Comments and Suggestions from Reviewer 1:

This topic is interesting, but there are still some issues. We suggest that it can be accepted after major repairs.

1.The author did not provide further research results on linear transmission machines and a comparison of the advantages and disadvantages of related algorithms in the introduction section. This is the core of their research, and the innovation points are not prominent. To our knowledge, linear transmission machines have become very mature and have been widely used in logistics transfer, docks, airports, stations, and other places. We suggest that the author conduct thorough survey and provide detailed comparisons in the introduction section, preferably with data support, in order to be convincing and increase readers' interest, otherwise it will be meaningless.

2.The explanation of some of the figures in the article is not in place, such as Figure 16. The author did not provide a detailed explanation of the figures and did not provide a conclusion. Some other images also have similar issues, please make modifications.

3.The author should provide the speed and accuracy of goods operation on the platform, which is also related to whether this platform is meaningful.

Response to Reviewer 1 Comments

Dear Reviewer :

Thank you for your thorough review, valuable comments, and constructive suggestions, which have significantly enhanced the presentation of our manuscript. We have carefully considered all feedback and made corresponding revisions to our paper. The manuscript has also undergone a review, and we have corrected all spelling and grammar errors we identified. In the following paragraphs, we will address each of the comments.

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Comments 1: The author did not provide further research results on linear transmission machines and a comparison of the advantages and disadvantages of related algorithms in the introduction section. This is the core of their research, and the innovation points are not prominent. To our knowledge, linear transmission machines have become very mature and have been widely used in logistics transfer, docks, airports, stations, and other places. We suggest that the author conduct thorough survey and provide detailed comparisons in the introduction section, preferably with data support, in order to be convincing and increase readers' interest, otherwise it will be meaningless.

Response 1: In response to the reviewers' feedback, we acknowledge the inadequacy of our initial research on linear conveyors. Consequently, in the introduction section, we have conducted an in-depth investigation and detailed comparison of the current state of linear conveyors. The specific changes are highlighted in red in lines 25 to 62. The exact modifications are as follows:

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Linear conveyors have become the backbone for end-to-end linear transportation tasks, primarily due to their advantages of extended conveying distances and the ability to handle substantial loads [1]. They find their major applications in the five key industries of steel, coal, cement, ports, and power, collectively occupying 85% to 90% of the conveyor belt market. With the widespread globalization of the economy and the improvement of living standards, there has been a significant surge in the demand for lightweight logistics, presenting immense potential. Notably, the evolu-tion of online shopping has led to smaller, more diverse, and varying-sized express cargo boxes [2]. More than 80% of these boxes weigh under 15 kg, giving rise to new challenges such as sorting, consolidation, cargo box disassembly and stacking, and warehousing. Faced with these new challenges, the limitations of linear conveyors have become increasingly evident, including fixed routes, directional constraints, lack of pose adjustment, complete downtime in case of malfunction, and single-item con-veyance. These shortcomings urgently require resolution.

To address the shortcomings of linear conveyors in lightweight logistics, the most primitive approach is manual assistance, which is characterized by low efficiency and high costs. Researchers have devised various automated solutions, which can be cat-egorized into two approaches: improvement and replacement. The improvement in-volves upgrading the conveyor belt system. For instance, adding sorting equipment with scanning and recognition capabilities and stacking robotic arms to reduce man-ual labor and enhance efficiency [3,4]. However, due to the inherent structure of line-ar conveyors, these upgrades can only address singular issues and often lead to com-plex implementation processes. Furthermore, the stacking robotic arms available in the market are typically limited by linear conveyors, as they are fixed-position grab-bers of a single type, capable of handling only one item at a time, resulting in substan-tial energy consumption and poor environmental sustainability. A novel conveyor belt system called "moveflex" has been invented, which operates without consuming electricity. It relies on gravity and multiple rolling wheels working together for trans-portation. While it doesn't completely eliminate the criticisms associated with linear conveyors, it introduces a novel concept of multi-wheel collaborative cargo convey-ance. Additionally, BIBA has developed a modular omnidirectional wheel platform called "celluveyor" [5], opening the era of intelligent logistics for two-dimensional omnidirectional transport within a flat surface. However, its practicality and com-plexity are yet to be fully realized. On the other hand, the replacement approach in-volves entirely forsaking the idea of improving linear conveyors and opting for alter-native tools or methods to transport goods. Examples include wheeled handling vehi-cles with path planning capabilities [6], guided shuttle cars [7], and material handling robots. However, these methods often come with complex algorithms, high technical requirements, immaturity, and substantial costs.

