
SMART
PHARMACY
SYSTEM
Faculty of Computer and Information Sciences
1995

# *Supervisors*

- **Prof. Randa Abo Elfatoh**
- **TA. Fatma gamal**


**Computer Systems Department**

# Team [8] Members

**Abdullah Waleed Saied**

**Mohamed Ahmed Mohamed Zakaria**

**Omar Mohamed Salah**

**Omar Shreif Elsayed**

**Sohayla Saied Hassan Shedeed**

**Zeyad Atef Shokry**

# Agenda

- Problem Statement
- Introduction
- Objectives
- Related Work & Applications
- System Architecture
- Solution
- Tools
- Phase Description & Time plan
- Common Questions
- References

# ❖ Introduction

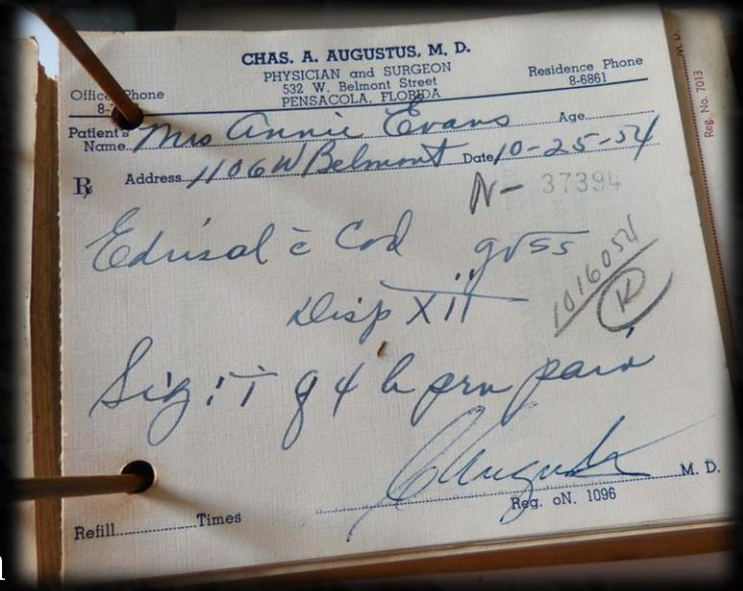
Pharmacy automation has existed since the 1960’s, and pharmacy automation includes: (Dispensing Robots, Prescription Reordering Apps, Electronic CD Registers,…) and pharmacy automation was classified in 5 Levels, and The best place to automate your pharmacy is wherever you and your team are spending the most time.

## ❖ What does automating mean for a pharmacy?

Automating in a pharmacy isn’t just about robots taking over. It means taking repetitive tasks and devising a way to achieve the same outcome without human input. In the industrial age, that meant human redundancies. In pharmacy, that means the staff trained for patient care are now released from the shackles of these administrative tasks. Rather than redundant, they’re released for valuable tasks instead of functional tasks.

# ❖ Problem Statement

The complex handwriting of doctors in prescriptions can lead to errors and misinterpretation during medication administration. This increases the risk of incorrect dosages and wrong medications.




- Doctors' sloppy handwriting kills more than **7,000** people annually.
- according to a July **2006** report from the National Academies of Science's Institute of Medicine (IOM), preventable medication mistakes also injure more than **1.5** million Americans annually.
- illegible writing on some of the **3.2** billion prescriptions written in the U.S. every year.

**[Cause of Death: Sloppy Doctors]**
**By Jeremy Caplan Monday, Jan. 15, 2007**

## ❖ Objectives

All processes are automated, and prescription is electronically transmitted through a desktop application, and this will be effective in two perspectives:

- Make the prescription easy and effective to understand and avoid mistakes.
- Speeding up the process of purchasing medicines and facilitating them and Avoid the crowd of waiting.

# ❖Related Works & Applications

# Initiation of the First Smart Pharmacy

- The first smart pharmacy was launched in Dubai in 2017. The pharmacy uses a robotic dispensing system that can fill prescriptions in as little as 15 seconds. The system is also able to track the inventory of medication and alert the staff when it is low.


# Smart Pharmacy Systems: A Comparative Overview

## Al Zahra Hospital Pharmacy, Dubai

- Efficiency: Rapid prescription filling (15 seconds)
- Inventory Management: Real-time tracking to prevent shortages
- Outcomes: Reduced medication errors by 50%, 20% improvement in safety, 15% increased satisfaction

## King Faisal Specialist Hospital and Research Center Pharmacy, Saudi Arabia

- Comprehensive Approach: Robotic dispensing, adherence, patient monitoring
- Results: 20% error reduction, 5% improved safety, 10% adherence, 3% fewer readmissions

## Hamad Medical Corporation Pharmacy, Qatar

- Holistic System: Robotic dispensing, tracking, patient education
- Improvements: 30% fewer errors, 10% better safety, 5% enhanced adherence

## Cleveland Clinic Abu Dhabi Pharmacy, UAE

- Integrated System: Robotic dispensing, tracking, patient education
- Achievements: 10% fewer errors, 3% enhanced safety, 8% increased satisfaction

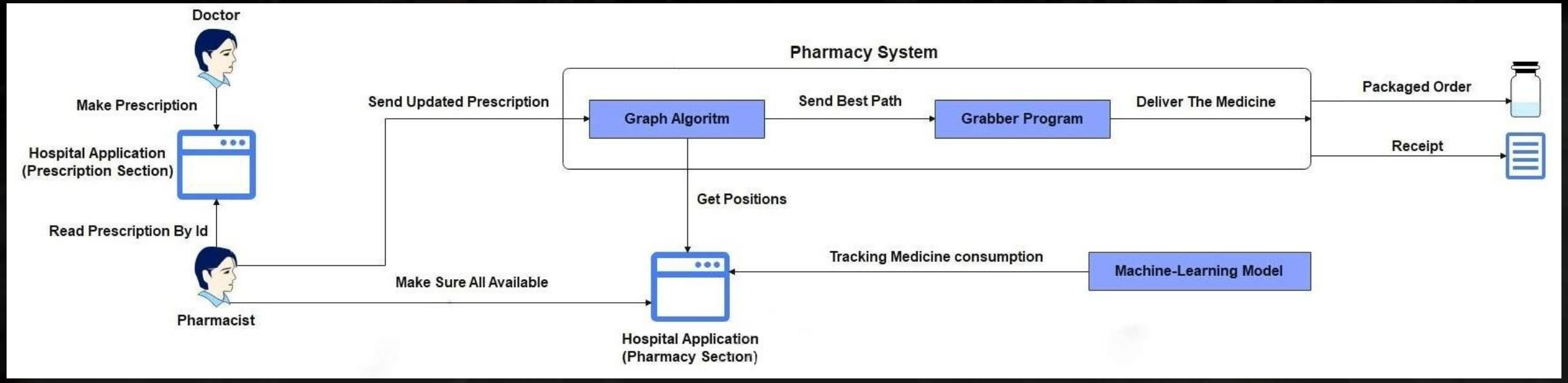
# Implementation and Impact

- The implementation of smart pharmacy technology has had a number of positive impacts on patient care. Studies have shown that smart pharmacies can reduce medication errors by up to 50%. They can also improve patient adherence to medication regimens, which can lead to better health outcomes.

