to this retraction. We have kept a record of any response received.

References

[1] H. Liu, L. Jiao, F. Wang, and X. Zhang, "Control Optimization Design of Radio Frequency Identification Technology in IoT Express Logistics Distribution System," *Journal of Control Science and Engineering*, vol. 2022, Article ID 3169032, 7 pages, 2022.

Hindawi
Journal of Control Science and Engineering
Volume 2022, Article ID 3169032, 7 pages
https://doi.org/10.1155/2022/3169032

Research Article

Control Optimization Design of Radio Frequency Identification Technology in IoT Express Logistics Distribution System

He Liu, Linna Jiao, Fangfang Wang, and Xiaoman Zhang

Xi'an Siyuan University, Xi'an, Shaanxi 710038, China

Correspondence should be addressed to Xiaoman Zhang; 20150915216@mail.sdufe.edu.cn

Received 4 August 2022; Revised 15 September 2022; Accepted 26 September 2022; Published 7 October 2022

Academic Editor: Jackrit Suthakorn

In order to solve the problems of high consumption cost and long transportation and distribution cycle of cross-border logistics, a control optimization design method of radio frequency identification technology in the express logistics distribution system of the Internet of Things is proposed. The details of the method are RFID positioning technology, laser ranging technology, RFID and laser fusion positioning feasibility analysis, and moving target state estimation. The experimental results show that when the phase shift threshold φ and the included angle of the antenna are 90°, the error can be reduced to 0.36 m, and the recognition rate can be increased to 94.8%. The simulation results show that, on the premise of meeting the customer's expectation of timeliness, the actual logistics distribution cost is significantly lower than the customer's expected logistics distribution cost, which verifies the effectiveness of the proposed method.

1. Introduction

Governments at all levels have unveiled ongoing policies to promote cross-border e-commerce, including the first advantages of home-based businesses in foreign markets, cross-border e-commerce business in our country has developed rapidly, and through e-commerce logistics being created unprecedented opportunities for improvement were opened up. Cross-border e-commerce logistics has evolved with the emergence of cross-border e-commerce and logistics services for shipments of two or more countries and regions [1]. Compared with domestic logistics, the biggest feature is internationality, during the entire logistics process, it may be affected by the policies of multiple countries, and the uncertainty becomes greater. In the process of commodity circulation in multiple countries, due to differences in language, customs, behavior habits, etc., the entire logistics process needs to undergo a series of treatments, which makes the logistics process more cumbersome, the possibility of errors is higher, and even seriously affects customers, the experiential nature of e-commerce shopping.

With the vigorous development of my country's foreign affairs, the economic exchanges with foreign countries are becoming more and more close, and domestic enterprises are also conducting foreign trade business with more and more countries. With the advancement of the Road and Road Initiative, home-based businesses have become increasingly integrated with countries along the Road and Road Initiative, and many companies have begun to try to develop cross-border e-commerce with the Middle East and China other areas. However, the infrastructure of these emerging markets is often very imperfect, and the logistics lines are still in the planning stage, the cross-border e-commerce logistics models that can be used are very simple and expensive, which restrict the rapid development of cross-border e-commerce [2]. Compared to home delivery, cross-border e-commerce logistics are increasingly complex, and the entire logistics process involves language, culture, and technology inputs from various sources. At present, our country's policy support for cross-border e-commerce logistics is not perfect, and there are still many problems such as construction, transportation costs, and timely delivery.

Cross-border e-commerce logistics is essential to prevent the successful development of cross-border e-commerce. Government agencies and companies cross-border e-commerce logistics must work together to improve infrastructure and improve cross-border e-industry logistics operations. Cross-border e-commerce logistics system should also be improved so as to provide better logistics services for cross-border e-commerce.

