Following information is required from applicant for drafting of patent application.

1. **Full name, nationality and address of applicant(s):**

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1. **Full name (including middle name), nationality, address (VIIT address), mail id, and phone number of inventor(s):**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
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1. **Title of the invention:**

Adjustable Ring Dispenser Mechanism with Precise Launch Control

1. **Technical field of the invention:**

Mechatronics

1. **Prior art:**

These prior art mechanisms often lacked adjustable launch distances and precise control over the angle of shooting, leading to inconsistent and imprecise ring delivery. Moreover, they struggled to accommodate variable requirements efficiently. The problem to be solved by the present invention is to provide a ring dispenser mechanism that overcomes these shortcomings. By introducing counter-rotating wheels, a timing belt pulley transmission, and a linear actuator, this innovation allows for adjustable launch distances and precise angle control, addressing the deficiencies of the prior art.

1. **Object:**

The primary purpose of the Adjustable Ring Dispenser Mechanism presented in this patent application is to offer a versatile and highly controllable solution for ring launching. The main object is to provide a ring dispenser that allows for adjustable launch distances and precise angle control, ensuring consistent and accurate ring delivery in various applications. Ancillary objectives include enhancing user experience in games and entertainment, improving target accuracy in industrial processes, and enabling customization based on specific requirements. Essential aspects encompass counter-rotating wheels, BLDC motors, a timing belt pulley transmission, a sheet metal plate, a linear actuator, and an external structure. Preferred aspects may include additional safety features and remote control capabilities, further enhancing the mechanism's utility.

1. **Synopsis:**

The Adjustable Ring Dispenser Mechanism is a novel invention designed to revolutionize ring launching systems. This innovation features two counter-rotating wheels, each powered by high RPM BLDC motors through a precise 1:3 timing belt pulley transmission. The mechanism offers adjustable ring launch distances and enables fine control over the angle of shooting, ensuring consistent and precise ring delivery. Supported by a sturdy sheet metal plate and enclosed in a durable 20x20 aluminum extrusion structure, this device offers versatility across applications, from gaming to industrial processes. Its simplicity and adjustability address prior art limitations, making it a valuable addition to the world of ring dispensers..

1. **Brief description of drawings (if any)**

Rendered Images of the mechanism designed is shown below, these are the components used:

1. Linear Actuator
2. Acrylic shooting ramp
3. Pneumatics(200mm Stroke Length)
4. Pushing Block ( 3d print)
5. Shooting Wheel
6. 20x20 Aluminum Extrusion
7. Left Support Plate
8. Bldc Motor
9. Middle Support Plate
10. Right Support Plate
11. GT2 60 teeth Timing Pulley
12. Timing Belt
13. GT2 20 teeth Timing Pulley
14. **Detail description of the invention:**

Counter-Rotating Wheels: The core of the mechanism consists of two counter-rotating wheels, strategically positioned to receive and propel rings. These wheels are designed for optimal friction and durability.

BLDC Motors: High RPM Brushless Direct Current (BLDC) motors are utilized to power the counter-rotating wheels. The BLDC motors ensure rapid and efficient rotation for smooth ring launching.

Timing Belt Pulley Transmission: To compensate for low torque inherent in BLDC motors, a timing belt pulley transmission with a precise 1:3 ratio is integrated. This transmission comprises two GT2 pulleys with 20 and 60 teeth, respectively, ensuring synchronized and powerful wheel rotation.

Sheet Metal Plate: A robust sheet metal plate, constructed in three sections using mild steel, forms the foundation of the mechanism. It provides a stable base for mounting the motors and pulleys, ensuring rigidity during operation.

Linear Actuator: Positioned beneath the sheet metal plate, a linear actuator is employed to control the angle at which rings are launched. This actuator allows for precise adjustments to the shooting angle, catering to various applications.

External Structure: The entire mechanism is encased within an external structure composed of 20x20 aluminum extrusions. This framework offers durability and stability while allowing for easy customization and expansion.

1. **Best method of performance of the invention:**

The Adjustable Ring Dispenser Mechanism is designed for precise and reliable ring launching. The following example outlines the practical working steps of the invention:

Initialization: Ensure that the mechanism is securely set up on a stable surface. Connect the BLDC motors to a power source and the linear actuator to a control unit.

Adjusting Launch Parameters: Depending on the desired ring launch distance and angle, use the control unit to configure the mechanism. The linear actuator allows for fine-tuning of the shooting angle, while the timing belt pulley transmission can be adjusted to set the launching distance.

Loading Rings: Place the rings to be launched into the entry point of the mechanism, ensuring they are properly positioned between the counter-rotating wheels.

Activating the Mechanism: Start the BLDC motors using the control unit. The counter-rotating wheels will begin to rotate in opposite directions, pushing the ring between them.

Launch and Angle Control: As the ring passes between the wheels, the linear actuator simultaneously adjusts the shooting angle. This fine control allows for precise targeting.

Repeat as Needed: Continue the process as required, launching rings with consistent accuracy and adjusting parameters as needed for different scenarios.

Shutdown: After completing the task, deactivate the BLDC motors and power down the mechanism.

This method of operation ensures that the Adjustable Ring Dispenser Mechanism performs optimally, offering users the ability to fine-tune and control the ring launching process according to specific requirements.

