Design for IoT Middleware

Idea Proposal: Intelligent Trash Cans

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Main Idea

Our City

- Dirty trash cans overflowing with litter
- Flies and mosquitoes

Smart Trashcans

- Improve the environment we live in!

Idea

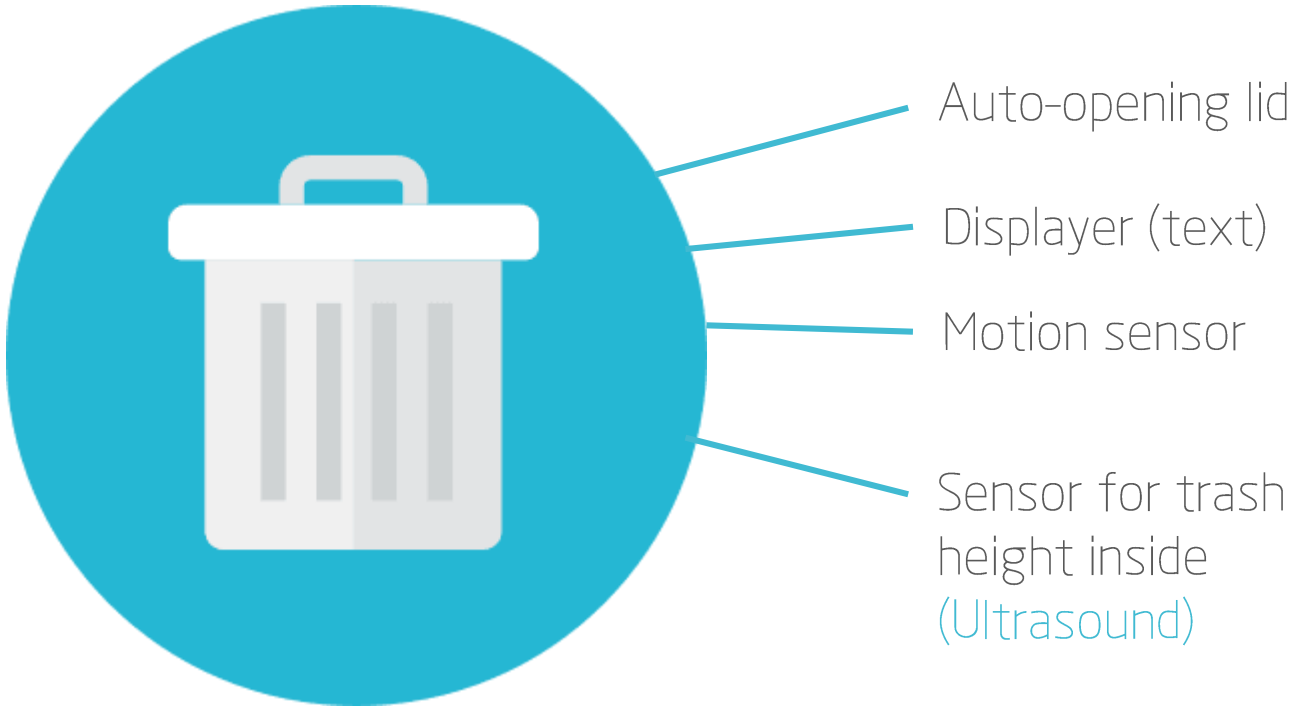
https://youtu.be/bWrKjQH0xBU?t=16m15s

Design

Design Goals

- Open the lid only when someone is trying to throw away their garbage
- Keep track of how much garbage there is
- When the can is full, notify the cleaning squad and stop opening the lid for people
- Dynamically assign garbage types to individual trash cans