## Statistics:

- Smart pharmacies can reduce medication errors by up to 50%.
- Smart pharmacies can improve patient adherence to medication regimens by up to 20%.
- 90% of patients reported increased convenience with smart pharmacy services.
- 95% of patients were satisfied with the speed and accuracy of the service.

# ❖ System Architecture [Phase diagram]



# ❖ Possible Techniques

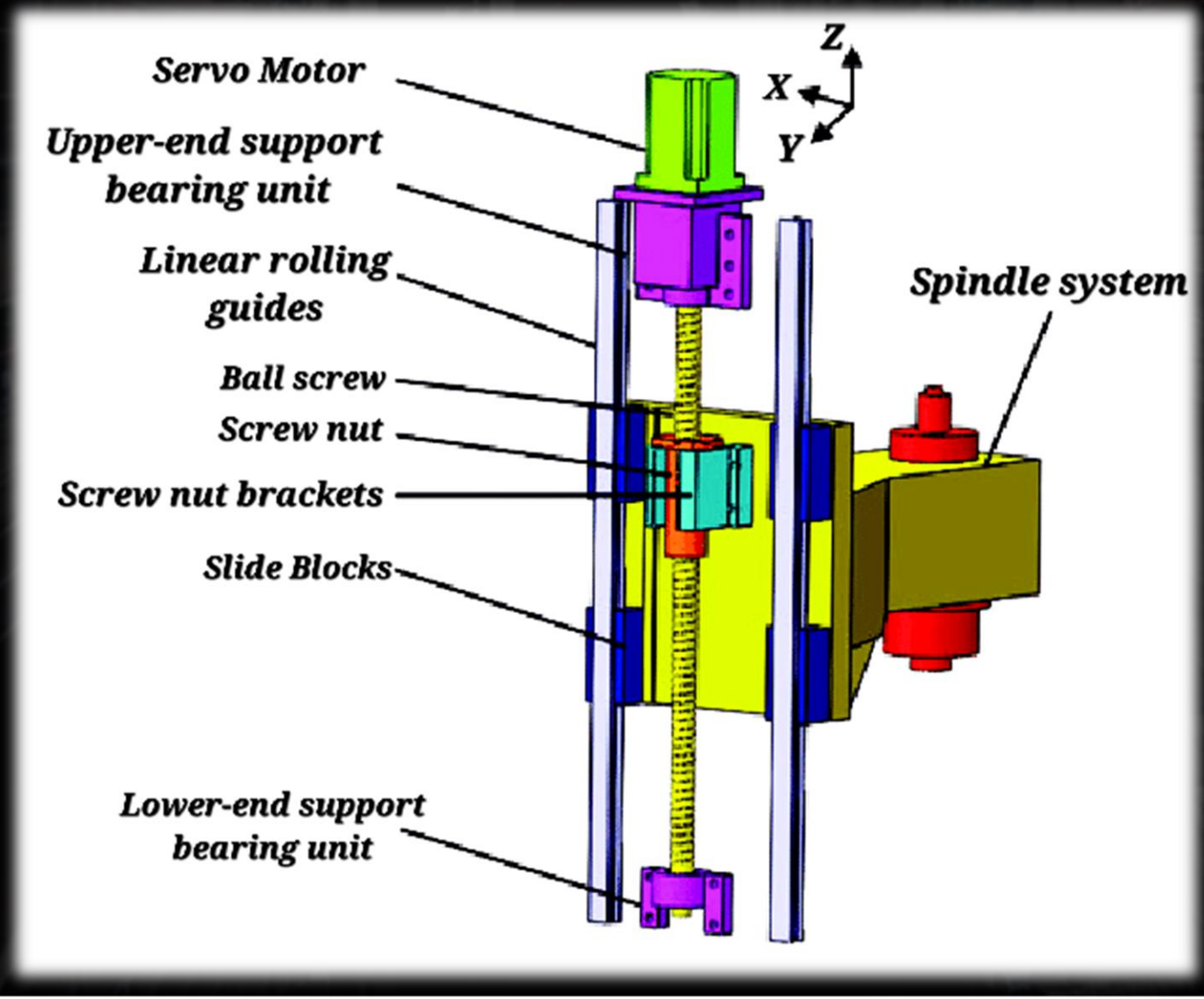
## ❖ Software

1. Desktop Application
2. Database Management
3. IoT Inventory Tracking
4. Predictive Consumption Modeling
5. Embedded Software