1. **CLAIMS:**

**Claim 1:** A ring dispenser mechanism comprising:

* Two counter-rotating wheels designed to rotate in opposite directions.
* High RPM Brushless Direct Current (BLDC) motors connected to the counter-rotating wheels.
* A timing belt pulley transmission with a 1:3 ratio, consisting of two GT2 pulleys with 20 and 60 teeth, respectively.
* A sheet metal plate, composed of three parts made of mild steel, providing support for the motors and pulleys.
* A linear actuator positioned underneath the sheet metal plate for controlling the angle of ring shooting.
* An external structure constructed using 20x20 aluminium extrusions.

**Claim 2:** The ring dispenser mechanism of claim 1, wherein the distance between the counter-rotating wheels is adjustable, facilitating precise control over the launching distance of rings.

**Claim 3:** The ring dispenser mechanism of claim 1, featuring a control unit for adjusting the rotational speed of the BLDC motors, enabling customization of the launching force.

**Claim 4:** The ring dispenser mechanism of claim 1, further comprising safety features, including emergency stop functionality and obstruction sensors, enhancing user safety during operation.

**Claim 5:** The ring dispenser mechanism of claim 1, equipped with remote control capabilities, allowing users to operate and adjust the mechanism from a distance, thereby increasing its utility and adaptability across applications.

1. **Inventive step of your invention:**

The inventive step of the Adjustable Ring Dispenser Mechanism lies in its ability to provide a unique combination of technical advantages over existing ring dispensers. Unlike conventional mechanisms, our invention offers adjustable ring launch distances and precise angle control, ensuring consistent and accurate ring delivery. This innovation significantly enhances user experience in gaming and entertainment, improves target accuracy in industrial processes, and allows for versatile customization based on specific requirements. Moreover, it achieves this without compromising cost-effectiveness. The timing belt pulley transmission and BLDC motors work in synergy, optimizing torque and RPM for efficient ring launching. Additionally, the external structure's aluminum extrusions ensure durability without inflating production costs, making it an inventive solution with a distinct competitive edge.

1. **Industrial application:**
2. **Manufacturing and Quality Control:** This mechanism can be integrated into manufacturing processes to accurately test and inspect products. For instance, it can be used in quality control procedures to assess the durability of products with ring components.
3. **Automated Assembly Lines:** In assembly lines requiring the installation of rings on components, this device can automate the process, ensuring consistency and precision.
4. **Entertainment and Amusement:** In theme parks, arcade games, and entertainment centers, the mechanism can be employed for ring-toss games, enhancing user engagement and enjoyment.
5. **Training and Simulation:** The precise control over ring launching distance and angle makes this mechanism suitable for training simulations in various industries, such as military, aviation, and sports.
6. **Material Handling:** It can be used for controlled delivery and sorting of materials in industrial environments
7. **Abstract:**

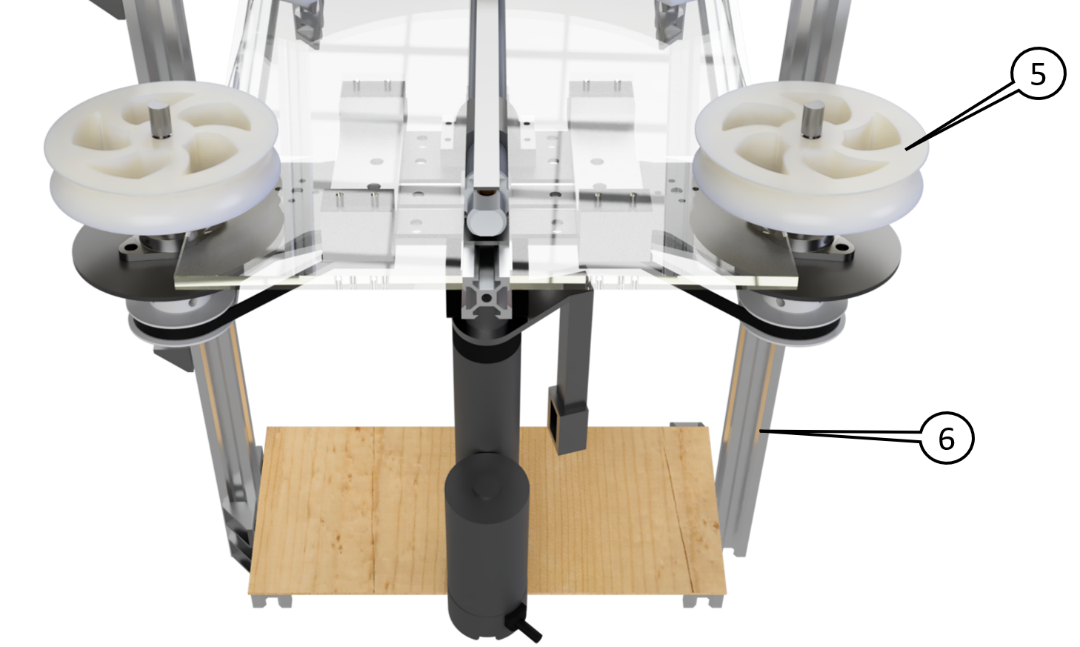
The Adjustable Ring Dispenser Mechanism is an innovative device designed to revolutionize ring launching systems. Comprising counter-rotating wheels driven by high RPM BLDC motors through a 1:3 timing belt pulley transmission, this invention offers adjustable ring launch distances and precise angle control, ensuring consistent and accurate ring delivery across a wide range of applications. Supported by a robust sheet metal plate and enclosed within a durable 20x20 aluminum extrusion structure, this mechanism combines versatility, adjustability, and durability to address the limitations of prior art ring dispensers, making it a valuable addition to the field.

1. **Drawings:**

A machine with a white surface

Description automatically generated with medium confidence

A close-up of a machine

Description automatically generatedA close-up of a machine

Description automatically generated