



[SUPPLEMENTARY RULES]

Construction Requirements: There are no restrictions on the materials used to construct the "device," but ready-made devices are not allowed. The "device" must reserve space for loading, gripping, transporting, or scooping objects.

Operation Functions: The "device" is operated via on-site remote control. The "device" must first move from the starting area into the "NFC Card Reading Zone" located at the center of the field to read the main mission data; it must then, in accordance with the signal instructions, proceed to designated mission areas within the time limit to simulate completing specified supermarket logistics, sorting, shelf restocking, and weighing tasks.

Weight & Dimensions: There is no weight limit for the "device", but its size must be less than 25cm×25cm×40cm (Height).

Power Supply Restriction: A DC power supply of 24 V or less must be used

Competition Format:

The competition is divided into Junior Secondary Group and Senior Secondary Group. Each group's competition consists of two stages: "Group Stage" and "Knockout Stage".

- **Group Stage:**
Group allocation: Teams will be allocated to groups by draw. The number of teams in each group will be announced before the competition, based on the total number of participating teams.
 - o Advancement Rules:
 - The group stage will consist of two rounds. In each group, the top two teams with the highest combined total score across both rounds within the time limit will directly advance to the Knockout Stage. In the event of a tie in total score, the team that completed the tasks in the shortest time (i.e. the fastest), will advance.
 - In addition to the top two teams from each group, all third-place teams across all groups will compete in an additional group stage match to determine the best third-place team(s) to advance to the Knockout Stage (the specific quota and rules for this additional match will be announced prior to the extra group stage based on the total number of entries).
- **Knockout Stage:**
Match Format: Qualifying teams will compete in 1-on-1 single-elimination knockout matches. The two competing teams will play their matches simultaneously in identical, separate fields.
- **Elimination Rules:**
 - The team with the highest total score for completing tasks within the time limit wins. In the event of a tie in total score, the team that took the shortest time (completed the tasks faster) wins.
 - If, during the knockout stage, neither team is able to complete any tasks within the time limit, or if both total scores and times are identical, an extra round will be held to determine the winner.



Competition Venue:

The competition venue measures 1.6 m × 1.2 m. The venue features a starting zone and an "NFC Card Reading Zone". Different markers and lines are used within the venue to identify the specific work areas for "Task I" through "Task IV". During the Group Stage, the venue setup and prop configuration across all groups are identical; during the Knockout Stage, the setup and prop configuration on both competing fields are also identical. The venue layout is roughly as shown in the attached diagram:



Competition Format:

Data Retrieval and Mission Instructions:

When the "device" enters the "NFC Card Reading Zone", it must retrieve four sets of numbers or a single 8-digit number (e.g. 43-21-42-35 / 43214235). For the purposes of the competition, the numbers are defined as groups of two digits read from left to right. The resulting four sets of numbers correspond to four supermarket simulation tasks:

- **First Three Sets of Data:** Two-digit numbers, where the first digit represents the "target items quantity", and the second digit represents the "target colour code (1 Red, 2 Green, 3



Blue)" (e.g. 43 represents 4 blue target objects).

- **Last Set of Data:** The last two digits will be multiplied by 2 grams to give the target total weight (e.g. 35 represents 70 grams).

Task Details and Perfect Scoring:

Within the match time limit (**5 minutes for Junior Secondary Group; 6 minutes for Senior Secondary Group**), participating teams must wirelessly control the "device" to set off from the start point, enter the NFC zone to read data, and then proceed to each task area to complete the missions. Each task has a maximum base score of 100 points. If a specified error occurs, 40 points will be deducted (the task receives only 60 points). If the task requirements are not completed, 0 points will be awarded.

