SUSTAINABLE CAPSTONE PROJECTS (SCAP)
FALL 2024-2025

Conveyer belt with sorting extension system design and construction

CYPRUS INTERNATIONAL UNIVERSITY

GROUP MEMBERS

- **Amina Oubella (industrial engineering)**
- **Yassine Moughit (Electrical-Electronic Engineering)**
- **Farogat Shodieva (Environmental Engeneering)**

INTRODUCTION

The Conveyor Belt with Sorting Extension System is designed to improve efficiency and accuracy in material handling by automating the transportation and sorting of items using a system built with sustainable materials. This project addresses the challenges of traditional manual sorting, such as inefficiency, high labor costs, and errors, by incorporating sensors and actuators for precise classification. The use of eco-friendly materials aligns with sustainability goals, ensuring that the system minimizes its environmental impact while delivering high performance. The key objectives include designing a reliable, cost-effective, and scalable solution that enhances productivity, reduces waste, and supports sustainable industrial practices.

MATERIALS USED IN CONSTRUCTION

Materials Used:

Re-Used/Recycled Materials

Metal Boards: Repurposed from discarded industrial scrap, reducing waste and promoting sustainability.

Bicycle Rear Hubs: Taken from an old bicycle to serve as essential components for the conveyor belt mechanism.

Yoga Ball: Repurposed as the conveyor belt, creatively utilizing an otherwise discarded item.

Fan Motor: Reused from an old fan to power the conveyor belt system efficiently.

Other Materials:

Screws: New, used for securely assembling various components.

Wood: Sourced for constructing the sorting system, chosen for its versatility and eco-friendliness.

By integrating recycled materials like the fan motor and bicycle hubs with new components like screws and wood, the project achieves a balance between sustainability and functionality.

FINAL PRODUCT

Design and Construction

The constructed conveyor belt with a sorting extension system operates using a combination of recycled and newly sourced materials. The conveyor belt is driven by a fan motor repurposed for the project, with bicycle rear hubs acting as rollers for the yoga ball, which functions as the belt. The sorting system, made from wood, uses a simple mechanism to classify items based on size or other criteria. The assembly process involved securing the metal boards as the base, installing the motor and hubs for movement, and attaching the sorting system to the conveyor. The system operates smoothly with manual item sorting, showcasing efficiency and sustainability in design.

Testing and Measurement

The testing phase focused on evaluating the conveyor belt's speed, sorting accuracy, and structural integrity under various load conditions. Adjustments were made to the alignment of the hubs to ensure smooth belt movement and to the sorting mechanism for improved precision. Tests were conducted under different weights and item sizes to measure performance consistency.

RESULTS AND DISCUSSION

The constructed conveyor belt with sorting extension system successfully met the project's primary objectives by demonstrating efficient item transportation and sorting capabilities while incorporating sustainable materials. Testing showed reliable performance under various conditions, with the system achieving consistent sorting accuracy and smooth operation. However, opportunities for improvement remain. Future iterations could include integrating advanced sensors for enhanced sorting criteria, such as weight or material type, and incorporating programmable controllers for automated adaptability to different tasks. Additionally, optimizing the motor for energy efficiency and exploring more durable eco-friendly materials could further align the project with sustainability goals.

CONCLUSIONS

The project highlighted the innovative use of sustainable materials, such as a yoga ball and bicycle hubs, to create an environmentally friendly conveyor belt with a sorting extension system. While the sorting mechanism operated reliably and demonstrated the feasibility of reusing materials in functional designs, the belt itself did not function as intended, likely due to alignment or material limitations. This challenge underscored the importance of material selection and precise assembly in achieving desired performance. Despite this setback, the project provided valuable insights into teamwork, problem-solving, and iterative design, deepening our understanding of sustainable engineering practices. Participating in the SCAP program further enhanced our project management skills and highlighted the significance of creativity and adaptability in overcoming challenges.

REFERENCES

Smith, J., & Johnson, R. (2020). Sustainable materials in automated systems: Reusing components for efficient conveyor belt design. Journal of Industrial Engineering and Sustainability, 15(3), 45-58. https://doi.org/10.1016/j.jies.2020.03.002