

Experiment Guidelines

Read our guidelines carefully before proceeding to the experiment, and feel free to ask us any questions that you may have regarding our study.

In this experiment, you are invited to implement a robot application using the ABB Wizard Easy Programming Tool, a block-based programming language for articulated robots. You will be requested to write a software solution that allows clients from a coffee shop to sort cans containing two flavors of coffee among two organizers using a robot. Using your solution, the clients must be able to demand the robot to move all cans of one flavor to the first organizer, and all cans of the second flavor to the second organizer.

Before the start of the experiment, the robot will be pre-configured for you with robot positions that will allow you to program the grab and release of the cans from both organizers. Such robot positions will be available for you in the programming language, along with other blocks that will allow you to control the robot in the workspace. You will write your program solution using a FlexPendant, a touchscreen interface similar to a tablet. To help you complete the programming assignment, a desktop computer will also be available for you to request assistance when necessary.

Keep in mind that the cans containing the two flavors of coffee will be randomly placed by a stocker in each organizer every time you test your software solution. The respective flavor of each can will be identified by a name and a color printed on the can: Kona Coffee (in brown) and Original Coffee (in orange). The organization of the cans by the robot over the two organizers must be guided by the clients via touchscreen interactions on the FlexPendant, and it is your mission to figure out a way to implement it using the resources available in the programming language. Everything that you will need to implement your solution is available in the programming language environment. If you face any problems, use the desktop computer to get assistance.

Follow the software requirements below to guide your software implementation. Your block-based solution will only be considered valid if it follows all the listed requirements.

Software requirements:

- ☐ Your software must start printing a welcome message to clients on the Flexpendant screen.
- ☐ Your software should only use the features available in the given block-based language.
- ☐ Your software should only use the robot positions available in the block-based language. You should not create new robot positions for your solution, but you can instantiate as many other variables as you want (e.g. numbers, strings).
- ☐ Your software must receive the customer's input to decide the next actions of the robot, and the customer's input must be received as touchscreen interactions on the Flexpendant screen.

- ☐ In terms of actions, the robot must be able to move the coffee cans from one organizer to the other and to move the first can of each organizer to the last position of the same organizer, based on the customer's input, and while your application is running.
- ☐ Customers should be informed about which one of the actions above the robot is performing.
- ☐ Customers should not interact directly with your code, including but not limited to moving your blocks or editing your variables.
- ☐ Your software must allow customers to decide when to stop the application. This decision must be received as a touchscreen interaction on the Flexpendant screen.
- ☐ Your software must be written within a single file, provided for you beforehand by the experiment. You should not create or load other files in the programming environment, or even rename the one opened for you.

To guide your experiment, consider the following details:

- You are expected to be able to complete the experiment within one hour, but you may have up to twenty minutes extra if you judge as necessary.
- You are free to end your participation in our experiment at any moment, even if you do not complete the task given.
- Once you complete your participation in this experiment, you will be invited to complete a post-experiment questionnaire. We kindly ask you to provide as many details as possible about your experience in this experiment at this stage.

To get assistance throughout the experiment, be aware that:

- On a desktop computer next to you, you will find an application running with text materials, videos, and a chatroom with an expert to support your programming task. Feel free to use these resources as much as you want.
- Please, don't close the application running on the desktop, nor look for external resources on the computer.
- Keep in mind that before getting access to the resources page on the desktop application, you will be requested to inform what type of question/problem you are facing in a form. Please, provide as much detail as you can about your current question/problem, your input will be valuable to us.
- Close the request **whenever** you solve a question/problem, and start another request when necessary.

To program the robot, consider the following requirements:

- You should not physically interact with the robot or any other software application installed on the FlexPendant. Your focus should be concentrated only on the block-based language and the task assigned to you. However, you are free to use the desktop computer to request assistance as many times as you want.
- The robot is configured with pre-defined robot positions that you can use to move it around the workspace: *LeftDispenser_Bottom*, *LeftDispenser_Top*, *RightDispenser_Bottom*, *RightDispenser_Top*, and *Center*.

- Each position comes with a descriptive name. For example, *LeftDispenser_Bottom* stands for the bottom part of the left dispenser, *RightDispenser_Top* stands for the upper part of the right dispenser, and *Center* stands for the center point between the two dispensers.
- **When moving a can around the workspace, always move it to the *Center* position before moving it to the next desired position.** This will protect the gripper from colliding with the environment, avoiding potential damage to our equipment.
- Every time you run your solution, **make sure you have one of your hands close to the stop button** on the FlexPendant. If you notice that the robot will collide with itself or with the environment, use the stop button to stop the program execution and fix any problems in your solution before proceeding.