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Test Project

Module G - Performance and Commissioning

Duration – 3 Hours

Autonomous Mobile Robotics

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1. Introduction

A small restaurant has several tables that are known as different drop pickup and drop off locations based upon the item. The robot must pick up drinks and napkin/condiments and deliver them to multiple locations. The robot, if possible, can carry several objects at once.

Order Triggers

Over a few minutes, staff enter requests as they come in: Table 2 needs an iced tea + napkins, Table 4 needs a lemonade, Tables 5 and 7 need napkins, Table 7 also needs a cola. Each request is logged as an individual task with item, pickup point, and destination.

1. The restaurant's POS/kitchen display system sends a delivery task to the robot's fleet manager: pickup location (pass position 2), destination (Table 6), item details, and any special notes (e.g., "keep upright — soup").
2. **Navigation to Pickup**
   Robot leaves its home area or, navigates through the dining floor avoiding chairs, staff, and customers via its obstacle-detection sensors.
3. **Pickup Confirmation**
   Robot arrives at the pickup location, announces itself via light signal, and loads the required object.
4. **Delivery Navigation**
   Robot travels to delivery location, replanning its route in real time if it encounters a blocked path (e.g., a customer walking, a chair pulled out).
5. **Arrival & Handoff**
   Robot arrives, announces itself via light signal, and waits and delivers the object, Customer or server removes the item(s) from the location. .
6. **Task Completion**
   Robot returns to the home location and marks the task complete via a light signal.

2. Description of project and tasks

2.1 Required Components

The list of required components to complete the task.

- Competitor robot built on C1

NOTE: Competitors are allowed to use their supplied laptops for processing. No extra time or appeals can be made if the Wi-Fi between the robot and computer is interrupted or dropped.

2.1 Control Mode

Competitors are required to use autonomous control during this module.

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2.2 Schedule

There is a total time block of 3 hours. Below is a chart to help the competitor manage their time.

TIME	TASK
00:00 – 02:30	Prep-Time
02:30 – 02:45	Team 1 and 2 Evaluation time on courts 1 and 2
02:45 – 03:00	Team 3 and 4 Evaluation time on courts 1 and 2

Competitors should refer to the official competition schedule to determine the start and finish time of their allocated session. Before the end of the time block, competitors must:

- clean and organize their workstation;
- prepare for rotation to the next module;
- leave the assembled base robot on the workbench;
- leave the completed Task Allocation Report and Commissioning Report with the robot; and
- wait in the designated briefing area until released by the Chief Expert.

Competitors are not **allowed** to work on the robot or anything else during the evaluation time.

2.3 Task

Competitors are required to use the robot they have assembled on C1 to navigate a court, find objects, pickup objects and drop-off objects. There is a total of 6 objects on the courts of which there 4 types of objects. Meaning 2 types of objects will have a count of 2.

At the start of the module the competitors or experts will roll a die to determine the pick-up and drop-off locations. The competitors **will not know** the objects to be used, only the locations. Competitors are allowed to use objects during the prep time for testing.

At the start of the evaluation period, competitors or experts will roll a die again to determine the objects used during the run. Competitors **are not allowed** to give these objects to the robot. The robot is **required** to find the objects and deliver them based on the **known** pickup and drop-off locations.

Note 1: The robot must start in the home location and end in the home location. A run is not considered completed if the robot is not in the home location with a solid red light on the light tower.

Note 2: It is expected that no part of the robot (or object attached to or carried by the robot) will contact any walls or court objects during the evaluation run. A contact is any touch, a continuous touch will be scored as multiple touches (1 per second of contact)

2.3.1 Court Information

The Commissioning court is 4m x 4m and contains internal walls. There is a home location and multiple drop-off and pickup locations which are randomly chosen at the start of the module.

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2.3.2 Light Tower Requirements

There are some light tower requirements the robot must follow.

- When robot is not moving the light must be solid green.
- When robot is moving the light must be flashing yellow.
- When robot is at a location picking up or dropping off an object the light must be flashing green.
- When robot is done and back at the home position light must be solid red.
- When the robot is moving in reverse the light tower must beep the buzzer.

2.3.3 Pick-up Locations

There will be 4 pick-up locations. The locations are chosen by the roll of the die at the start of the module. Objects will be placed on the location platforms inside the precision markers.

2.3.4 Drop-off Locations

There will be 4 drop-off locations. The locations are chosen by the roll of the die at the start of the module. Objects must be dropped off on these platforms. For locations that have multiple objects to be dropped off, once the robot has dropped off the object the competitor can ask the expert if they can remove the object. Once the expert gives the ok, they can remove the object.

2.3.5 Precision Markers

On all locations there is a 200mm circle or cube to indicate precision areas. Competitors should aim to place objects inside these areas.

2.3.6 Task sequence

- At the start of the module experts or competitor roll the die to select which of the 6 runs is to be completed.
- Prep time, competitors have access to the commissioning courts for prep.
- Evaluation time, competitor will place the robot in the home start location.
- A roll of the die is done to select the objects to use.
- Competitor will place the objects from the selected run on the pickup locations. Experts will verify.
- Expert will signal to the competitor when they can start. Competitor will then hit start on the robot control panel.
- During the run after dropping off an object the competitor can ask the expert if they can remove the object. Once the expert gives the ok, they can remove the object.
- Run is completed when all objects have been picked up, dropped off and the robot is back in the home position and following the light tower requirements.

3 Competitor Instructions

3.1 Prepare during allotted prep time

Competitors will have the preparation time during each module to practice and get the robot ready for the evaluation run. During this time the commissioning courts are free to use and may be used by any of the teams currently completing the module. Courts may have more than 1 robot on it at time. Competitors will be required to show good communication skills to manage the area.

3.2 Cleaning up before Evaluation

Competitors must clean up the work benches before the evaluation time starts to prepare for rotation to the next module when required.

3.3 During Evaluation

During evaluation competitors must place the robot in the start location and wait for the ok from the experts. When the ok is given the competitor must push the start button on the robots control panel to start the run.

Competitors will indicate to the experts when the run is complete if the robot does not show the solid red light in the home location of the court.

Competitors not being evaluated must sit at their workbenches. These competitors are not allowed to work on their robot during this time.

4 Equipment, machinery, installations, and materials required

4.1 Equipment provided by Competition Organizer

- All equipment, tooling, and materials in the Infrastructure List – see AMR Discussion Forum and Technical Description;

4.2 Equipment and material not permitted

- Non WorldSkills supplied laptops or portable computers;
- Tablet's e.g. Android, IPAD etc.;
- Memory sticks/ Digital Storage;
- Digital music Player;
- Electronic organizer/diaries;
- Wireless communication devices;
- Non approved SD Cards – approval by Experts or delegate is required for all SD Card images;
- Any additional software not supplied by Competition Organizers unless approved by Experts;
- Purchased items modified in any way prior to the Competition;
- Equipment that is similar or operates in similar manner as supplied equipment. Example – if a metal cut-off saw is provided by Competition Organizers, then no team may provide their own metal cut-off saw;
- All raw materials, components, parts, purchased item, tools and equipment not permitted in the Technical Description and List of Materials Allowed and Not Allowed of the skill.

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