The Alchemist Robot

KUKA robot demonstrator

Student

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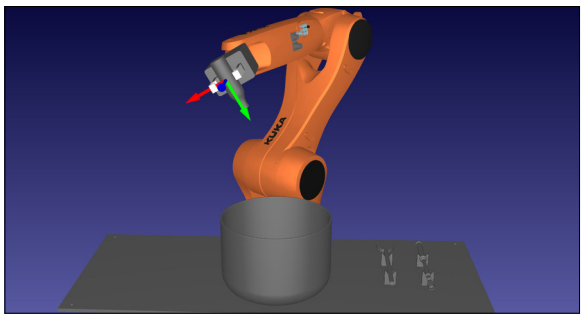
Initial Situation: Industrial robotic arms are commonly associated with manufacturing environments and repetitive industrial tasks. At OST, robotics courses offers to students to work hands-on with real robotic systems, including an aging industrial KUKA robot. At the beginning of the project, both the robot and its working environment had been unused for an extended period and therefore required reconfiguration and functional testing. In addition to the use within courses or projects, ILT had a need to use the robot to showcase robotics in an attractive and playful way during events.

Objective: Therefore, the main objectives of this project were :
- Setup the robot and write a QuickStart documents for students It is a prerequisite for the second objective.
- Reuse the KUKA robot by transforming it into a fun interactive demonstrator intended for public exhibitions, fairs, and forums. By embedding the technical aspects of robotic motion planning, manipulation and coordination within a storytelling-based scenario inspired by alchemy, the project aims to renew the perception of industrial robotics and present robotic technology in a more accessible and engaging way.

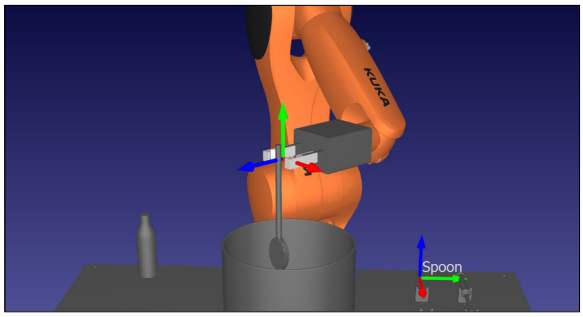
Result: The first phase was dedicated to reading the supplier documentation, setting up the robot and its working environment and testing it. A quick-start guide was then redacted for all future users of the KUKA. It now allows students to focus on the main tasks required, instead of having to dig into a heavy documentation reading process.
Then, the second phase started, focused on the demonstrator development process.
The design of the environment using CAD tools allowed to precisely define object placement and interaction zones. Robot trajectories and task sequences were then planned and validated through simulation using RoboDK prior to real-world implementation, enabling safe motion planning and efficient iteration. The functional simulation of the main robotic routine was successfully achieved.
Within the simulator, the robot was able to select a specific glass vial among several others, perform a pouring motion above a cauldron, return the vial to its original position, stir the cauldron with a spoon, and finally use a magic wand to perform a symbolic “spell-casting” action.
The sub-routine motions have then been successfully tested on the real robot. In addition, fantasy props (vials, magic wand) have been custom made for this project using 3D printing and other miscellaneous means.
The robot is now ready for the next steps, that are the integration of additional hardware components, including a customized gripper and a magnetic tag sensor, in order to increase interaction capabilities and system flexibility, as well as special effects to make the experience fully magical !

Concept design of the Alchemist Robot demonstrator (Not AI-generated)
Own presentment

Screenshot of the robotic motion simulation created by the author using RoboDK - Vial pouring sequence
Own presentment



Screenshot of the robotic motion simulation created by the author using RoboDK - Cauldron mixing sequence
Own presentment



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Subject Area
Mechatronics & Automation, Mechatronics and Automation