SCHOOL OF COMPUTING

FACULTY OF ENGINEERING

SECJ3553 ARTIFICIAL INTELLIGENCE

SECTION 10

ASSIGNMENT 3

Project Title: Smart Recycle Pick-Up Route Application

Group 8 Team Members:

1. Chiam Wooi Chin   A19EC0034

2. Goh Jo Ey   A19EC0047

3. Ng Jing Er   A19EC0115

4. Ong Yin Ren   A19EC0204

Contents

PEAS Model

1. Formulate The Solution By Using PEAS Model

The field of the PEAS model in this project is daily living. The table below shows the formulated solution by using PEAS Model.

P: Performance Measure	● Minimize the energy consumption to sort the recycled material ● Detect the recycled material, sort and filter different recycled material to the respective bin ● Notify the user about the smart recycled bin fill level ● Notify the recycled center and generate route automatically with the full bin detector
E: Environment	● Residential Area ● Residents ● Recycle center ● Driver of the recycle center ● Recycled waste
A: Actuators/Effectors	● Waste recognize detector ● Full level detector ● Route generator
S: Sensors	● Waste detector detect the type of the recycled material(Paper/Glass/Plastic&Aluminium) and respond by lighting different type of light and smart bin only open with correct type of materia;

	- Full level detector detect the level of the smart recycled bin and only open when it still have the capacity in the bin - Notification is generated if the waste detector activated or the full level detector activated - The route generator is activated if the full level detector is activated to generate route plan to the driver

2. PEAS Model

Agent: Waste Recogniser and Route Planner App

P: Performance measure: Efficiency of waste material sorting and full level detector notification
- The waste recognizer of a smart recycle bin is able to detect the recycled material, sort and filter different recycled material to the respective color of the bin in an effective way.
- The waste recognizer and notification in smart recycle pick up route application is able to guide the user to the recycle waste classification.
- The notification in smart recycle pick up route application is able to notify the user about the smart recycled bin fill level and the correct recycled material and generate notification to the recycle center to generate the route automatically with the full bin detector.

E: Environment: Recycled waste, Residential Area, Household residents, Recycle center, Driver of the recycle center
- The smart bin interacted with the household residents and the driver of the recycle center.
- The smart bin is located in the household residential area of the user.
- The smart bin with capacity detector will operate automatically and generate notification to the driver of the recycle center.

- The mobile application will provide predictive routes generated through algorithms for recycling center drivers that improve the recycled waste pick up process by the driver of the recycled center in residential areas.
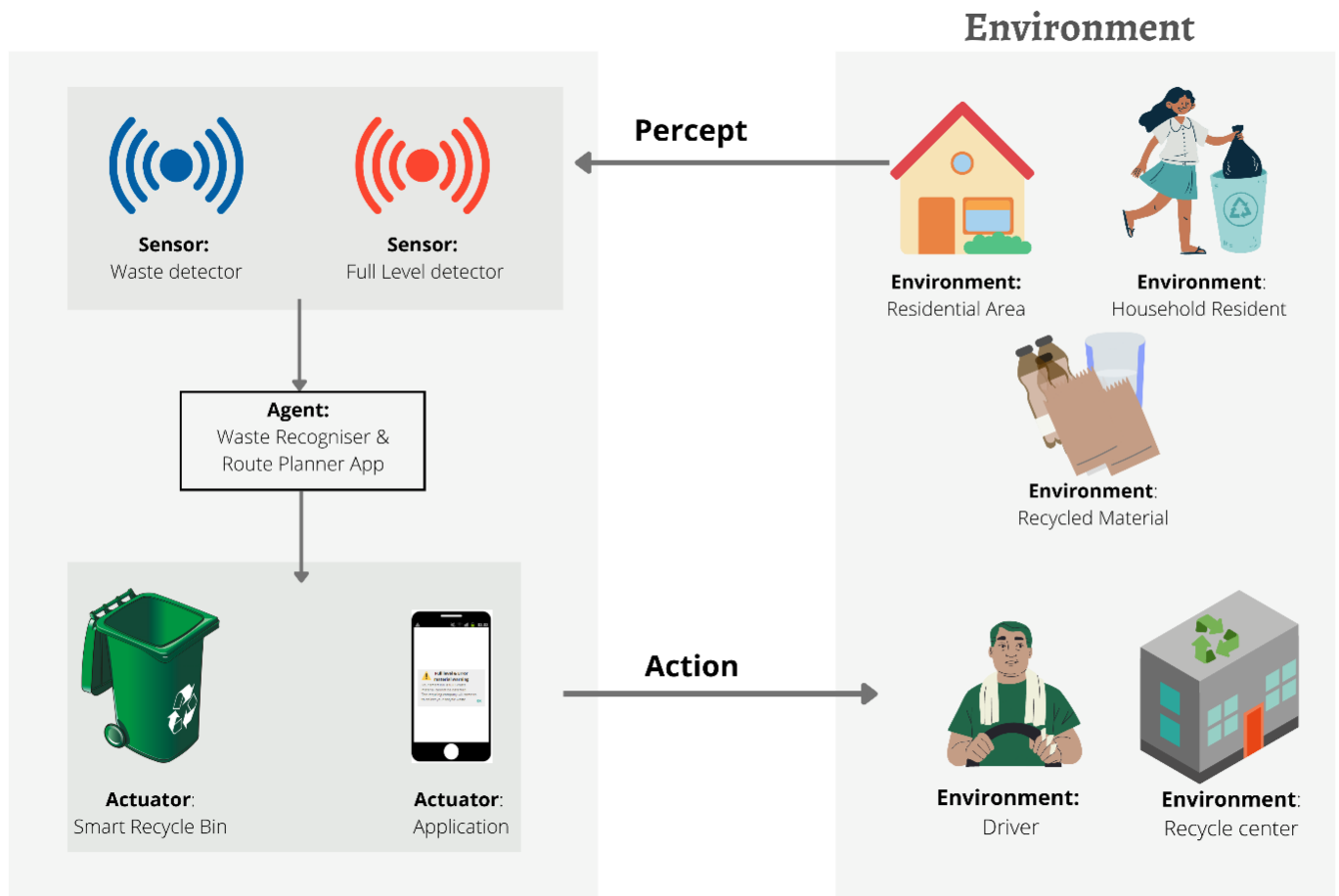
A: Actuators/Effectors: Smart Recycle Bin, Application
- The smart recycled bin will respond and generate notification based on the waste detector and the full level detector.
- The smart recycled bin will remain open or close and show different light(red light, green light) as the warning purpose.
- The waste detector will detect the type of the waste material and sort it into different compartments in the smart recycled bin.
- The route generator will be activated if the full level detector is activated to generate a route for the driver.