2. Literature Review

Cross-border e-commerce logistics includes packaging, transportation, customs clearance, storage, distribution and other connections, and the entire logistics process is more complex. Home delivery, and customs clearance of goods also affects the cost, so the logistics cost is lower than domestic logistics. For cross-border e-commerce, the speed of international shipping and home delivery is fast, but the freight cost is high, even more than half the cost of products, which often affect the competitiveness of products international trade. If the cost is low for international shipping and other shipping methods, the delivery time will be too long and the cost will be high, which will affect the customers, which is obviously not applicable to some products that customers urgently need. The high cost of shipping and handling in cross-border e-commerce is related to the high cost of return from the customer, and once the customer returns, the cost of return logistics will be high, so this part of the cost also has to be averaged into the distribution cost of cross-border e-commerce logistics, thereby increasing the cost of cross-border e-commerce logistics.

In response to the above problems, the author proposes a method based on RFID and sensing technology in cross-border e-commerce logistics and distribution [3]. The method is mainly: (1) The RFID system continuously collects the phase information reflected back by the tag according to the given frequency, processes the phase, and estimates the radial velocity based on the RFID phase difference, at the same time, the laser ranging sensor continuously emits scanning lasers to the environment to be measured according to the set frequency, each frame of laser can represent the state of the environment at that moment, cluster discrete laser points, and cluster information according to adjacent moments, estimating the radial velocity of each object in the environment based on laser clustering [4]. (2) Identify and locate multiple moving targets in a simple indoor environment: radial velocity similarity is calculated for each time window using the time sliding window according to the similarity change algorithm. Similar groups are usually combined with the label to determine the location of the target, the ID of the label is the target identification, and meanwhile, the center coordinate of the cluster is the estimated position of the target. (3) Identifying and locating multiple moving targets in a complex environment: when identifying and locating multiple moving targets in an environment with multiple obstacles, there are gaps between the target and the target and between the target and the obstacle, the problem of frequent occlusion occurs, if only the similarity matching algorithm based on sliding time window is used, the algorithm cannot distinguish obstacles and targets well, therefore, the author proposes a moving target trajectory estimation method based on improved particle filtering to estimate the trajectory of each moving target, instead of simply taking the cluster center as the estimated position of the target, the radial velocity of each target is further estimated, and then matched with the radial velocity estimated by the RFID system [5].

3. Method

3.1. RFID Positioning Technology. A RFID system has two main components, a reader (or known as a transponder) and a tag (or known as a transponder). Compared with barcode technology, the biggest advantage of RFID is that the card does not need to be in the line of sight of the reader. Currently, RFID technology is widely used in areas such as product management, inventory research, and surveillance. For example, RFID tags can be placed in a car and the system can be raised and lowered when entering and leaving the garage without having to park the car in the garage [6].

In particular, long-distance passive ultra-high frequency (UHF) RFID technology can detect the material at longer readings (e.g., 10 meters) without the need for additional capping power. These inexpensive markers can be linked to finished products and accessories to enhance merchandise in stores, malls, and libraries. In this case, RFID portable devices can identify remote devices, which avoid the process of manual counting devices and prevent data entry errors. The use of mobile robots can further reduce operating costs. If the mobile robot can solve the problem of self-localization, the position of the character can be determined. In addition, each RFID card has an ID identification code, which solves the problem of local robot identity, making RFID technology important in robots [7].

3.1.1. RFID System Composition. According to whether the power supply is used or not, RFID tags can be further divided into passive and active tags. Active tags are mainly used to track valuables and monitor the environment, while passive tags are often used to take inventory of assets using mobile readers or stationary readers in the environment. The experimental scenario simulated by the author is to use the existing RFID chips on people to identify and locate them, in daily life, most people use passive tags, because it is smaller and cheaper, we prefer passive RFID tags.

There are several factors that affect passive UHF RIFD reading and writing: antenna transmission, read and write frequency, and environmental interference. The card reading frequency is specified as shown in Table 1. A comparison of passive RFID technologies is documented. Low or high contact is based on magnetic induction or close contact. LF operates in low-frequency bands (e.g., 134 kHz) and therefore has a shorter read range. However, low-band tags are not very sensitive to interference from the environment, so they can play a greater role, such as in environments with water or metal objects [8]. Therefore, these tags can be put into the body for identification and positioning, and can also be effectively used in the factory for data collection of inventory goods.

Table 1: Operating frequency and reading range of passive UHF RFID.