## ❖ Hardware

1. Ball Screw Slider
2. Belt Driven Slider
3. Gripper With Worm Gears.
4. Robot Servo Motor Gripper.

# ❖ Solution [Hardware]

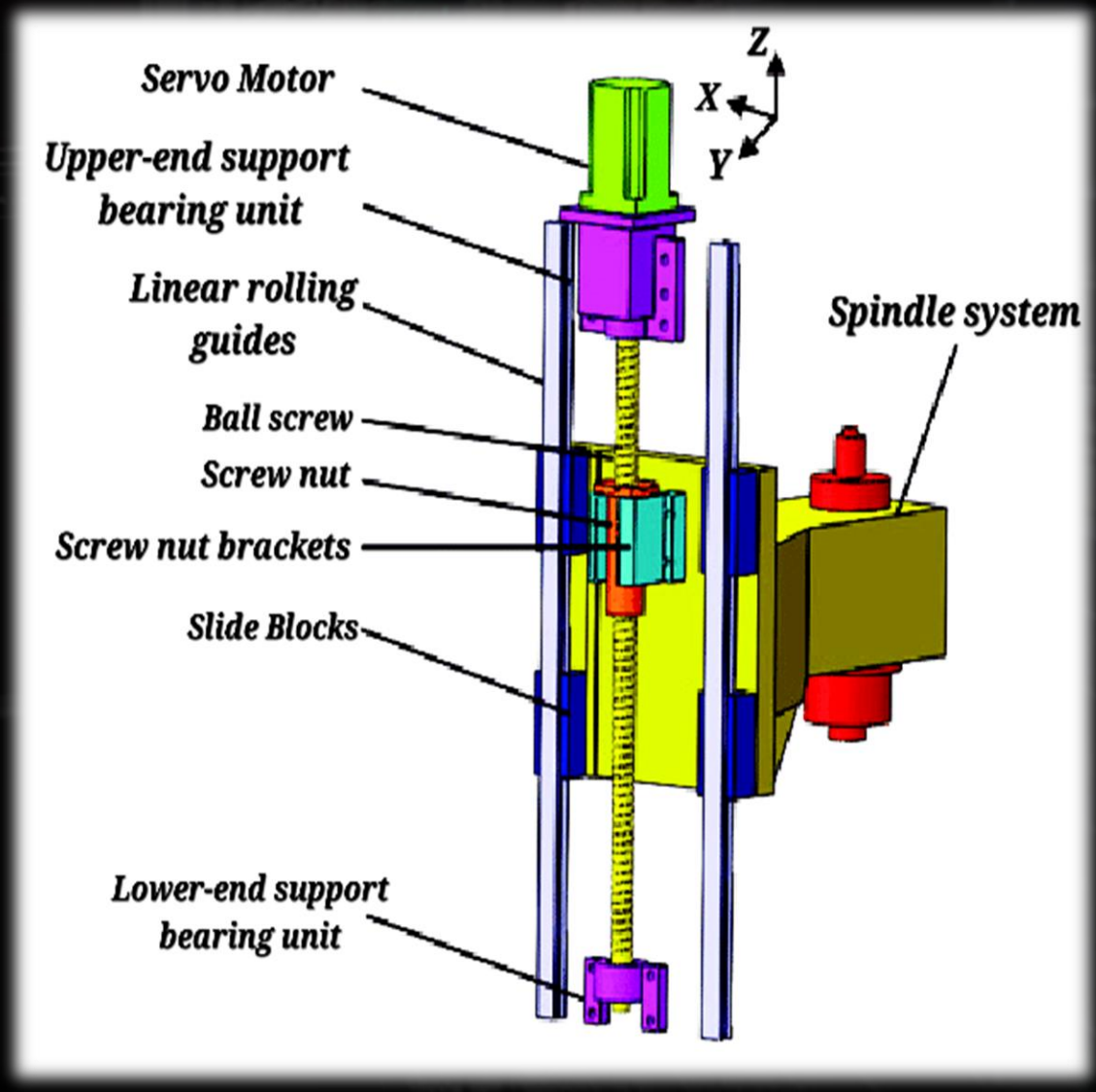


# ❖ Solution [Hardware]

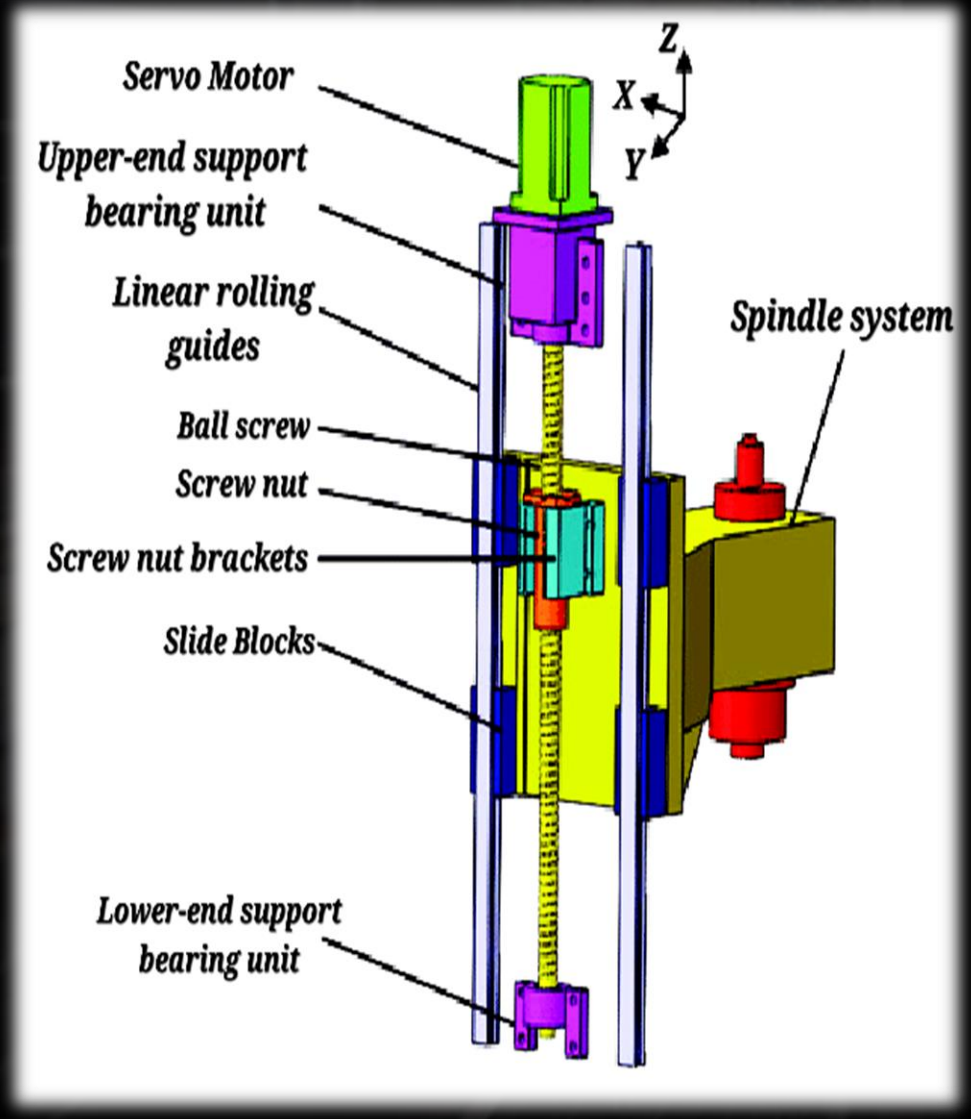
## Ball Screw Slider

**Advantages :**

- High efficiency, exceeding 90%.
- Excellent precision and accuracy for precise linear motion control.
- High load capacity, capable of handling heavy loads.
- Long service life due to reduced wear and tear.
- ball screw slider are often seen as safer than belt drives for carrying vertical loads.