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Comments 2: The explanation of some of the figures in the article is not in place, such as Figure 16. The author did not provide a detailed explanation of the figures and did not provide a conclusion. Some other images also have similar issues, please make modifications.

Response 2: Thank you for your valuable suggestions. We acknowledge that we have combined the explanation of Figure 16 with Figure 15, causing difficulties in reading the article. Furthermore, our explanation of Figure 16 was overly concise. Hence, we will begin a new paragraph for the explanation of Figure 16, providing additional and highly effective details. The specific changes are highlighted in red in lines 480 to 488. The exact modifications are as follows:

(In order to present the paper method more clearly, we add Figure 13, the original manuscript Figure 16 has been significantly revised to Figure 17)

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Figure 17 presents a comparison between the real-time angular adjustments of cargo boxes on the two-dimensional convey platform from Table 3 and the ideal trend line. The ideal trend line represents the most optimal trend of angular adjustment in the absence of interference and errors. By comparison, it can be observed that during the actual correction process on the two-dimensional convey platform, the deviation angle of the cargo boxes changes relatively smoothly, allowing for the adjustment of the cargo box's orientation to meet the predetermined requirements, with a final error of less than 1.5°.

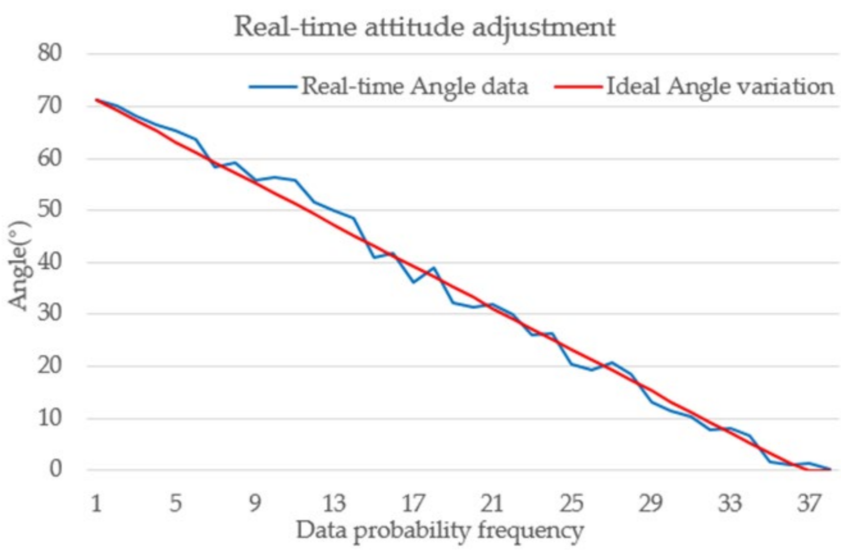

Figure 17. Real-time variation of cargo box angles during adjustment process and ideal trend line.

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Comments 3: The author should provide the speed and accuracy of goods operation on the platform, which is also related to whether this platform is meaningful.

Response 3: Thank you for your constructive feedback, which has made us realize that the information we provided is still insufficient. As a result, we have provided a more detailed explanation of the cargo box adjustment experiment and conducted a more meticulous analysis of the adjustment results. The specific changes are highlighted in red in lines 456 to 466. The exact modifications are as follows:

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The experimental platform utilizes omnidirectional wheels with a diameter of 58 millimeters, and a set of fixed omnidirectional wheels arranged in concentric circles with a radius R of 0.1 meters. The cargo box adjustment experiment was conducted based on a foundation where the line speed v_0 of the omnidirectional wheels was set at 120 revolutions per minute. The adjustment was completed within 4-5 seconds, aligning with the rotational adjustment motion analysis outlined in Equation (4). To mitigate the effects of inertia, we set a stop criterion: the adjustment operation ceased when the identified angular deviation from the expected result was <1°. In other words, the adjustment operation was halted after recognizing an angle of 0.962°, and the final angle at the point of cessation was 0.138°, with minimal deviation from the expected value of 0°, indicating a high level of precision.

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