Frequency range	Typical frequency	Read range	Tag price 格
Low frequency (LF)	125–134 kHz	<0.5 m	1
High frequency (HF)	13.56 MHz	<1.0 m	0.5
Ultra high frequency (UHF)	865–928 MHz	1–10 m	0.15

High-frequency tags typically operate at 13.56 MHz, have a wider read range than low-frequency tags, and are more sensitive to disturbances present in the environment. High-frequency tags are commonly used for payments, airport baggage tracking, ticketing, and asset tracking. Both low-frequency and high-frequency tags have problems with short readings, as the reader's magnetic field degrades faster as the reader's gain increases, and the form should be closer to the reader's. Short readings are useful for security applications such as vehicle keys and personnel records, which prevent data theft from limiting physical transmission, but not suitable for applications with low frequency and markers higher than 1 meter. In addition, low-frequency and high-frequency labels require inductive antennas and multiple wire coils, which increases equipment and manufacturing costs.

UHF RFID tags have a longer read range (up to 10 meters) and are less expensive than low-band or high-band tags. It derives energy from the captured signal [9]. In addition, tags in the UHF band have higher data transfer rates than tags in the low and high-frequency bands. These features make it ideal for a variety of business applications such as noncontact payments, inventory management, access control, or freight tracking. However, despite its many advantages, its shortcomings are also very obvious. The performance of UHF RFID tags rapidly degrades when approaching metal, water, or obstructions. In addition, the operating frequency of UHF RFID tags depends on local regulations and restrictions. For example, the operating frequency in Europe is 865–868 MHz, and the operating frequency in the United States is usually 902–928 MHz. The author mainly studies long-distance passive UHF RFID based on EPC C1G2 standard.

3.1.2. Long-Range Passive RFID. Typically, UHF RFID uses radio waves to transmit power and communicate. Unlike inductive near-field RFID, long-range passive UHF RFID (also called far-field RFID) is based on backscatter modulation [10].

More precisely, the RFID antenna propagates the electromagnetic field generated from the reader, and since the signal gradually decays during free propagation, only a small amount of energy reaches the tag's antenna. The main energy absorbed by the signal by the electric energy received to make the base bistable: A portion of the energy is used to power the circuitry within the tag; the rest is reflected. The complete data (that is, itself) is encoded by the transducer as a fully backscattered signal, and the reader is designed to capture and resolve this problem. In addition to self-identification, the new generation of RFID readers provides signal strength, which is the energy transmitted through the tag. For example, some readers provide a strong signal in dBm (such as Impinj's Speedway reader), while some card readers provide a weak signal (such as ThingMagic's Mercury5e reader).

Passive tags must rely on the reader's source of electromagnetic radiation. The law of inverse square is expressed by the Friis equation, in formula (1), the energy produced by the symbol is minimal [11]. In order to complete UHF RFID passive identification, two requirements must be met: One is that the document must receive sufficient power from the reader to open the internal electronics, and the other is that the reader should understand enough to get answers from the paper.

$$P_r = G_r G_t \left(\frac{\lambda}{4\pi\pi R} \right)^2 \cdot P_t. \quad (1)$$

3.2. Laser Ranging Technology. Laser ranging sensors have the advantages of high measurement accuracy (usually up to centimeter level), high scanning frequency, and rich data points. It can be roughly divided into 2D and 3D laser range finders [12]. The latter is relatively more expensive and bulkier. In addition, due to the huge number of point clouds acquired by the device, the calculation speed is relatively slow, and it is rarely used in application scenarios that need to ensure real-time performance. In the field of positioning, the most widely used is 2D laser ranging sensor. The sensor has a built-in rotatable optical device, which continuously emits a beam of discrete laser points during use to quickly scan the environment, it can be effectively used in various aspects such as target positioning and map construction.

