Intelligent Inventory Management System

TEAM: 02

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Introduction

Our Intelligent Inventory Management System offers a revolutionary solution for inventory tracking through NFC-based automation, enhanced with a robotic arm and weight sensors. By reducing manual labor, improving stock visibility, and enhancing accuracy, the system guarantees efficiency and cost reduction. offering end-to-end automated inventory solutions, empowering companies to streamline operations, minimize errors, and achieve sustainable growth

Problem Statement

Manual item handling often leads to inefficiencies, errors, and increased labor costs. Update the stock once every three month and every year with an average time of 3-5 days
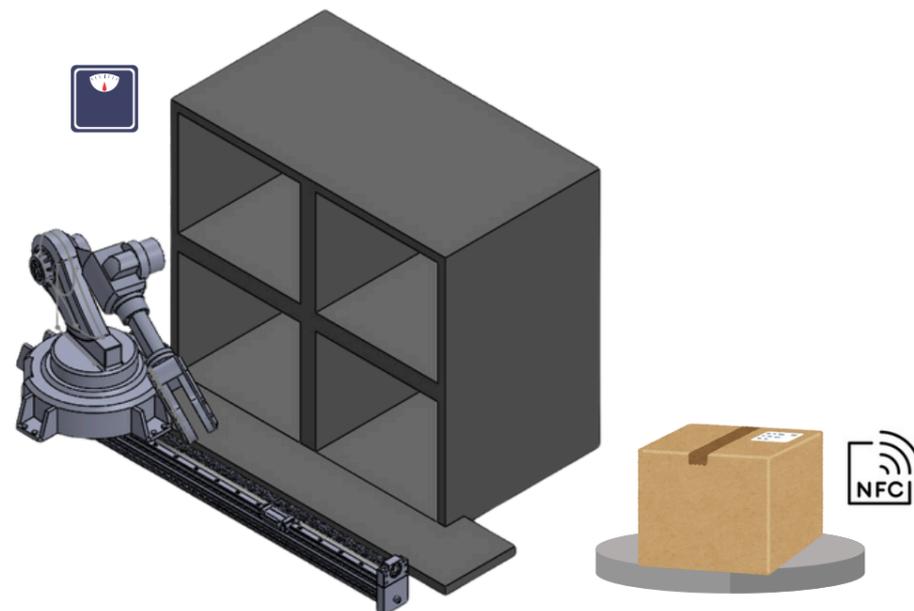
Target Specifications

- Weight sensor accuracy: ±0.1 kg
- Robotic arm accuracy: 95%
- Dashboard refresh rate: < 5 minutes
- NFC range: < 5 cm
- Load capacity: Robotic arm capable of lifting 3 kg

Constraints

- Budget: ≤ 6,000 SAR.
- Timeline: Completion within 4 months

Prototype Design

Our idea combines three technologies: an NFC-enabled stage for real-time product tracking, a robotic arm for efficient item handling, and smart shelves with sensors for real-time inventory control and optimal storage conditions.

IIMS Flow Chart

Rail system

Testing / Validation

- Weight Sensors: Tested using a Measurement of the weight sensor resistances to ensure accuracy within ±0.1 kg.
- Robotic Arm Accuracy: Measured positional errors and calculated average accuracy.
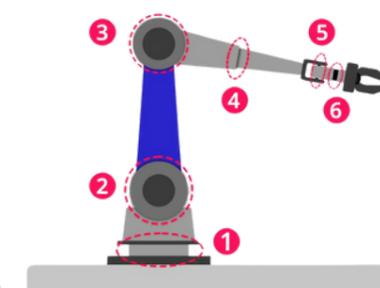- NFC System: Verified the range between NFC tags and the reader
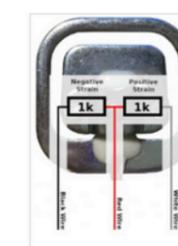
Weight Sensor's Impedance Diagram

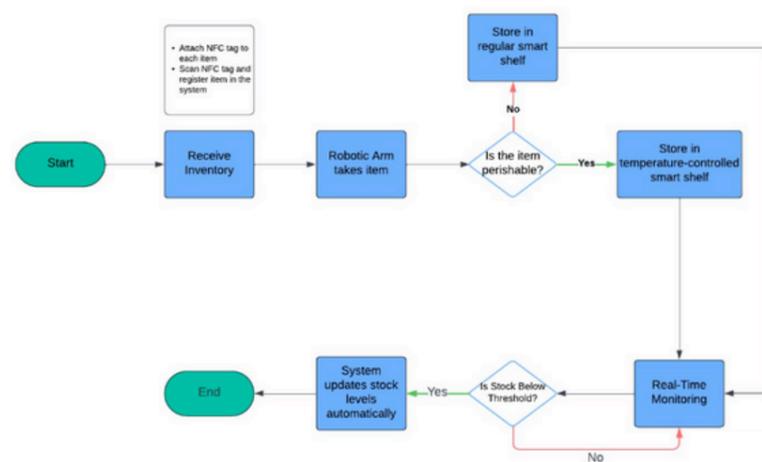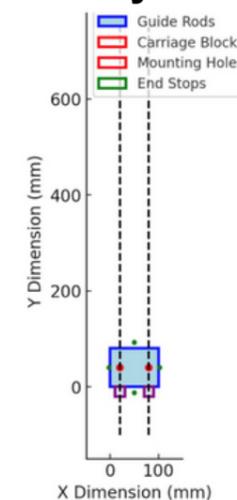Weight Sensor's Impedance Test

kinematics

Kinematics studies motion without forces, focusing on a robotic arm's positions and movements. In our project, we used calculation of angles for each motor at each position.

Conclusions

The prototype successfully achieved several key specifications, including weight sensor accuracy. However, the robotic arm accuracy fell short. Future iterations will focus on refining the robotic arm's kinematics and improving its power supply to enhance precision. Overall, the project demonstrates feasibility and within the specified budget and timeline