Hilfskraft Roboter

Groups 7 & 15
Rahil Shah 09005011
Namit Rawal 09005014
Pallav Dhobley 09005012
Aditya Gupta 09005017

The Idea

- Imagine a busy departmental clothing store; say a Westside or a Lifestyle.
- There exist a lot of discarded clothes outside the changing room.
- **It is this problem that we want to address!**
- Instead of making an employee sort these clothes and put them back in the correct racks, we envision a future where the entire process is automated!

The Idea - Generalized

- This particular process can be a generalized to a simple sorting and delivering mechanism.
- Although we have used a departmental store as an example the same system can be used in garbage sorting and disposal, at factories and at many other places.
- **Thus we are attempting to automate the generic problem of sorting and transporting.**

Basic Description

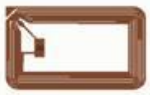
- There will be a robotic arm which will sort the items from the dump box and put them into various baskets, depending on which section the item has to be returned too.
- When a basket contains the required number of items, the delivery robot will pick up the basket and return it to the correct section of the store.
- Path planning needs to be done to optimize the path and prevent collisions between robots.
- This entire process being an “intelligent one” needs to be coordinated using a device like a laptop

Diagram for Product Functionality:

Sorting Arm

Coordinator

Delivery Bot



RF ID Tag

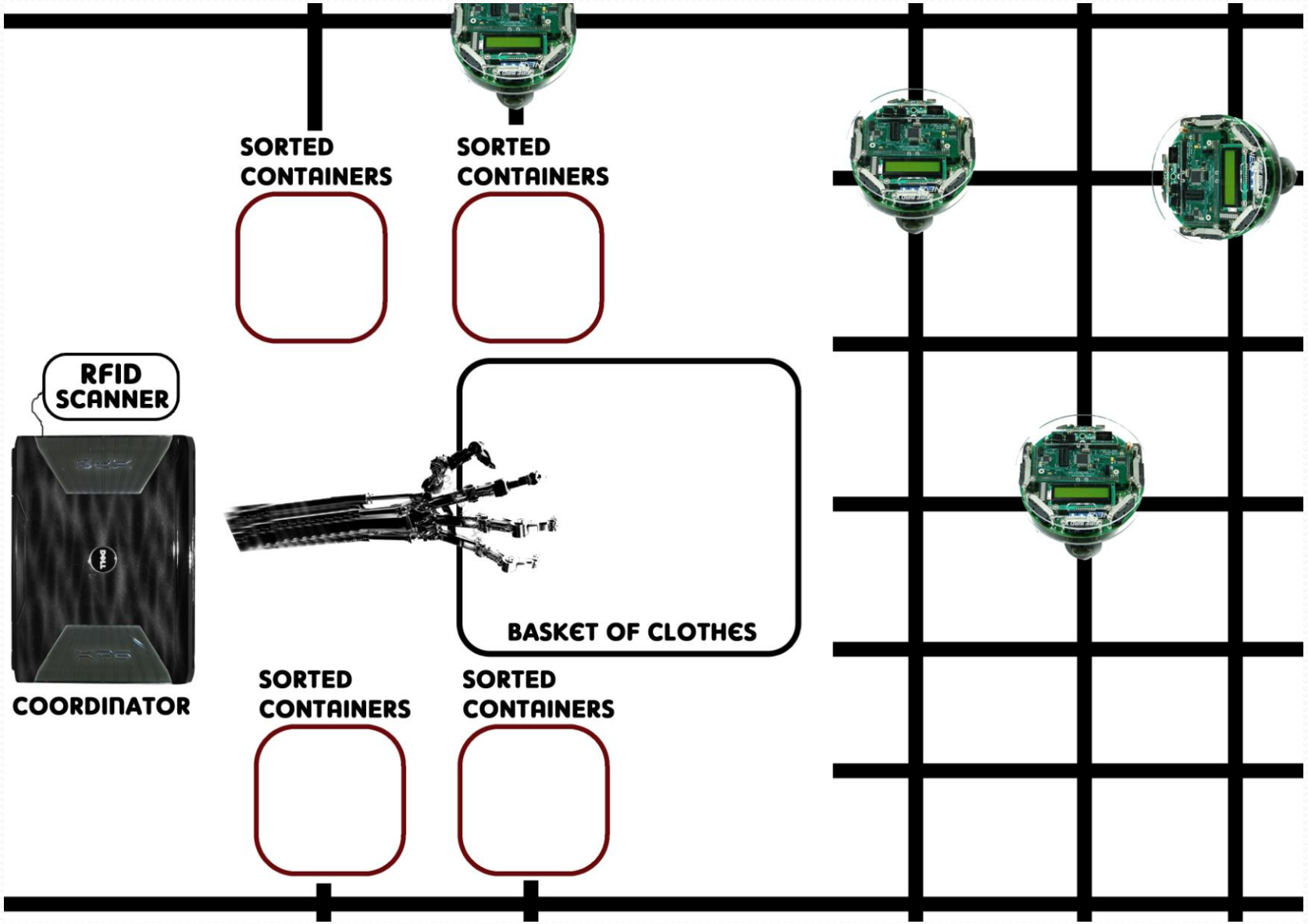
RF ID Reader

The Algorithm!

- 1. The robotic arm picks up an item from the dump box and places it on the RFid Reader.
- 2. The Arm communicates to the Coordinator that an item is placed on the reader.
- 3. If RFid is not scanned due to some error, the Coordinator instructs the Arm to return the item to the dump box. The algorithm then proceeds from step 1.
- 4. Based on the RFid scanned, the Coordinator checks if an empty basket is available. If no empty basket is available, the Coordinator instructs the Arm to return the item to the dump box. The algorithm then proceeds from step 1.

Algorithm Contd.

- 5. Based on the RFid scanned, the Coordinator instructs to place the item in a particular basket.