3.2.1. Laser Ranging Data Analysis. The 2D laser rangefinder can follow the preset frequency, the pair is continuously scanned in its plane with its inherent angular resolution [13]. Each scan fires a discrete laser spot into the environment. Each discrete laser point can obtain a distance and angle value in the polar coordinate system with the rangefinder as the origin. The result obtained from each scan measurement can be expressed as formula (2):

$$S_k = (\rho_k, \theta_k)^T, \quad k = 1, \ldots, N. \quad (2)$$

The result obtained from the above formula is converted to the global Cartesian coordinate system, which is expressed as formula (3):

$$u_k = (x_k, y_k)^T, \quad k = 1, \ldots, N. \quad (3)$$

Among, $x_k = \rho_k \cdot \cos\theta_k$, $y_k = \rho_k \cdot \sin\theta_k$, N is the number of scanning points. For the SICK S300 2D laser sensor used by the author, $N = 1081$ and the angular resolution is 0.5°.

Assuming that the sensor emits a beam of discrete laser points at a certain moment, the kth point is emitted to the obstacle M, and the distance returned by this point is $= d_k$, then the coordinates of the obstacle M in the polar coordinate system can be expressed as formula (4) and (5):

$$M_x = d_k \cos(\theta_k - 45), \tag{4}$$

$$M_y = d_k \sin(\theta_k - 45). \tag{5}$$

3.3. Feasibility Analysis of RFID and Laser Fusion Positioning. RFID has the advantages of fast and accurate identification, low price, and noncontact, it is very suitable for identifying indoor moving targets without violating personal privacy, however, RFID is difficult to locate the target accurately, although the position of the target can be estimated by measuring the signal strength, phase, and other information of the tag, the former needs to model the signal strength model, and the latter because the phase changes periodically, therefore, there is a problem of periodic ambiguity, which in turn leads to low positioning accuracy. Laser sensors can emit a laser beam and capture the echoes reflected by the surrounding environment, the distance and angle information of each laser point reaching obstacles in the environment can be accurately read, and the position coordinates of the target can be obtained after conversion. However, in order to use the laser sensor to identify the target, we must first use the laser data to extract the surface contour of the object, on the one hand, the algorithm is relatively complicated, on the other hand, if it is for two targets with similar appearances, the recognition rate is often lower. In view of the above situation, the author uses sensor data fusion technology to fuse RFID and laser data to realize the complementarity of the two sensors, RFID makes up for the difficulty of laser recognition of targets, and laser sensors improve the shortcomings of RFID's low positioning accuracy [14].

There are one or more dynamic targets in the experimental scene, and the laser sensor and the RFID are mounted on the same robot (that is, they are both at the origin of the coordinate system in the global coordinate system). The target will move continuously in the experimental area, so there will be a certain displacement in adjacent moments, therefore, by collecting the radial displacement of the target relative to the robot at adjacent moments, the RFID system and the laser system can be used to estimate the radial velocity of the moving target [15]. Theoretically, if the two sensors detect the same target, the estimated radial velocity similarity of the target should be the highest, therefore, the author uses the designed algorithm to continuously match the radial velocities estimated by the two types of sensors to achieve data fusion, finally, the recognition and positioning of moving targets can be realized in the indoor environment, a single dynamic target recognition and positioning system is shown in Figure 1.

The author delineates a time series of fixed size, and based on the idea of "sliding window," the series slides over the entire experimental period, and use the information collected by the RFID system and the laser system, respectively, the radial velocity of the moving target relative to the robot is estimated, and the similarity of the radial velocity is matched within each "window" through the similarity matching algorithm to achieve sensor data fusion. In addition, due to the complex environment (such as the existence of multiple obstacles or multiple moving targets), there may be frequent and long-term occlusions between targets and obstacles, and between targets. Particle filter is widely used in the fields of target localization, tracking, and robot navigation due to its non-Gaussian and nonlinear advantages [16]. The author proposes an improved particle filter algorithm to estimate the trajectory of each moving target, instead of just taking the center position of the cluster as the estimated position of the target.

3.4. Estimation of Moving Target State. Due to the limitations of the sensor or the influence of the environment, the measurement data from the sensor is usually noisy, which seriously affects the accuracy of the target state estimation [17]. This subsection describes three commonly used target state estimation methods. We describe in detail the filters received by the authors because of its popularity, performance, and usability in robots.

