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(Recycling Machine App):

**Use Case 1: Deposit Item**

**Actor(s):** Customer, Recycling Machine  
**Goal:** Customer deposits recyclable items (e.g., bottles, cans) into the machine for refund or credit.  
**Pre-condition:** Recycling machine is powered on, operational, and ready to accept items.  
**Post-condition:** Item successfully deposited and recorded in the system.  
**Main flow:**

1. Customer places a recyclable item into the deposit slot.
2. Machine activates sensors and begins to analyze the item.
3. System identifies the item type (via the *Recognize Item Type* use case).
4. Once verified, the system records the transaction (*Record Transaction*).
5. If the customer requests it, a receipt is printed (*Print Receipt*).  
   **Alternative flow:**

* 2a. Item not recognized → System triggers an alert (*Trigger Alarm*) and returns the item.
* 3a. Item damaged or non-recyclable → Machine rejects it with a message to the user.
* 4a. Machine full or out of service → Operation halted; alert generated.

**Use Case 2: Recognize Item Type (Included)**

**Actor(s):** Recycling Machine  
**Goal:** Identify the type and material of the deposited item.  
**Pre-condition:** An item has been inserted for processing.  
**Post-condition:** Item type (plastic, glass, aluminum, etc.) is determined.  
**Main flow:**

1. Machine scans the item using sensors/camera.
2. System compares detected properties with its database.
3. Item type is classified and validated.  
   **Alternative flow:**

* 2a. Item not found in database → Item rejected and alarm triggered.
* 3a. Sensor malfunction → Machine logs error and notifies operator.

**Use Case 3: Record Transaction (Included/Extended)**

**Actor(s):** Recycling Machine  
**Goal:** Log each deposit or refund operation for tracking and reporting.  
**Pre-condition:** Item has been recognized and accepted.  
**Post-condition:** Transaction entry created in database with timestamp, item type, and refund value.  
**Main flow:**

1. Machine prepares transaction data (item ID, type, refund value).
2. System stores transaction record in database.
3. Record is used for receipts or refunds.  
   **Alternative flow:**

* Database connection fails → System retries; if still fails, triggers an alarm.
* Data inconsistency detected → Transaction flagged for operator review.

**Use Case 4: Request Receipt**

**Actor(s):** Customer, Recycling Machine  
**Goal:** Customer requests a printed receipt after making a deposit.  
**Pre-condition:** At least one transaction has been completed.  
**Post-condition:** Receipt is printed and issued to the customer.  
**Main flow:**

1. Customer selects “Print Receipt.”
2. System retrieves last recorded transaction(s).
3. Receipt is printed (*Print Receipt* use case).  
   **Alternative flow:**

* Printer out of paper → Alarm triggered.
* Customer cancels request → Operation ends without printing.

**Use Case 5: Receive Refund**

**Actor(s):** Customer, Recycling Machine  
**Goal:** Customer receives refund (cash, voucher, or digital credit) for deposited items.  
**Pre-condition:** Item deposit successfully completed and recorded.  
**Post-condition:** Refund processed and transaction marked complete.  
**Main flow:**

1. Customer selects “Receive Refund.”
2. Machine calculates refund amount based on deposited items.
3. Machine dispenses cash or voucher, or sends credit to linked account.
4. Transaction recorded (*Record Transaction*).  
   **Alternative flow:**

* 2a. Insufficient cash in machine → Refund issued as voucher or alert triggered.
* 3a. Dispensing error → Machine triggers alarm and logs issue.
* 4a. Refund rejected due to system error → Customer prompted to contact support.

**Use Case 6: Print Receipt (Extended)**

**Actor(s):** Recycling Machine  
**Goal:** Print a physical record of a customer transaction.  
**Pre-condition:** Valid transaction data exists.  
**Post-condition:** Receipt printed successfully.  
**Main flow:**

1. Machine retrieves transaction details.
2. Formats data into a receipt layout.
3. Prints and dispenses the receipt.  
   **Alternative flow:**

* Printer jam or paper empty → System triggers alarm and notifies operator.
* Print data corrupt → System logs error and cancels print.

**Use Case 7: Trigger Alarm (Extended)**

**Actor(s):** Recycling Machine, Operator  
**Goal:** Alert operator or system about an error, fault, or security issue.  
**Pre-condition:** Fault, rejected item, or malfunction detected.  
**Post-condition:** Alarm activated and event logged.  
**Main flow:**

1. System detects anomaly (e.g., unrecognized item, mechanical jam, database failure).
2. Alarm triggered (sound, light, or notification).
3. Event details logged for operator.  
   **Alternative flow:**

* Alarm manually silenced by authorized operator (*Resolve Technical Issue*).
* Alarm auto-resets if issue resolves (e.g., network reconnects).

**Use Case 8: Check Daily Usage**

**Actor(s):** Operator, Recycling Machine  
**Goal:** Monitor the daily number of deposits, refunds, and system usage.  
**Pre-condition:** Operator authenticated to system.  
**Post-condition:** Daily usage data retrieved and displayed.  
**Main flow:**

1. Operator selects “Check Daily Usage.”
2. Machine fetches transaction summary for the current day.
3. Data displayed on screen or sent to reporting system.  
   **Alternative flow:**

* No data found → System notifies operator.
* Data sync failure → Alarm triggered and logged.

**Use Case 9: Generate Report**

**Actor(s):** Operator, Recycling Machine  
**Goal:** Create detailed performance and usage reports for analysis.  
**Pre-condition:** Historical transaction data is available.  
**Post-condition:** Report generated and stored/exported.  
**Main flow:**

1. Operator requests report generation.
2. System compiles transaction and usage data.
3. Report created (daily, weekly, or monthly).
4. Operator views, saves, or prints the report.  
   **Alternative flow:**

* Incomplete data → System generates partial report with warning.
* Operator cancels report → Process terminated.

**Use Case 10: Update Deposit Values**

**Actor(s):** Operator, Recycling Machine  
**Goal:** Adjust refund or deposit rates for different item types.  
**Pre-condition:** Operator authenticated and authorized for configuration updates.  
**Post-condition:** Updated deposit/refund values saved in the system.  
**Main flow:**

1. Operator selects “Update Deposit Values.”
2. System displays list of recyclable item types and current rates.
3. Operator updates deposit values and confirms.
4. System saves changes and logs update.  
   **Alternative flow:**

* Unauthorized user → Access denied.
* Input validation error → Prompt operator to correct entries.
* System error → Alarm triggered.

**Use Case 11: Resolve Technical Issue (Extended)**

**Actor(s):** Operator, Recycling Machine  
**Goal:** Diagnose and fix any hardware/software problems reported by the machine.  
**Pre-condition:** System has triggered an alarm or logged an issue.  
**Post-condition:** Problem resolved, and machine returns to normal operation.  
**Main flow:**

1. Operator reviews the error message or alarm log.
2. Diagnoses issue (hardware, software, network, etc.).
3. Performs maintenance or resets the machine.
4. Confirms system health restored.  
   **Alternative flow:**

* Problem persists → Operator escalates to maintenance team.
* Safety hazard detected → Machine shut down until repaired.