- 6. The Arm places the item in the correct basket and informs the coordinator about the same.
- 7. The Coordinator checks if any basket has required number of items. If a basket has the required number of items, the algorithm proceeds to step 8. Meanwhile the arm returns to step 1.
- 8. The Coordinator looks for a free delivery robot. If a free robot is found, the coordinator instructs it to deliver the basket to the desired location. It also plans the path for the delivery robot to minimize delivery time and prevent collisions.


SORTED CONTAINERS
SORTED CONTAINERS
RFID SCANNER
BASKET OF CLOTHES
COORDINATOR
SORTED CONTAINERS
SORTED CONTAINERS

Key Challenges

- The biggest challenge we will face is probably with the robotic arm:
  - Designing an algorithm which will scan through the entire box looking for items
  - To ensure that an item is picked up properly
  - To ensure that only one item is picked up at a time.
  - The item must be placed on the scanner in such a manner that the Rfid is detected properly
  - Items must then be dropped in the correct basket.

Key Challenges Contd.

- The next challenge that we will face is going to be the wireless communication module
- For the system to function correctly, there must be simultaneous coordination using Xbee between:
  - Robotic Arm and Laptop
  - Laptop and each Delivery Robot (we plan to use 2 currently and might increase to 3 if time permits)
- The path planning and collision avoidance between the delivery robots will also be a challenge.
- Accurate delivery and drop off of baskets by the delivery robot

Response

- Robotic Arm: We will try out best to ensure we can pick up items from the box.
- However this seems extremely difficult.
- We will shift to a clipper robot if using the arm seems unfeasible

Additional Hardware

- No additional hardware is required as such.
- We would require 3 clipper robots and the arm for demonstration and testing

Where can we fail

- The Robotic Arm: It seems a difficult task to pick up items from a box and to ensure that all items are picked up using the robotic arm.
- While all efforts will be done to ensure we can manage the same, we realize that this is one possible area where there is a chance of failure!

Thank You!