3.4.1. Kalman Filtering. Kalman filter (KF) solves the problem of recursively estimating the state of a linear dynamical system with a normal distribution. Kalman filter is considered to be one of the simplest applications of Bayesian framework. It has achieved excellent performance in a wide range of applications, especially in the control, fielding, and steering of low-powered vehicles. Kalman filter is based on the assumption that all errors and measurements are always distributed [18]. More precisely, the normal division is represented by the multivariate Gaussian division with covariance. The disadvantage of Kalman filter is that the equilibrium is based on different linear curves, that is, the variable states and the standard values must be linear. In practice, systems can be very complex and seamless, which limits the use of Kalman filters. To solve the above problem, scientists have applied EKF and Unscented Kalman Filter (UKF) parts. However, EKF performs particularly poorly when states change and the diagnostic standards are not linear. To solve this problem, UKF uses the decision model to select a minimum of sample terms to represent the distributed state (e.g., and comparison) [19]. Compared with EKF, UKF expanded the state distribution later to the third-order Taylor series with the same computer complexity as EKF. Although the above two methods can handle nonlinear situations, they can only be effectively applied in applications where the posterior probability can be approximated as a Gaussian distribution. This shortcoming can be solved by a non-Gaussian filter.

3.4.2. Histogram Filtering. Histogram filters, called network-based Markov methods, decompose state centers into fine-grained, network-based regions [20]. In this case, the

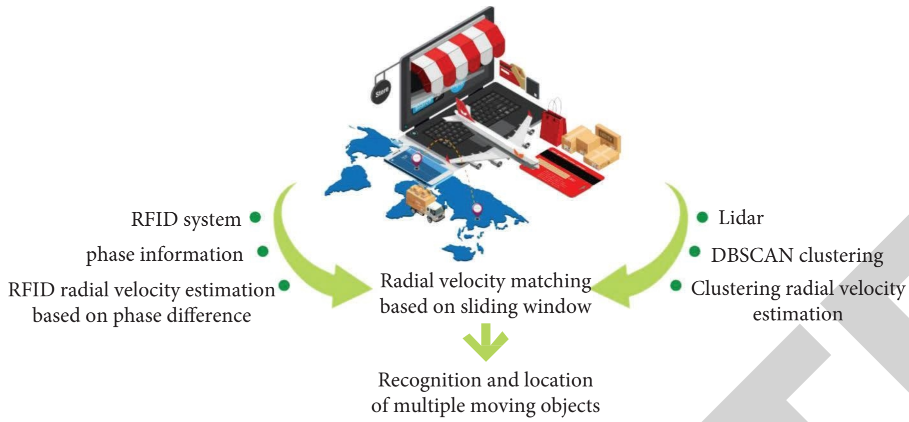

Figure 1: Block diagram of a single dynamic target recognition and positioning system.

Table 2: Influence of antenna settings on experimental results.

Antenna angle	Antenna selection	Positioning error (m)	Recognition rate (%)
45°	Left antenna only	0.98	83.7
	Right antenna only	2.53	43.4
	Dual antenna	0.69	88.0
90°	Left antenna only	0.80	89.8
	Right antenna only	0.98	82.0
	Dual antenna	0.36	94.8
135°	Left antenna only	4.92	33.3
	Right antenna only	6.72	17.6
	Dual antenna	4.18	40.5

next result is represented by a histogram. This method is widely used in robot localization. Substituting Gaussian religious expressions like the Kalman filter below, the filter histogram retains the implications for each state. This representation can represent complex, arbitrary, non-Gaussian, and multivariate distributions. The process is more accurate if the dispersion state is very high. The disadvantage is that we have to store a lot of power lines, which require a high memory. In addition, modifying the state of the entire power line is considered expensive. Therefore, this method is not suitable for many real applications. To overcome this problem, some scientists have suggested choosing an update that only modifies the cells and the representation of the tree, which can change the speed of the network.