# ❖ Solution [Hardware]

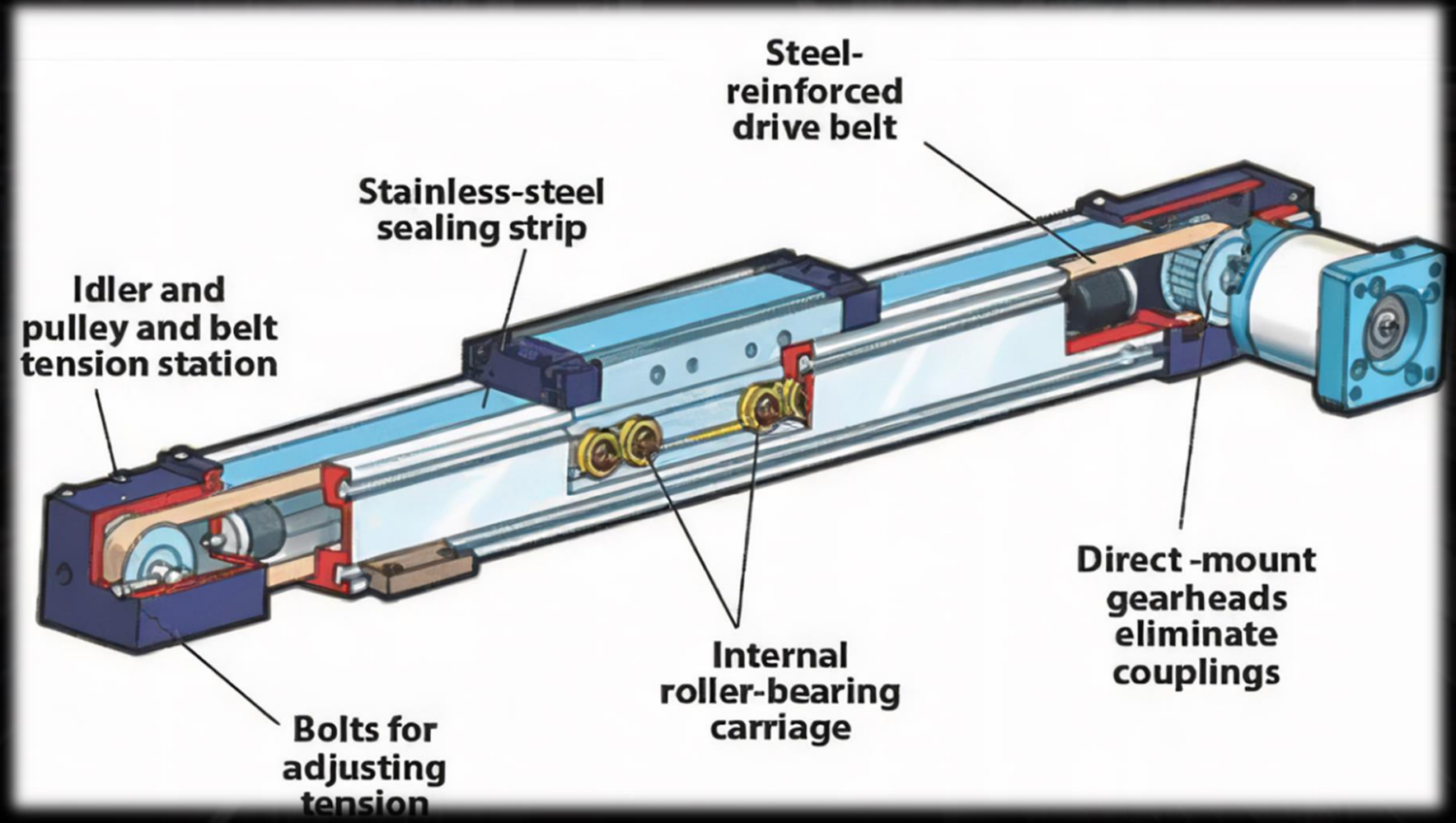



**Ball Screw Slider**

**Disadvantages:**

- Higher cost compared to other linear motion systems.
- Requires periodic maintenance and lubrication.
- Limited speed capabilities, not suitable for high-speed applications.
- Sensitivity to misalignment, requiring proper alignment and regular checks.

