



Building a Lifting Arm Team 35 Cranbrook Schools Bloomfield Hills, MI

Introduction

- We're going to show you how to build a lifting arm using a pivot mechanism
- Basic design that has many uses
- For example, it can be used to score a lot sacks for this season's game, Sack Attack









Advantages of a Lifting Arm

- Very Simple
- Reliable
- Fast and Powerful
- Customizable to fit a variety of needs







Building a Lifting Arm

- 1. Determine the pivot point
- 2. Design a good structure
- 3. Select a gear ratio
- 4. Build from the top down

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1.Determine the Pivot Point

- Select the height the game requires
- Position it for good balance
- We like to put it even or forward of the rear axle

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2.Design a Good Structure

- Starts with a solid foundation that ties into the base
- We're building a 2 tower, 4 post design with 2 motors
 - Keep posts close to minimize axle bending
 - Allow enough room for moving parts
- Plan to add reinforcements after the lift is built



3.Select a Gear Ratio

- Gear ratio should be a balance of power and speed
- Using a 15:1 for this example

$\frac{60T}{12T} \times \frac{36T}{12T} = 15:1$





4.Build From the Top Down

- 1. Arm Assembly
- 2. Gearing
- 3. Motors
- Make sure
 - Axles attached to motor
 - Collars keep parts in place







Summary

- Shown how to build a lifting arm using a pivot mechanism
- Pivot design is reliable and has many uses
- Best of luck with Sack Attack and all your projects!





Lifting Arm Parts List

| #Needed | Description _ |
|---------|--------------------------|
| ▶ 4 | chassis rail (for posts) |
| ▶ 2 | chassis rail (for arms) |
| ▶ 2 | motors |
| ▶ 2 | 60T gears |
| ▶ 2 | 36T gears |
| ▶ 4 | 12T metal gears |
| ▶ 6 | axles |
| ▶ 12 | collars |
| ▶ 8 | bearings |
| ▶ 12 | plastic rivets |
| ▶ 8 | spacers |

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