3.4.3. Particle Filter. Particle filter (PF), also known as Sequential Monte Carlo (SMC) method, uses a finite number of random particles or samples to represent a probability density function [21]. In simple terms, particle filtering is to uniformly distribute N particles in the state space; Then the particle state at the current moment through the state data of the particle at the previous moment is predicted, which is also called the prediction stage; In the update stage, the prediction results are revised according to the latest observation data returned by the sensor, and the particle weight is re-estimated. During resampling, heavier items are replaced by heavy things. The recent example is usually made up of probability. Precisely, the probability of particles is proportional to their weight. After this step, the total particle weight is set to $1/N$. It enforces the placement of particles in regions with high post probabilities, thereby concentrating on regions of high interest [22].

As mentioned above, the core of particle filtering is to use randomly sampled particles to approximate the motion state of the target. Theoretically speaking, as the number of particles increases, the state of the particles is closer to the real state. Although the particle filter algorithm has a large amount of calculation, with the continuous upgrading of computer hardware, it has been able to meet the calculation requirements of particle filter, and its robustness is strong, so it is more practical.

4. Results and Discussion

Since the detection range of RFID antennas is limited, the number of antennas and the span angle between the antennas will have a greater impact on the experimental results [23, 24]. This section discusses the influence of the number of antennas and the span angle between the antennas on the experimental results. The antennas are set to the left antenna, right antenna, and dual antenna. The included angles between the antennas are set to 45°, 90°, and 135°, and the results are shown in Table 2.

It can be seen from Table 2 that, due to the limited coverage area of a single antenna, whether you choose the left antenna or the right antenna, the positioning accuracy is

Table 3: Influence of the phase shift threshold φ on the experimental results.

φ	Recognition rate (%)	Positioning error (m)
10°	81.7	0.98
30°	91.3	0.49
60°	94.7	0.36
90°	94.8	0.36
120°	94.8	0.37
150°	94.6	0.38
180°	77.3	0.83

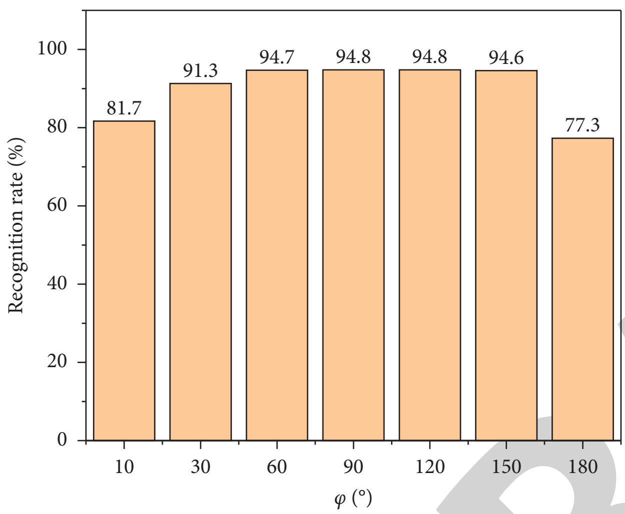

Figure 2: The histogram of the influence of the phase offset threshold φ on the recognition rate.

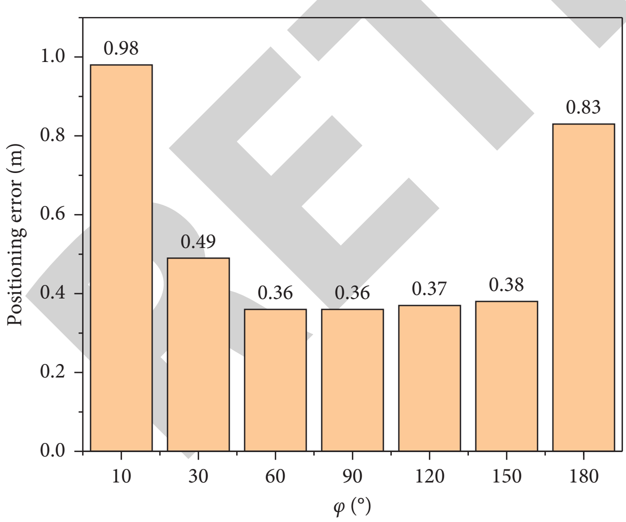

Figure 3: Histogram of the influence of phase offset threshold φ on positioning.

poor, and when using dual antennas, due to the larger coverage, when the antenna angle is 90°, the error can be reduced to 0.36 m, the recognition rate can be improved to 94.8%. In addition, it can be seen that the optimal configuration angle of the antenna is 90°. For the RFID phase, whether an appropriate threshold can be set is the key to whether the algorithm can eliminate the π phase jump problem [25].

