Automation Engineer for a Day

Click here for an instructional video to support the task

Introduction

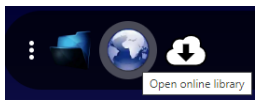
Interested in Automation solutions? This task will take you through the process of task automation as used in manufacturing, logistics, and many other industries using automation tools such as robotic arms. The task will give you insights into the approach an engineer takes to design an automation solution and online support to develop and test your own automated station.

Background

Automation is all about using technology to automate manufacturing, material handling, warehouse distribution, and many other tasks. Automation aims to reduce the need for human intervention, increase accuracy, and maximize efficiency. Engineer develops automation solution on a case-by-case approach, where they study the requirements, the available resources, accuracy required, operating hours, and many other factors to design an optimized solution, that is cost effective and technically viable. In this activity, we will quickly take you through the process from initial concept development, to building your automated station, programming it, and then performing simulation to ensure proper operation. You will see full size industrial robots in operation but use a cloud-based software to test your station.

The Task

Your task is to develop your very own automated station using a robotic arm from scratch. The automated task is to spray paint a provided object. A cloud-based software will be used as a simulation package that can be accessed at robodk.com/web, the following steps will take you through the process.

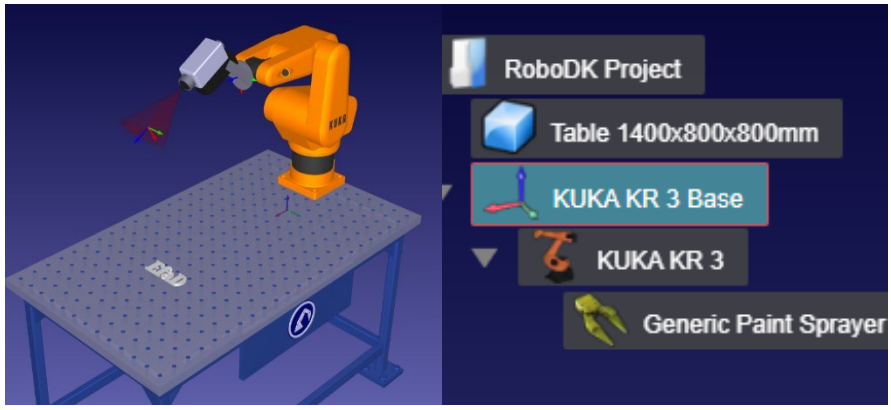


1. Use an internet browser to navigate to robodk.com/web
2. Get familiar with the available buttons, then use the globe button to access the online library. Use the search bar to search for a table to be the base of your station.
3. Navigate the library for robots using brands, look for KUKA KR 3 robot and add it to your station.
4. To perform spray paint operation, a sprayer is required. Use the search bar again to search for a sprayer.
5. Select the robotic arm reference frame then add the available Generic Paint Sprayer to the station, the sprayer should automatically attach to the robot end effector.
6. The robot may appear outside the table due to the difference in the reference frame. To adjust the location, press and hold the Alt key in your keyboard to show the reference frames arrows, use the mouse pointer to select and move the ones at the robot's base until it is on the desired location on the tabletop.
7. Import the provided 3D file as that will be used as a sample to paint, adjust its location by double click on the object on the Station tree on the left, then update the X and RX values to X=650 and RX=90.
   To download the 3d file, follow this link.

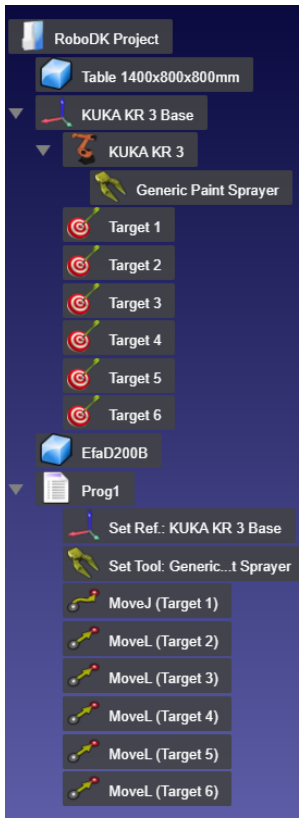
Post a photo or comment on social media or use the QR code to access our Padlet:
https://padlet.com/t_s_o_donovan/EngineerForADay

Connect with **Engineer for a Day** at Heriot-Watt University

EfaD@hw.ac.uk @HWU_Engineer @HWU_Engineer Engineer for a Day



8. As the station is complete, it is time to start setting targets to develop your first program. While the robot in the home position, click once on the target button to set the first target. Select “move reference frame” or hold the Alt key then use the mouse pointer to move the arrows until the sprayer is near by the 3D object.
9. Follow the previous steps to develop a path that runs twice over the 3D object as if it is performing two spay pint layers.
10. To convert the set of targets to a program, select all the targets then click on the “add new program” button.
11. A program will be generated automatically on the station tree. The program will automatically have “MoveJ” (for joint movement) and “MoveL” (for liner movement) instructions.
    In case an error appears referring to singularity, you will need to convert the affected “MoveL” movement to a joint one by right clicking on it.
12. Test each program step individually by double clicking on it, then the full program by double clicking on the “Prog1” icons on the station tree.
13. When done, save your work by exporting the station.



Useful notes

1. To select an item, double click on it or on it name on the station tree.
2. To get the robot to its home position, double click on the robot then select home on the window that will appear at the right. Do not use the browser’s back or refresh buttons as that will erase your work.
3. For detailed step by step guidance, refer to this recording .

Think about

- What could you do to optimise the operation time of your station?
- How can you automate your task further?

Post a photo or comment on social media or use the QR code to access our Padlet:
https://padlet.com/t_s_o_donovan/EngineerForADay

Connect with **Engineer for a Day** at Heriot-Watt University
EfaD@hw.ac.uk @HWU_Engineer @HWU_Engineer Engineer for a Day

Record your participation

After completing the task and posting your work to the Padlet, ensure that you complete this form to record your participation to acquire your Certificate of Participation.

Post a photo or comment on social media or use the QR code to access our Padlet:
https://padlet.com/t_s_o_donovan/EngineerForADay

Connect with **Engineer for a Day** at Heriot-Watt University

EfaD@hw.ac.uk @HWU_Engineer @HWU_Engineer Engineer for a Day