- **Task I: Cardboard Box Identification and Sorting**
- **Props Design:** Several cardboard boxes are placed within the grid area (Figure I).
- **Operational Requirements:**
 - **Junior Secondary Group (Visual Sorting):** 12 cardboard boxes labeled with colour text (Red, Green, Blue) are placed on-site. Operators must identify the colour by reading the text at the base of the cardboard boxes and, using the first set of the data from the "NFC Card Reading Zone" (e.g. 43), operate the remote-controlled device to push the correct colour and quantity of boxes (e.g. 43 represents 4 blue boxes) across the checkout line at the front. The number of boxes of each colour on site must not be less than the maximum possible target quantity drawn.
 - **Senior Secondary Group (NFC Blind Test Search):** 12 cardboard boxes, all identical in appearance, are placed on-site. Each box has an NFC tag embedded in its base with a unique chip code, indicating its target colour code (1=Red, 2=Green, 3=Blue). The device must enter the task grid, scan the NFC tags inside the cardboard boxes one by one at close range to retrieve data, identify the specified quantity of target boxes corresponding to the target colour code, and push them across the checkout line. The number of boxes of each type on site must not be less than the maximum possible target quantity drawn.
- **Scoring Criteria:**
 - **100 points:** Successfully pushing the correct number of target boxes across the checkout line, with no incorrect boxes beyond the line.
 - **60 points:** The correct number of target boxes crosses the line, but during the process of pushing them forward, other boxes of the wrong colour were accidentally pushed along across the checkout line as well.
 - **0 points:** The final number of target boxes (excluding non-target boxes) is incorrect.
- **Task II: Logistics Box Collection and Stacking**
- **Props Design:** Several different-coloured soft drink crates are placed within the task grid (Figure II).
- **Operational Requirements:** Based on the second set of data from the "NFC Card Reading Zone" (e.g. 21), the device must organize and stack the specified number of soft drink crates scattered in the task area (e.g. 21 represents 2 red soft drink crates) into the designated



collection grids.

- o **Junior Secondary Group:** Move the specified number of soft drink crates into the designated coloured grid within Task Area II.
 - o **Senior Secondary Group:** Using grippers or a lifting mechanism to vertically stack the specified number of soft drink crates one by one (e.g. 21 represents 2 red crates) inside one of the designated coloured grids in Task Area II, whilst maintaining balance to prevent them from toppling over.
- **Scoring Criteria:**
 - o **100 points:** The correct quantity and colour of soft drink crates are successfully returned to their positions or stacked, with the bottom crate entirely within the colour-coded grid.
 - o **60 points:** The correct quantity and colour of soft drink crates are returned to their positions or stacked, but the bottom crate partially extends beyond the colour-coded grid.
 - o **0 points:** An incorrect quantity or colour of soft drink crates is placed in the recycling/collection grid.
- **Task III: Shopping Cart Return**
- **Props Design:** A dedicated shopping cart return lane is set up in this area. The ground is marked with two colour zones (e.g. Red, Green). Model shopping carts with wheels (both empty and loaded with goods) are provided (Figure III).
- **Operational Requirements:** The device must push or move the specified number of empty shopping carts within Task Area III so that they stop precisely in the parking area of the correct colour and are interlinked (i.e., the rear cart must be in contact with the front cart).
 - o **Junior Secondary Group:** Based on the third set of data among the four sets from the "NFC Card Reading Zone" (e.g., 42 in the example above), the operator remotely controls the device to push or move the shopping carts, interlinking the specified number of empty shopping carts within Task Area III in the designated colour parking area (in the example above, pushing and interlinking 4 empty shopping carts into the green area).
 - o **Senior Secondary Group:** The third set of data in the "NFC Card Reading Zone" is the encrypted data x (e.g. 42). Teams must use the function $f(x)$ announced on-site as the key to perform on-site decryption and obtain the actual number and colour code Y , expressed as:
$$Y = f(x)$$
 - o The calculation will reveal the colour and quantity of the designated target parking area. The specified number of empty shopping carts must be nested in the lane, and the device must apply force from the rear of the cart train to push the entire line forward.
- **Scoring Criteria:**
 - o **100 points:** When the shopping cart train comes to a complete stop, the designated



carts are fully parked and nested within the correct colour zone, and the wheels do not cross or touch any boundary lines.