It can be seen from Table 3, Figures 2 and 3 that when φ is too small (such as $\varphi = 10°$), the algorithm will eliminate the normal phase information as "jumping" abnormal phase values. As a result, the radial velocity estimation based on the RFID phase difference of the adjacent time tags is deviated, the recognition rate is only 81.7%, and the positioning error is 0.98 m. On the other hand, if φ is too large (such as $\varphi = 180°$), the algorithm cannot effectively smooth out the outliers that "jump," the positioning error is also as high as 0.83 m, and the recognition rate is only 77.3%.

5. Conclusion

The author proposes a method based on RFID and sensing technology in the optimization of cross-border e-commerce logistics distribution. The specific content of the method: (1) RFID positioning technology. A RFID system has two main components, a reader (or known as a transponder) and a tag (or known as a transponder). Compared with barcode technology, the biggest advantage of RFID is that the tag does not need to be placed in the line of sight of the reader. (2) Laser ranging technology. Laser ranging sensors have the advantages of high measurement accuracy (usually up to centimeter level), high scanning frequency, and rich data points. It can be roughly divided into 2D and 3D laser rangefinders. The latter is relatively more expensive and bulkier. In addition, due to the huge number of point clouds acquired by the device, the calculation speed is relatively slow, and it is rarely used in application scenarios that need to ensure real-time performance. (3) Feasibility analysis of RFID and laser fusion positioning. Due to its advantages of fast and accurate identification, low price and noncontact, RFID is very suitable for identifying indoor moving targets without violating personal privacy, however, RFID is difficult to accurately locate the target, although the position of the target can be estimated by measuring the signal strength, phase, and other information of the tag, the former needs to model the signal strength model, and the latter because the phase changes periodically, therefore, there is a problem of periodic ambiguity, which in turn leads to low positioning accuracy. Through the influence of the experimental antenna settings on the experimental results and the influence of the phase offset threshold φ on the experimental results, it is concluded that it has good effects on cross-border e-commerce logistics infrastructure, logistics costs, and delivery timeliness.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

References

[1] E. R. Cahyadi, K. R. Widianti, and A. S. Slamet, "The use behavior of tracking and tracing services in e-commerce logistics," *Journal Manajemen dan Organisasi*, vol. 12, no. 1, pp. 10–20, 2021.

[2] Z. H. Adnan, A. H. Ashik, M. Rahman, S. S. Bhuiyan, and A. Ganguly, "Applying linear programming for logistics distribution of essential relief items during covid-19 lockdown: evidence from Bangladesh," *International Journal of Logistics Economics and Globalisation*, vol. 9, no. 3, 2022.

[3] C. Ye, W. He, and H. Chen, "Electric vehicle routing models and solution algorithms in logistics distribution: a systematic review," *Environmental Science and Pollution Research*, vol. 29, no. 38, pp. 57067–57090, 2022.

[4] Z. Yufeng and S. Wan, "Research on logistics distribution in e-commerce environment based on particle swarm optimization algorithm," *Journal of Physics: Conference Series*, vol. 1881, no. 4, Article ID 042059, 2021.

[5] L. Zong, "Smart logistics and distribution system based on laser and vision fused slam algorithm," *Modern Economics & Management Forum*, vol. 2, 2021.

[6] S. Dou, G. Liu, and Y. Yang, "A new hybrid algorithm for cold chain logistics distribution center location problem," *IEEE Access*, vol. 8, 2020.

[7] C. Yao, "Research on logistics distribution path analysis based on artificial intelligence algorithms," *International Journal of Biometrics*, vol. 12, no. 1, p. 100, 2020.