# ❖ Solution [Hardware]

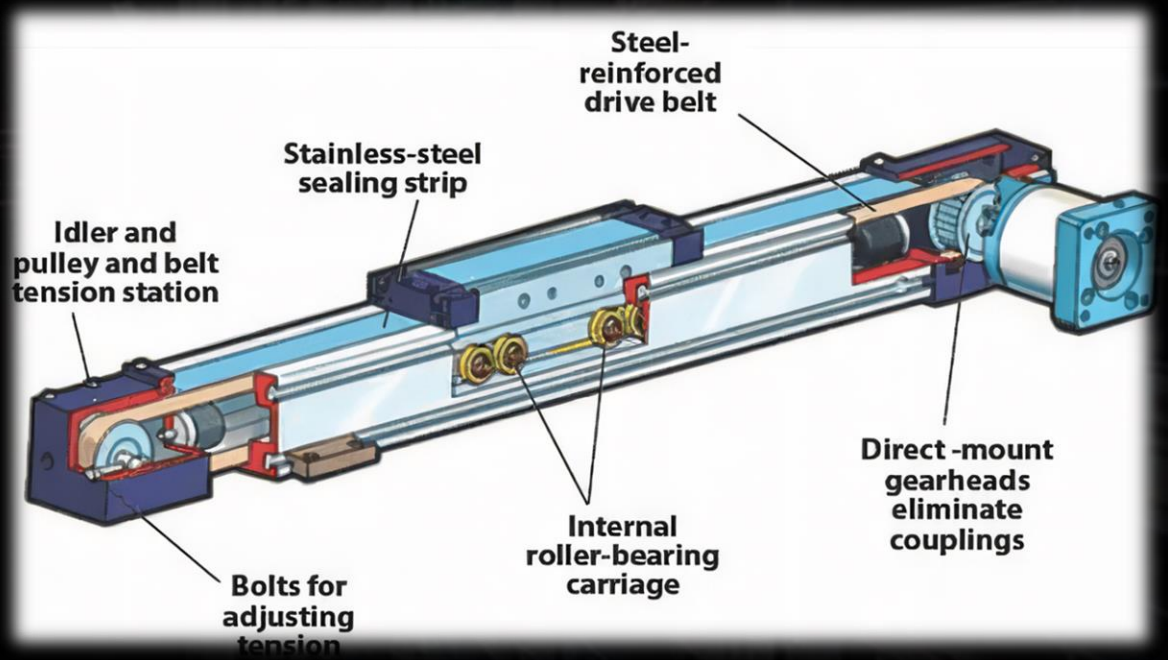


# ❖ Solution [Hardware]

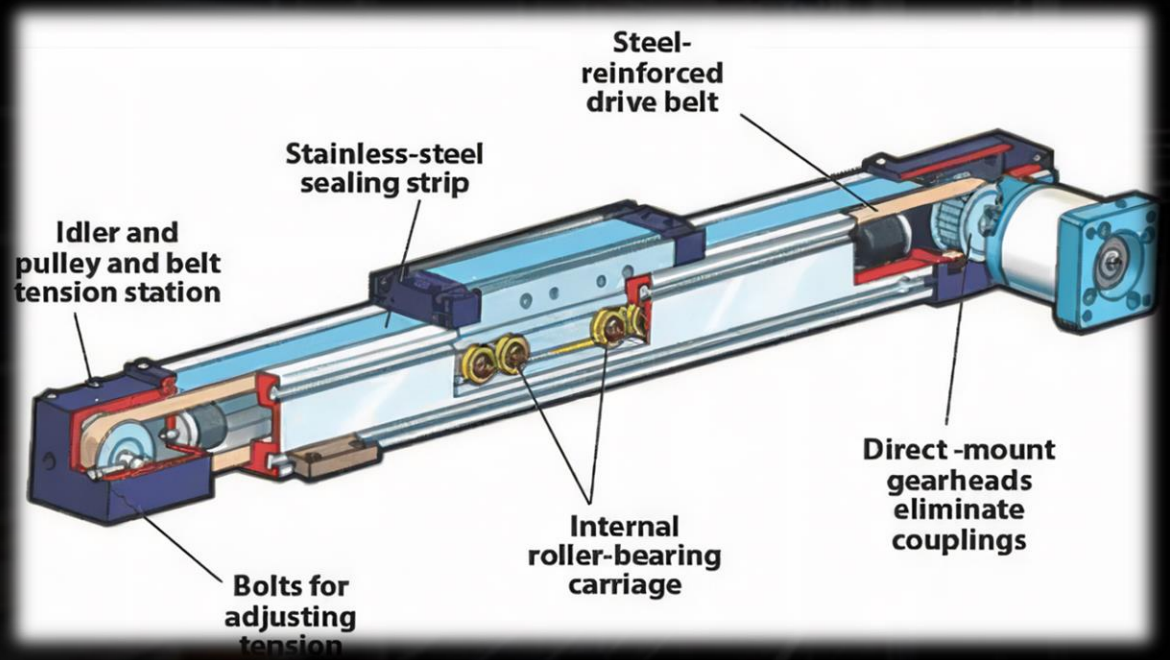
## Belt Driven Slider

**Advantages:**

- Cost-effective compared to other linear motion systems.
- Well-suited for high-speed applications.
- Low maintenance requirements.
- Quieter operation compared to systems with direct contact.



# ❖ Solution [Hardware]




**Belt Driven Slider**

**Disadvantages:**

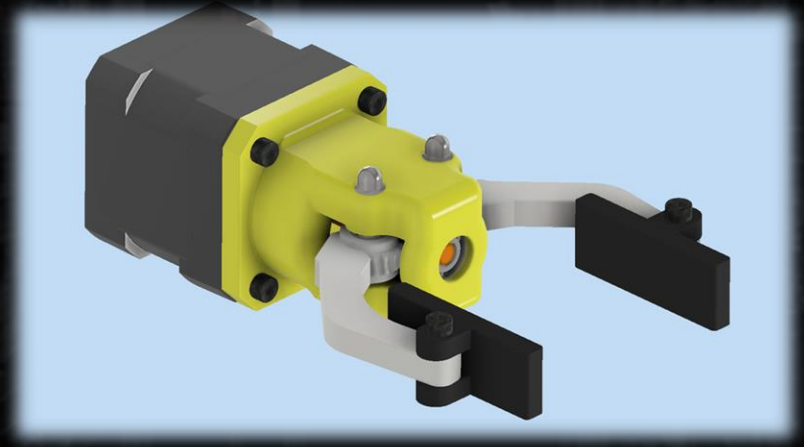
- Lower precision and accuracy compared to other systems.
- Occasional belt maintenance or replacement may be required.

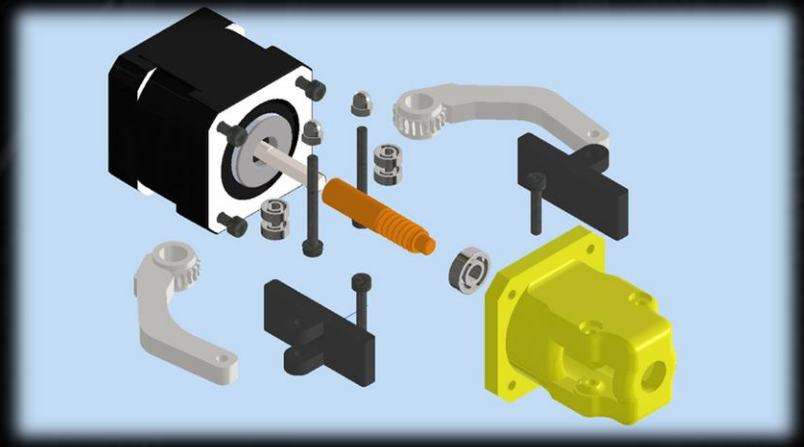
# ❖ Solution [Hardware]

- Ball Screw Slider VS Belt Driven Slider

| Comparison of Ball Screw and Belt Drive Actuators | | | | | |
|---|---|---|---|---|---|
| | Performance | | | | |
| | Stroke Length | Speed | Accuracy | Vertical Mounting | Maintenance |
| Ball Screw Drive | + | + | ++ | ++ | + |
| Belt Drive | ++ | ++ | + | + | ++ |

# ❖ Solution [Hardware]



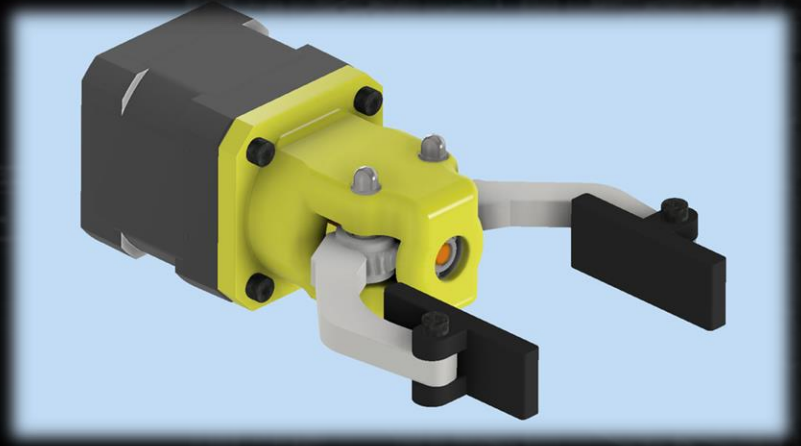


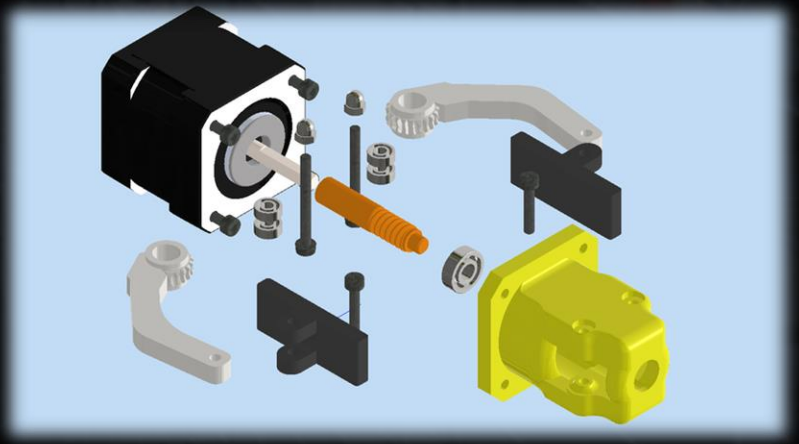
# ❖ Solution [Hardware]