- o **60 points:** The shopping cart train enters the correct colour zone, but parts of the wheels or cart frame rest on the boundary lines, or the carts are not fully nested.
- o **0 points:** Incorrect target number or colour zone, or non-empty shopping carts are nested among the empty shopping carts.

- **Task IV: Weighing Bulk Goods**

- **Props Design:** An electronic scale is placed in Task Area IV. The remaining area serves as a fresh produce section containing designated seafood models (Figure IV) and simulated ice cubes.

- **Operational Requirements:** Based on the value of the final set of data (e.g. 35 represents 70 grams), the device must go to the fresh produce area, use a scoop or a gripper to retrieve the seafood models and place them onto the electronic scales.

- o **Junior Secondary Group:** The fresh produce area contains a single model type of seafood with a roughly fixed weight, allowing the device to perform simple quantitative calculations of the models for weighing.
- o **Senior Secondary Group:** The fresh produce area contains a mixture of seafood models of varying sizes and weights. The device must be capable of remote-controlled manoeuvres involving slight tilting or the precise placement of individual items to achieve the target weight accurately.

- **Scoring Criteria:**

- o **100 points:** The total weight displayed on the electronic scale exactly matches the weight value represented by the fourth set of data from the "NFC Card Reading Zone" (e.g. 35 represents 70 grams).
- o **Weight Error Score Calculation:** If the weight displayed on the scale is not exact, the final score S is calculated based on the weight deviation $|\Delta W|$ (the absolute difference between the displayed weight and the target weight, in grams) using the following formula:

$$S = \max \left(0, 100 - \frac{|\Delta W|}{5} \right)$$

- o **0 points:** No seafood models have been placed on the electronic scale.

Props Specifications & Dimensions:

Figure. I	Figure. II



Figure. III	Figure. IV
	

Timeout and Repairs:

There are no timeout during the matches. Requests for repairs or readjustments are allowed at any time within the competition time limit, however, competitors must first signal to the referee and obtain the referee's consent before removing the "device" from the arena for repair. The competition timer will not be paused during repairs. Once repaired, the "device" must be returned to the starting point to restart. Tasks successfully completed and scores recorded by the referee prior to repairs will be retained; any objects that have come into contact with the device during repairs will be reset by the referee.

Violation of Rules:

The following infractions will be dealt with according to their severity; in serious cases, participants may be disqualified from the competition:

- o Deliberately damaging the competition venue, NFC Card reading equipment, shopping cart models, seafood props, or any task-related items;
- o Touching the "device" or venue props within the venue with their hands during the competition without prior consent;
- o Using "device" that does not comply with the specification set out in by the supplementary rules;
- o Deliberately obstructing other teams or their "devices" from competing;
- o Using a device uninspected nor approved by the organizer;
- o Using power supply that does not comply with regulations;
- o Intentionally entering designated areas during the competition without the consent of staff;
- o Disobeying the instruction of the staff, interfering or stalling the competition;
- o Using offensive, insulting or abusive language or behaviour towards other participating teams;
- o Violating the principles of fair play.



2027年度通訊博物館電子裝置製作比賽

Museu das Comunicações – Concurso de Construção de Dispositivos Electrónicos, 2027
Communications Museum - Electronic Device Construction Competition, 2027

Others:

- o Competitors must take care to ensure electrical safety; the organisers will not provide any power supply;
- o Maintenance/repair tools are the sole responsibility of the participating teams, the organizer shall not provide any;
- o Participants are allowed to use the test area at the museum during opening hours prior to the competition;
- o Should any dispute arise, the organisers reserve the right to make the final decision;
- o The organisers reserve the right to make decisions and take action regarding any unforeseen circumstances that may arise during the competition;
- o In the event of any dispute regarding the contents of these supplementary provisions, the Chinese text shall prevail.