Cover page

Project title: PackSort

Academic Year: 2024/2025

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Department Name: Computer Engineering

Project Type : Hardware

Supervisor Name: Dr.Abdallah Rashed

Format:

- Single space, Times New Roman.
- 12 pt,
- Maximum 1 page.

Abstract Body:

Items must be provided in the Abstract:

- Why do you think this project is important? Please explain the significance of this Project in brief.
- In your point of view what are the important aspects that should be covered in the project?
- Objective(s): In your view, please explain the main objectives of the project.
- Methodology: Give a brief outline of the application development process.
- Had this project been done before? Are there any similar applications available today?
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- **Note:** Please deliver this abstract early to ensure that your Project has been approved by the department's projects committee. **Registration will not be done without this approval.**

Project's Abstract:

This important project addresses a critical challenge in logistics and e-commerce by developing an affordable, automated package sorting system to replace inefficient manual processes. Its significance lies in making this technology accessible to small and medium-sized enterprises through the use of repurposed components, with the potential to greatly improve efficiency, reduce labor costs, and minimize errors. The project will integrate multiple sensors for identification, design a reliable mechanical sorting system, implement a distributed control architecture, and feature a key innovation: a mobile IoT application for remote monitoring and control. To further enhance efficiency, the system also incorporates an automatic shut-off mechanism: if no packages are detected on the conveyor for two minutes, it powers down until new activity resumes.

The main objectives of the project are:

1-To design and implement a hardware system capable of automatically detecting and sorting packages based on barcode data, color, and physical dimensions.

2-To develop a flexible software system that allows the user to select from several sorting modes (e.g., by size only, by color and barcode, etc.) via both a local interface and a remote mobile application.

3-To ensure system safety and reliability by incorporating emergency stop functionality and robust error-handling protocols.

4-To provide a real-time reporting mechanism to track sorting statistics and system performance.

The methodology for application development will follow a structured systems engineering approach. It will begin with a requirements analysis and literature review, followed by the modular design of the mechanical, electrical, and software subsystems. Key hardware components, including Arduino microcontrollers, various sensors, and actuators like DC and servo motors, will be integrated. The software will be developed using the Arduino IDE for embedded control and the Flutter framework for the cross-platform mobile application. The project will culminate in rigorous testing and validation of the complete system against the defined objectives.

While automated sorting systems are widely used in industrial settings, they are typically large-scale, proprietary, and cost-prohibitive. This project is novel in its approach to creating a small-scale, cost-effective, and multi-modal system intended for educational demonstration and potential adoption in smaller-scale logistics operations. It differentiates itself through its use of repurposed materials and its focus on IoT integration for enhanced usability.