## Gripper With Worm Gears

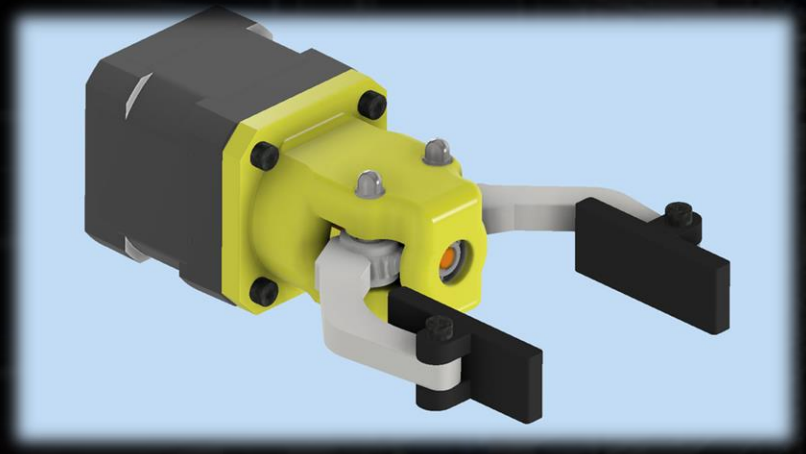
**Advantages**:

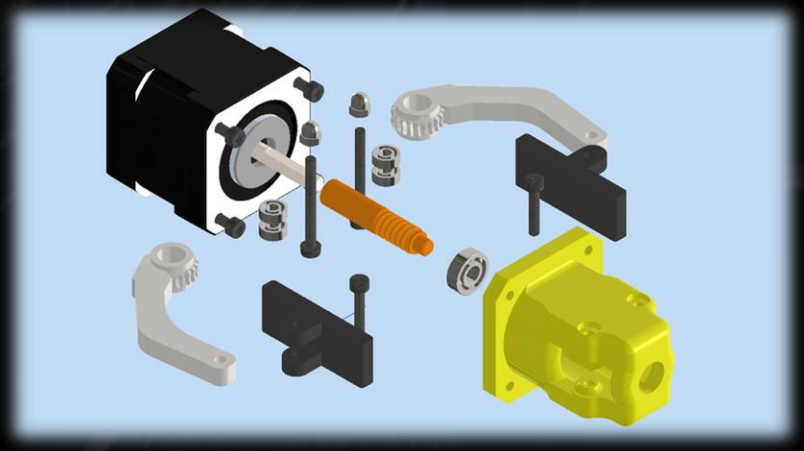
- High Torque and Precision.
- Self-Locking Feature.
- Compact Design.
- Reduced Backlash.
- High Efficiency.





# ❖ Solution [Hardware]



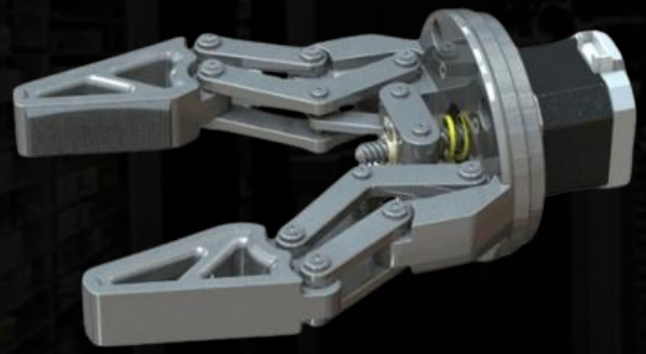


**Gripper With Worm Gears**

**Disadvantages:**

- Limited Speed.
- Efficiency Variability.
- Back-Driving Difficulty.
- Higher Friction.

# ❖ Solution [Hardware]

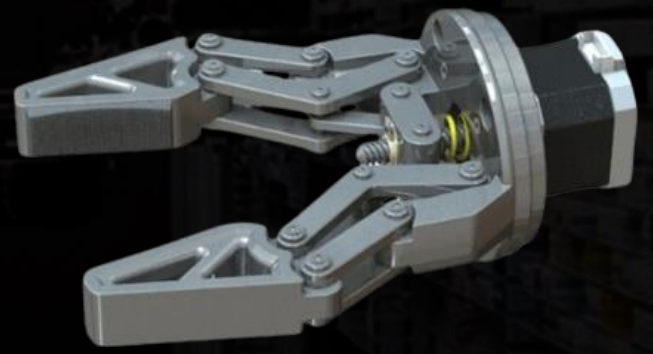


# ❖ Solution [Hardware]

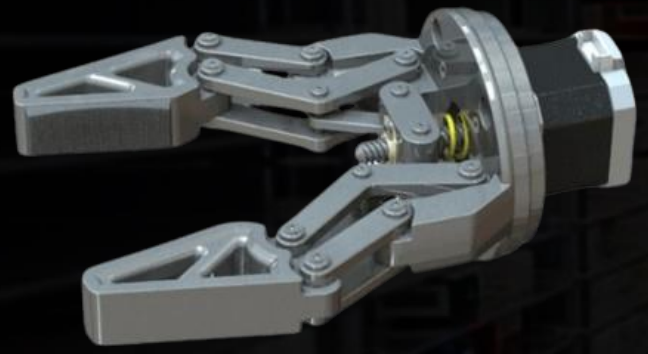
**Servo Motor Gripper**

**Advantages**:

- Precision Control.
- Variable Speeds.
- Programmability.
- Back-Driving Capability.
- High Torque.