[8] S. Yang, "Optimization of urban logistics distribution path under dynamic traffic network," *International Core Journal of Engineering*, vol. 6, no. 1, pp. 243–248, 2020.

[9] Z. Zhang, "An optimization model for logistics distribution network of cross-border e-commerce based on personalized recommendation algorithm," *Security and Communication Networks*, vol. 2021, no. 4, pp. 1–11, 2021.

[10] S. Yue, Y. Wang, M. Zhao, and Y. Liu, "Research on the feasibility and distribution mode of urban logistics distribution by rail transit," *Journal of Physics: Conference Series*, vol. 1827, no. 1, Article ID 012101, 2021.

[11] C. L. Wang, Y. Wang, Z. Y. Zeng, C. Y. Lin, and Q. L. Yu, "Research on logistics distribution vehicle scheduling based on heuristic genetic algorithm," *Complexity*, vol. 2021, no. 11, pp. 1–8, 2021.

[12] C. Xiong and Y. Xu, "Research on logistics distribution path planning based on fish swarm algorithm," *Journal of Physics: Conference Series*, vol. 1883, no. 1, Article ID 012040, 2021.

[13] F. Ouyang, "Research on port logistics distribution route planning based on artificial fish swarm algorithm," *Journal of Coastal Research*, vol. 115, no. sp1, p. 78, 2020.

[14] X. Meng and X. Li, "Research on optimization of port logistics distribution path planning based on intelligent group classification algorithm," *Journal of Coastal Research*, vol. 115, no. sp1, p. 205, 2020.

[15] P. Liu and Y. Li, "Multiattribute decision method for comprehensive logistics distribution center location selection based on 2-dimensional linguistic information," *Information Sciences*, vol. 538, pp. 209–244, 2020.

[16] G. Lang, "An empirical study on the exploration of factors influencing customer satisfaction in logistics distribution service," *IOP Conference Series: Earth and Environmental Science*, vol. 546, no. 5, Article ID 052031, 2020.

[17] G. D. Konstantakopoulos, S. P. Gayialis, and E. P. Kechagias, "Vehicle routing problem and related algorithms for logistics distribution: a literature review and classification," *Operational Research*, vol. 22, no. 3, pp. 2033–2062, 2020.

[18] L. Hu, C. Xiang, and C. Qi, "Cold-chain logistics distribution routing optimization based on pso," *IOP Conference Series: Materials Science and Engineering*, vol. 790, no. 1, Article ID 012166, 2020.

[19] S. Lu, T. He, Q. Zhou, J. Wen, Y. Liu, and M. Zhang, "Research on a distribution-outlier detection algorithm based on logistics distribution data," *Journal of Physics: Conference Series*, vol. 1624, no. 4, Article ID 042002, 2020.

[20] W. W. Qian, X. Zhao, and K. Ji, "Region division in logistics distribution with a two-stage optimization algorithm," *IEEE Access*, vol. 8, pp. 212876–212887, 2020.

[21] X. Qiu, "Intelligent classification of logistics multi-distribution resources based on information fusion," *International Journal of Infomation Technology and Management*, vol. 20, 2021.

[22] C. Cui and Q. Xu, "Optimization of urban logistics terminal distribution based on cellular automaton model," *Artificial Life and Robotics*, vol. 27, no. 1, pp. 142–148, 2022.

[23] H. Chen, Y. Jin, and B. Huo, "Understanding logistics and distribution innovations in China," *International Journal of Physical Distribution & Logistics Management*, vol. 50, no. 3, pp. 313–322, 2020.

[24] D. R. Morgan, D. Styles, and E. Thomas Lane, "Packaging choice and coordinated distribution logistics to reduce the environmental footprint of small-scale beer value chains," *Journal of Environmental Management*, vol. 307, Article ID 114591, 2022.

[25] J. V. Rodríguez, J. P. Cómbita Niño, K. A. Parra Negrete, D. C. Mercado, and L. A. Fontalvo, "Optimization of the distribution logistics network: a case study of the metalworking industry in Colombia," *Procedia Computer Science*, vol. 198, pp. 524–529, 2022.