




Hygieia

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Object Recognition



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- Most research focuses on image processing to recognize objects
- There are many other senses that can be used
- Humans use touch, smell, sound and taste
- What can robots use?
 - Magnetic permeability
 - Electric permittivity
 - Transparency
 - Softness by using pressure sensors
 - Image processing using cameras

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Now What?

- We recognized objects, what do we do with that? What is my application?
- Hygieia - Greek god of cleanliness
- My robot is designed to collect waste objects, recognize their category, and sort them accordingly
- The categories are:
 - Metallic waste (soda cans, Al foil, etc.)
 - Organic waste (food, peels, etc.)
 - Dry waste (paper, glass, etc.)

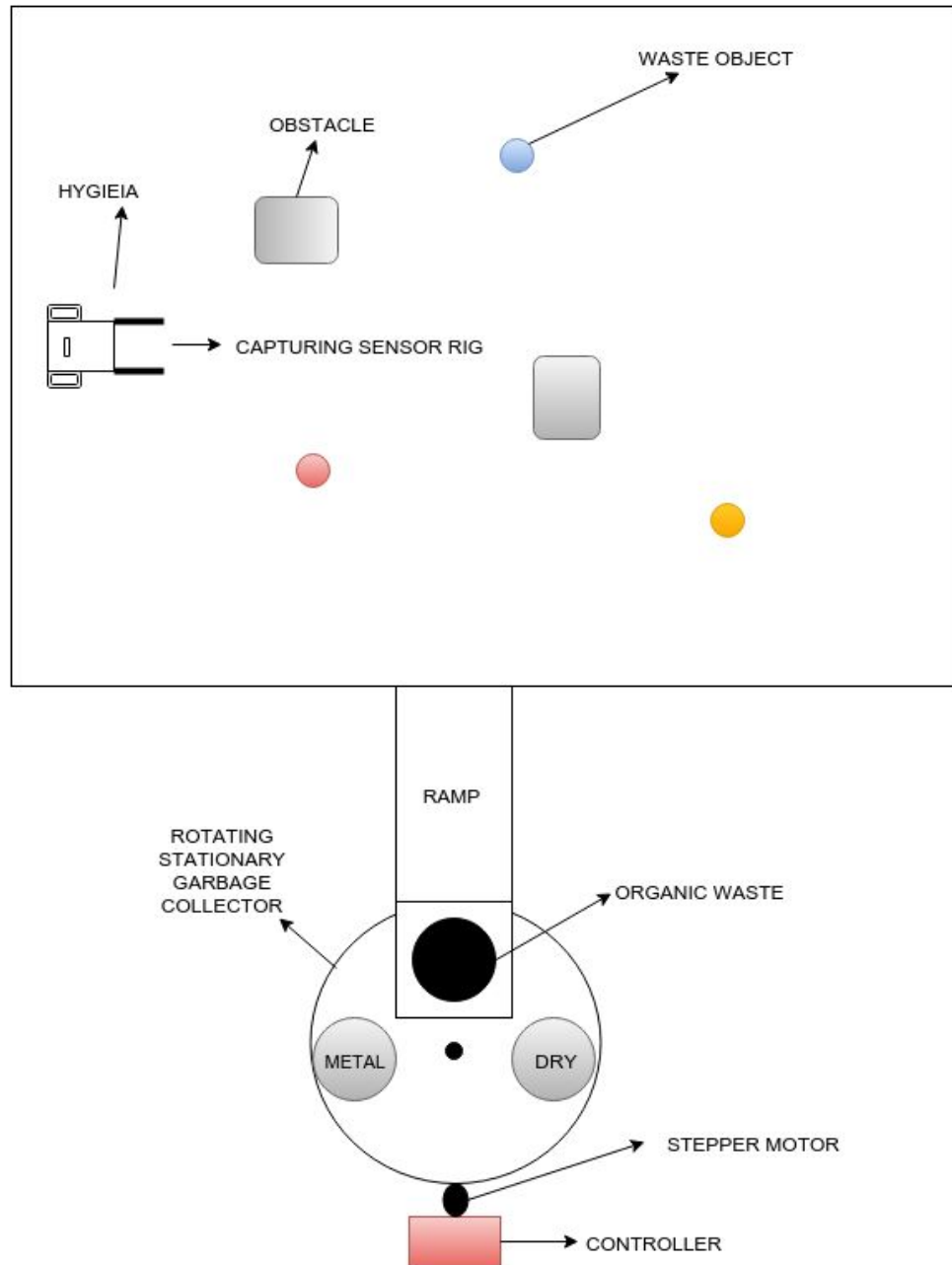
Main Mobile Robot

- Has IR sensors for obstacle avoidance
- Camera for searching for waste objects
- Special sensory rig that captures and classifies the waste object
- Uses ODROID-C1+ has high level computing board
- Uses STM32F4 Discovery board for low level computing
- For actuation, it has 2 wheels for differential drive
- A servo for capturing objects
- ZigBee module for wireless communication

Stationary Garbage Collector

- Has a rotating tray controlled by a stepper motor
- The tray has 3 trash cans, for each of the waste categories
- Uses Arduino as the controller
- Communicates with the mobile robot using ZigBee wireless communication

Behaviour



Special Sensor

- Has an inductive coil that measures the inductance of the object using an inductive-to-digital converter (TI LDC1000)
- Has 2 capacitive plates that measure capacitance by using an inductive-to-digital converter (TI FDC1004)
- Has IR sensors to detect object presence and transparency
- Inductive sensor helps detect metallic waste
- Capacitive sensor helps detect organic waste
- IR sensors help detect glass or transparent plastic
- Classification will be used to classify the objects

Thank You