# ❖ Solution [Hardware]



**Servo Motor Gripper**

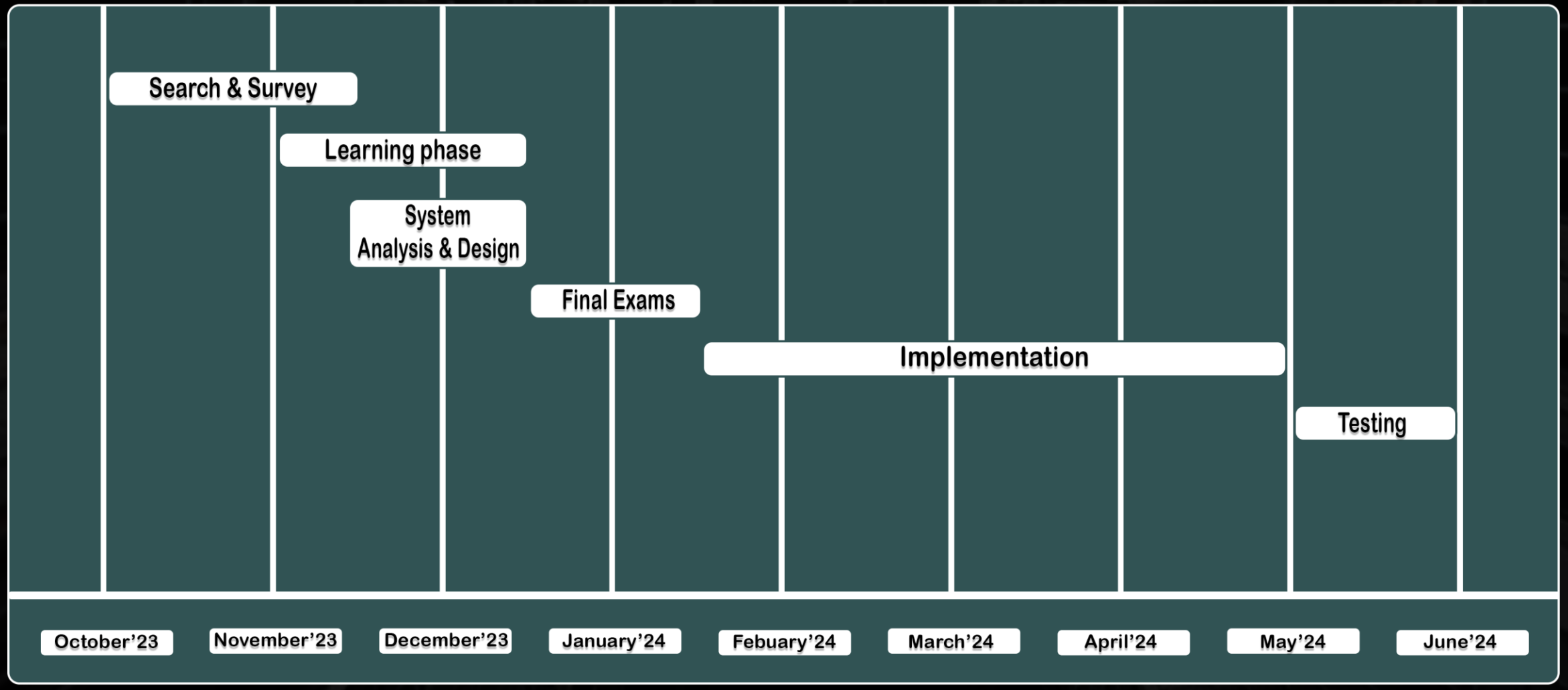
**Disadvantages**:

- Complexity.
- Cost.
- Power Consumption.
- Size and Weight.

# ❖ Tools




# ❖ Time plan


Search & Survey
Learning phase
System Analysis & Design
Final Exams
Implementation
Testing
October'23
November'23
December'23
January'24
Febuary'24
March'24
April'24
May'24
June'24

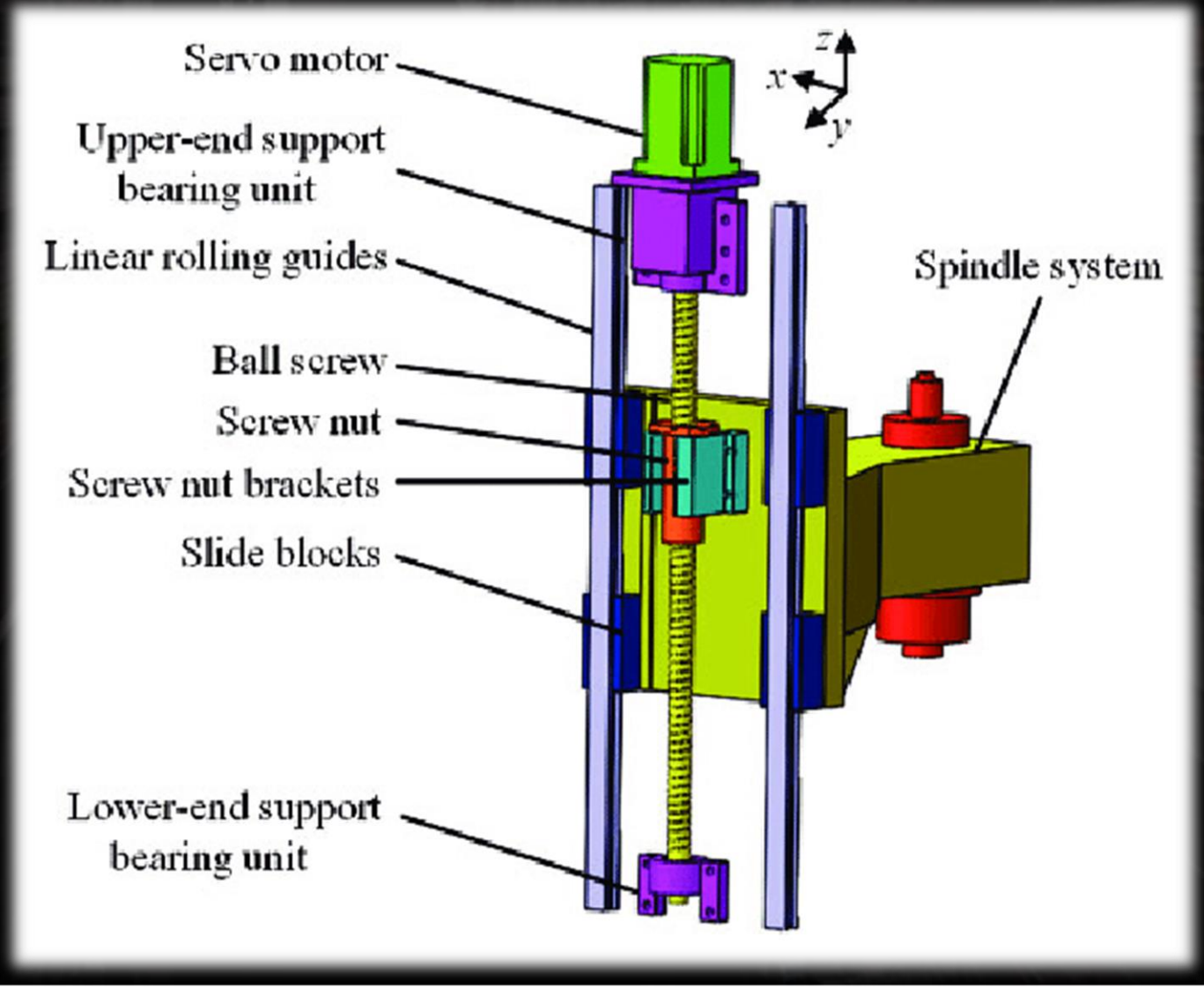

❖Common Questions

## ❖ Does automating mean fewer employees in the pharmacy?

No. Automations typically means your staff can spend more time on value-adding tasks that can’t be automated, such as customer service and patient care.