S: Sensors: Waste detector, Full level detector
- The waste detector will send an error material warning notification, and the smart bin will remain close and display a red light if the recycled material cannot be recognised as one of the three categories.
- The full level detector detects the full level of the smart recycle bin and generates a full level warning to the application to generate a route when the smart recycle bin is detected full.
- When the waste detector and the full level detector do not activate error warning or full level warning, the smart bin will show green light and open to sort the recycled material to the respective compartment.

PEAS Model Diagram

Environment

Percept

Action

Sensor:
Waste detector

Sensor:
Full Level detector

Agent:
Waste Recogniser &
Route Planner App

Actuator:
Smart Recycle Bin

Actuator:
Application

Environment:
Residential Area

Environment:
Household Resident

Environment:
Recycled Material

Environment:
Driver

Environment:
Recycle center

Property Representation in Proof of Concept (POC)

Performance:

- The goal is to increase citizen awareness of recycling and the households' satisfaction with recycling services. The waste recognizer of a smart recycle bin is able to detect, sort and filter different recycled material to the respective color of the bin and notification in smart recycle pick up route application is able to guide the user to the recycle waste classification.
- The notification in smart recycle pick up route application is able to notify the user about the smart recycled bin fill level and the correct recycled material and generate notification to the recycle center to generate the route automatically with the full bin detector to increase efficiency of the recycling work by notifying the users and recycle center to avoid error material and full level of recycle bin.

Environment:

- The model in the environment is used to show the interaction among the household residents and the driver of the recycle center.
- Recycled waste model will be used to show the interaction of the waste detector and the full level detector.
- The agent will be located in the user residential area for users to manage the recycled waste collected easily.
- The mobile model and the smart bin model used to show how the application provides predictive routes for the driver of the recycling center which improves the recycled waste pick up process by the driver of the recycled center in residential areas.

Actuator:

- The smart recycled bin will respond to remains open and close, show different colors of light and generate notification based on the waste recognition detector and the full level detector. The waste detector recognized the type of the waste material and sorted it into different compartments in the smart recycled bin. The application will receive the

notifications if the waste detector or the error material detector is detected. The route generator will be activated if the full level detector is activated to generate a route for the driver.

Sensor:

- The waste detector detects the error material and sends a warning notification, the smart bin will remain closed and display a red light.
- The full level detector detects the full level of the smart recycle bin and generates a full level warning to the application to generate a route when the smart recycle bin is detected full, the smart bin will remain close and display a red light.
- When the waste detector and the full level detector do not activate error warning or full level warning, the smart bin will show green light and open to sort the recycled material to the respective compartment.

3. **The Behavior of The Agent to Achieve the Goal in AI**

The smart recycled bin is the simple reflex agent. The agent will respond to the user by choosing the action based on the basis of the current percept. For example, the performance of the agent is measured by the response of the smart recycle bin to the user with the different conditions. The waste detector and the full level detector will detect the condition of the smart recycled bin and the material thrown by the user respectively. The waste detector will respond to an error message in order to close the smart bin, generating an error material warning to the user if the error material is detected. The smart bin can prevent residents from continuing to throw recycled waste into overflowing bins and alert drivers to collect recycled waste. The full level detector will generate full level warning and send notification to the driver to generate a route if the capacity of the smart recycled bin is detected full. The agent will detect, sort and filter different recycled material to the respective color of the bin and send notification to the recycling center in smart recycling to generate a pick up route for the driver. It shows that the simple reflex agent is implemented through the condition-action rule.