Overall Design

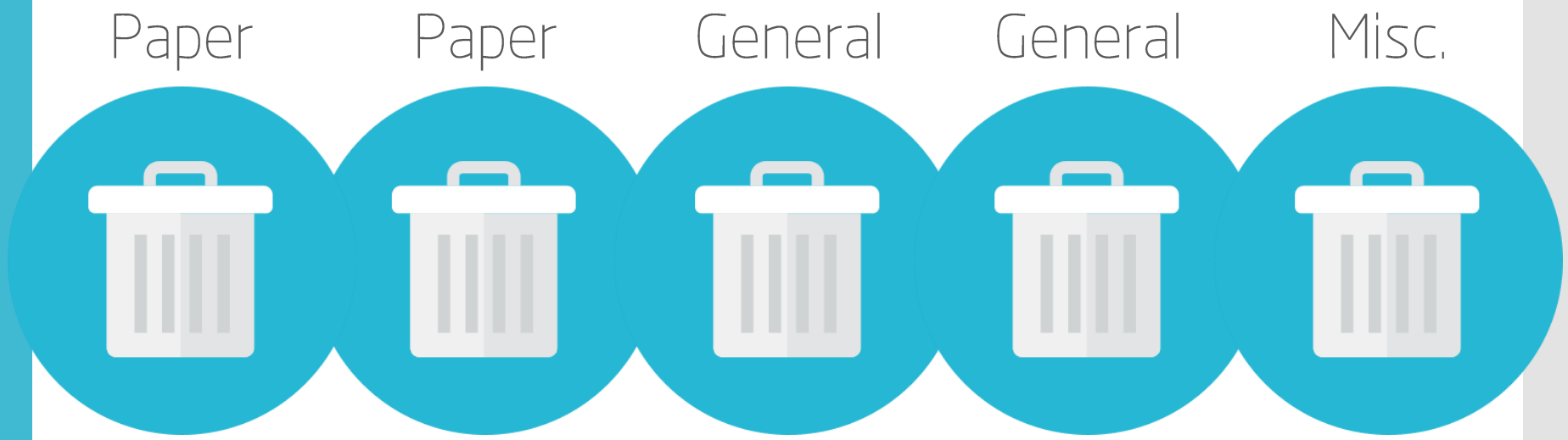


Overall Design: Interior

Overall Design: Interior

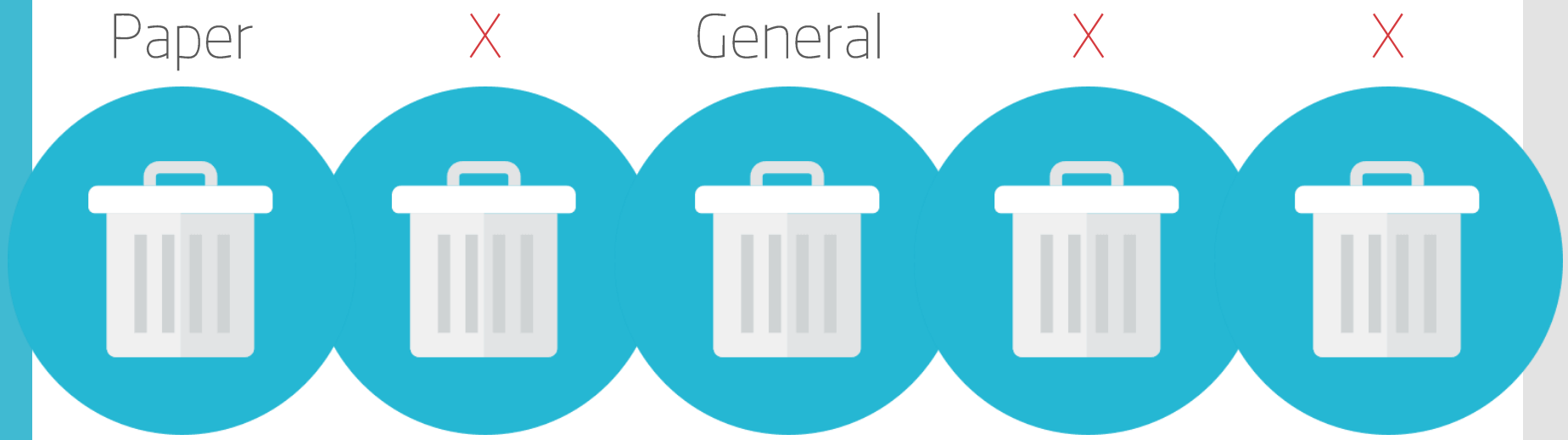
Overall Design: Dynamic Assigning

Current Assignment



Overall Design: Dynamic Assigning

Initial Assignment



Overall Design: Dynamic Assigning

Scenario: After Lunch

Overall Design: Dynamic Assigning

Scenario: After Lunch

Overall Design: Alert System

Scenario: After Lunch

Paper (full)

Notify

Alert System (cleaning squad)

Required Equipment

Per trash can:

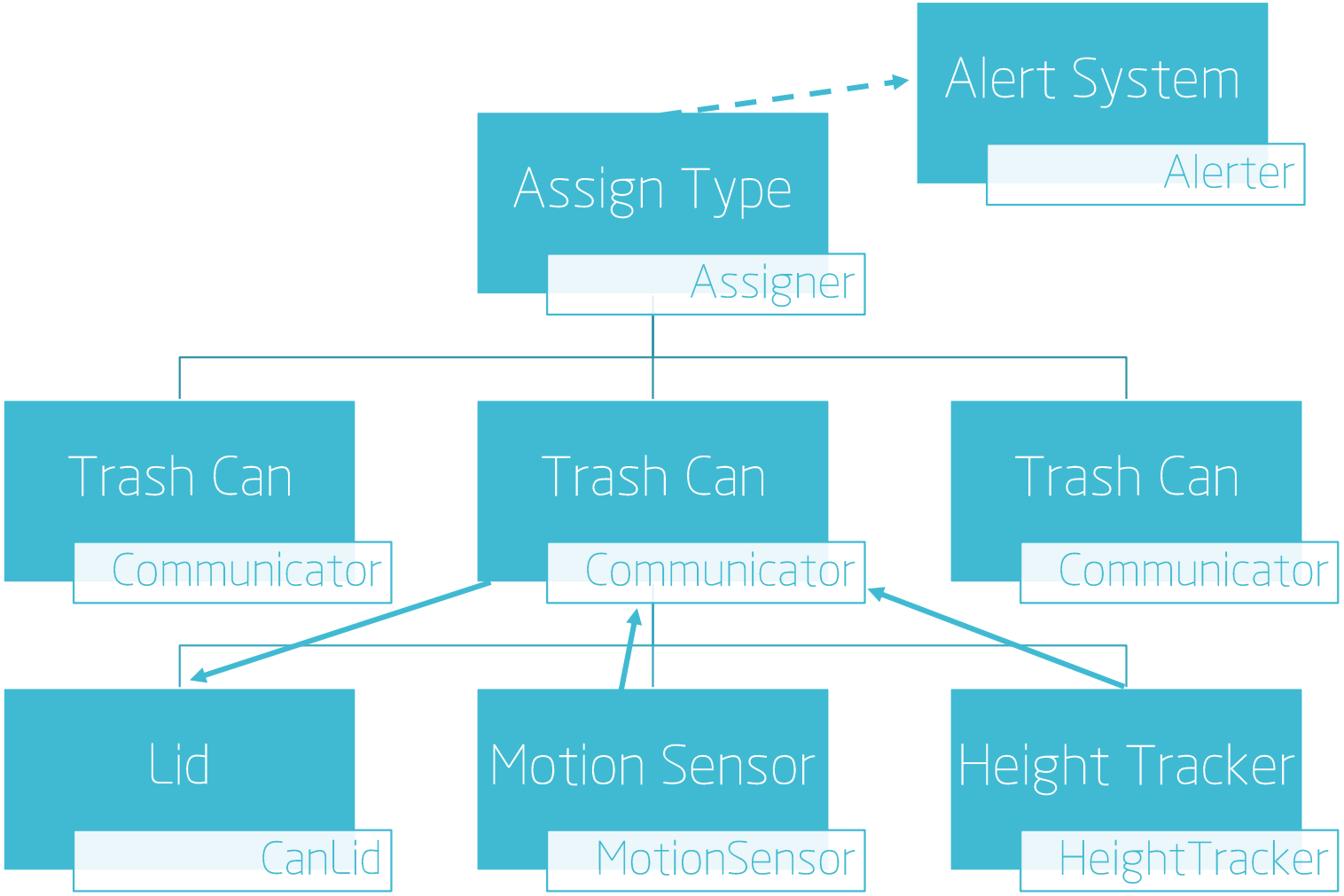
- 1 IoT board
- 1 motion sensor
- 1 touch sensor
- 1 LED displayer (text)
- 1 ultrasound device

Implementation

- WuClasses

1. CanLid
2. MotionSensor
3. HeightTracker
4. Communicator
5. Assigner
6. Alerter

Implementation



Implementation

WuClass: Assigner

- Assign garbage types to trash cans
- Keep track of garbage types
- Notify cleaning squad when a trash can is full
- Assets: is_full, types

Implementation

WuClass: Alerter

- Remotely controlled by the Assigner
- Show that there is garbage to be cleaned
- Assets: is_full

Implementation

WuClass: Communicator

- In charge of communication

1. Listen to Assigner and remember garbage type
2. Display type on displayer
3. Notify CanLid to open based on information from other classes

- Assets: is_full, open, type

Implementation

WuClass: CanLid

- In charge of opening the lid when notified
- Assets: open

Implementation

WuClass: MotionSensor

- Sense if there is motion near the trashcan
- Notify Communicator
- Assets: motion

Implementation

WuClass: HeightTracker

- Tracks the height of the garbage inside the trash can
- Notifies Communicator to change is_full asset
- Assets: is_full

Implementation

WuClass: Alerter

- Tracks the height of the garbage inside the trash can
- Notifies Communicator to change is_full asset
- Assets: is_full

How to Demo

- Simulate 5 trash cans in the same spot (like in CSIE building)
- Use LED light and text displayer to show status of trash can
- Dynamically assign garbage types

Thank you!

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