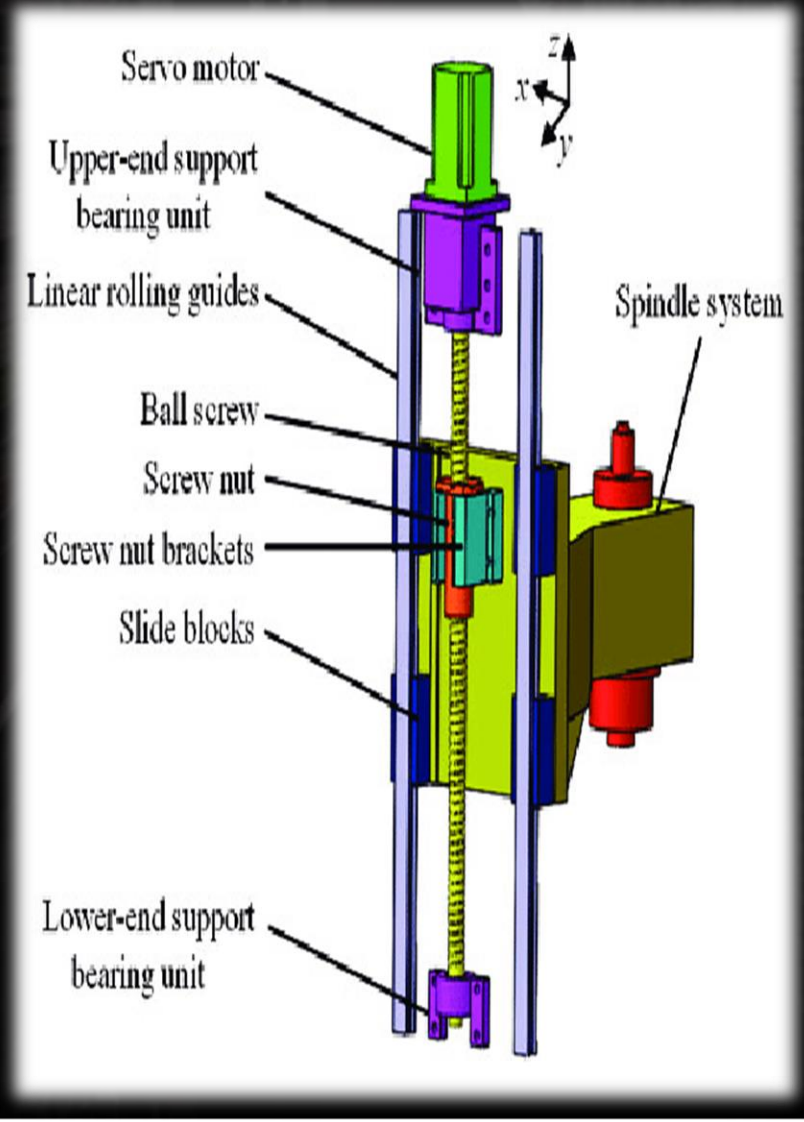
# ❖ Possible Techniques [Hardware]

## Ball Screw Slider



# ❖ Possible Techniques [Hardware]

## Ball Screw Slider




**Advantages :**

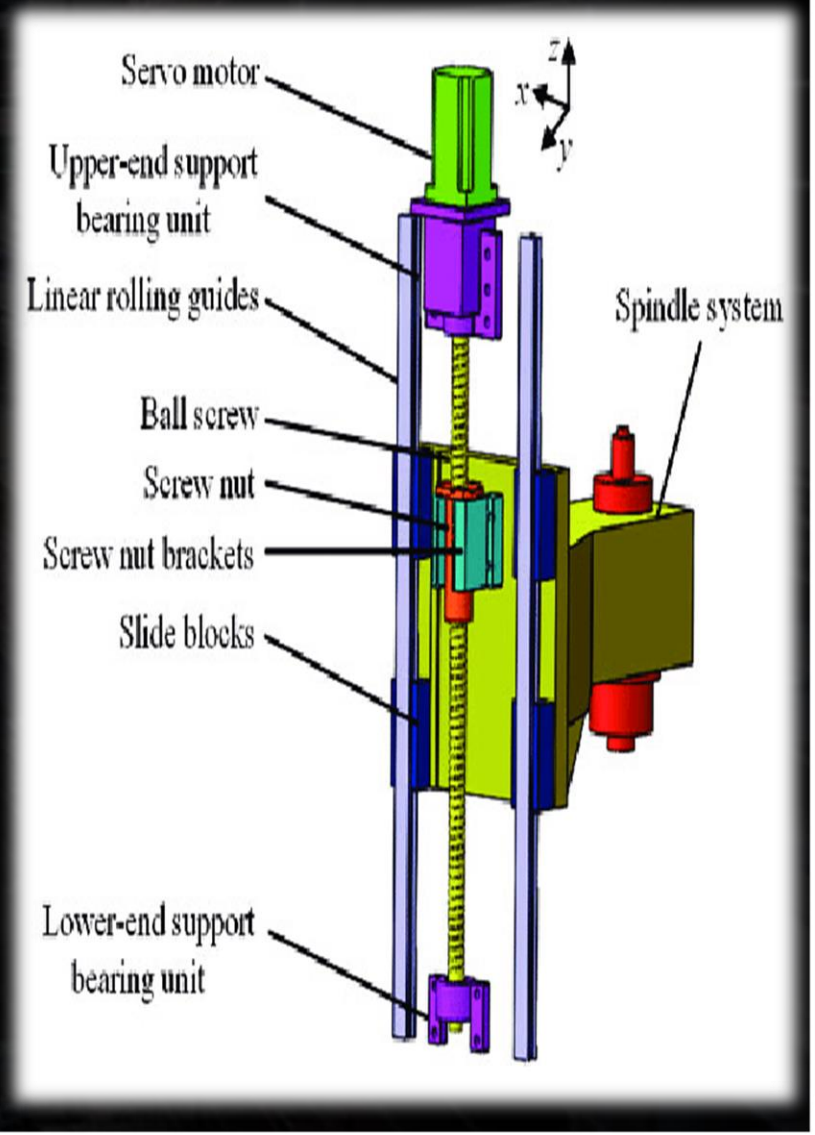
- High efficiency, exceeding 90%.
- Excellent precision and accuracy for precise linear motion control.
- High load capacity, capable of handling heavy loads.
- Long service life due to reduced wear and tear.
- ball screw slider are often seen as safer than belt drives for carrying vertical loads.

# ❖ Possible Techniques [Hardware]

## Ball Screw Slider

**Disadvantages:**

- Higher cost compared to other linear motion systems.
- Requires periodic maintenance and lubrication.
- Limited speed capabilities, not suitable for high-speed applications.
- Sensitivity to misalignment, requiring proper alignment and regular checks.



# ❖ Possible Techniques [Hardware]

Belt Driven Slider