

# A User-Friendly Digital Twin Package for UR Collaborative Robots

## PROJECT BACKGROUND

The incorporation of automation technology into a production facility is an arduous and capital-intensive process that requires considerable expertise. Many companies, especially small and medium-sized enterprises (SMEs), are struggling to integrate robotic systems into their facilities due to the overwhelming capital expenses and technical knowledge required during setup.

The digital twin package presented hereafter is intended to make industrial robots more accessible for SMEs by lowering the capital and skill-level required for robot integration.

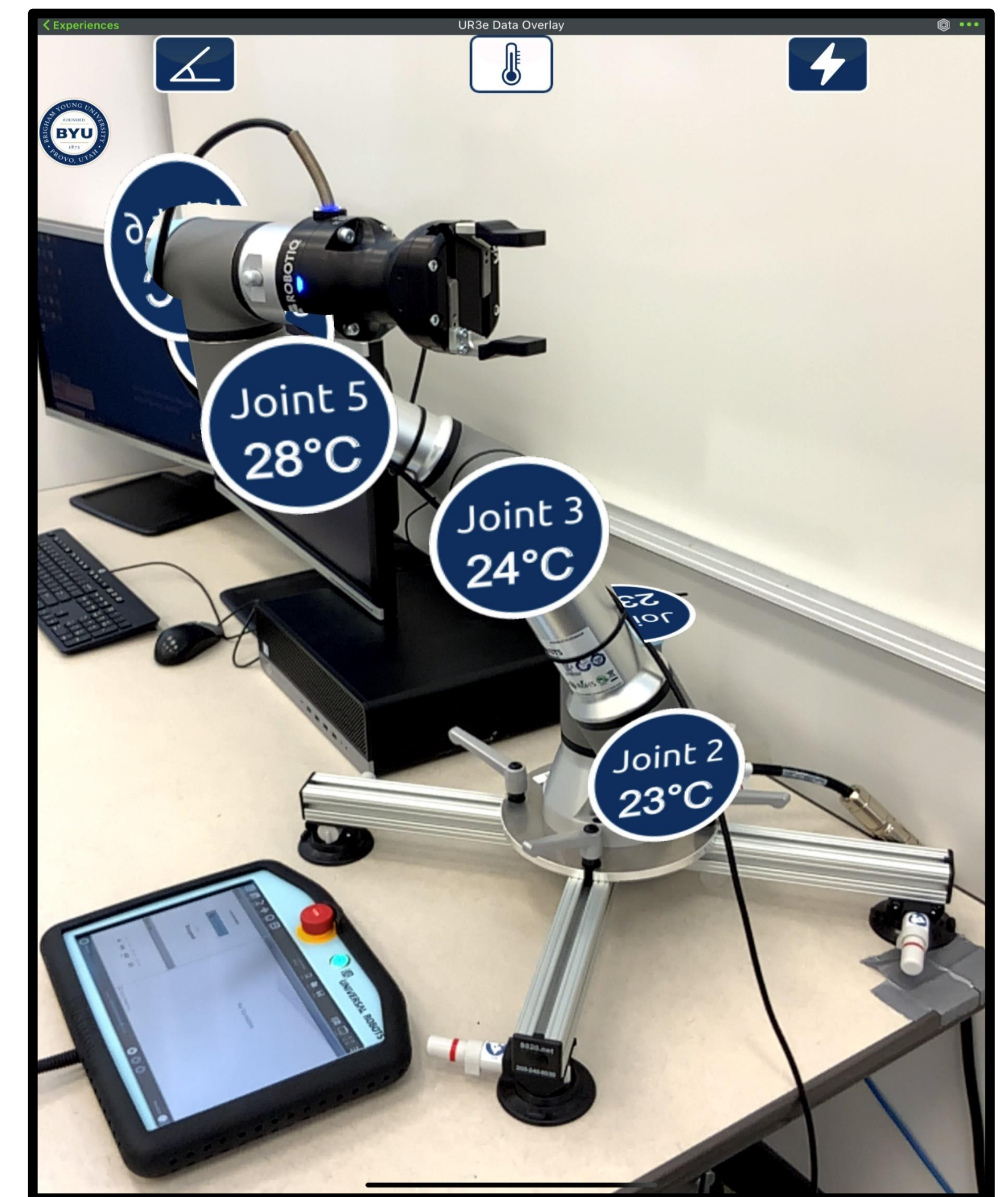
## DIGITAL TWIN #1 (BELOW)

This digital twin allows the user to place a virtual robot into a physical space using augmented reality and serves to facilitate workstation planning. It includes a library of various robots and end effectors which render an accurate representation of the physical robot. The on-screen sliders allow the user to move the AR robot into any pose. This AR experience allows the user to easily visualize how a robot will fit into a workspace without having to purchase it first.



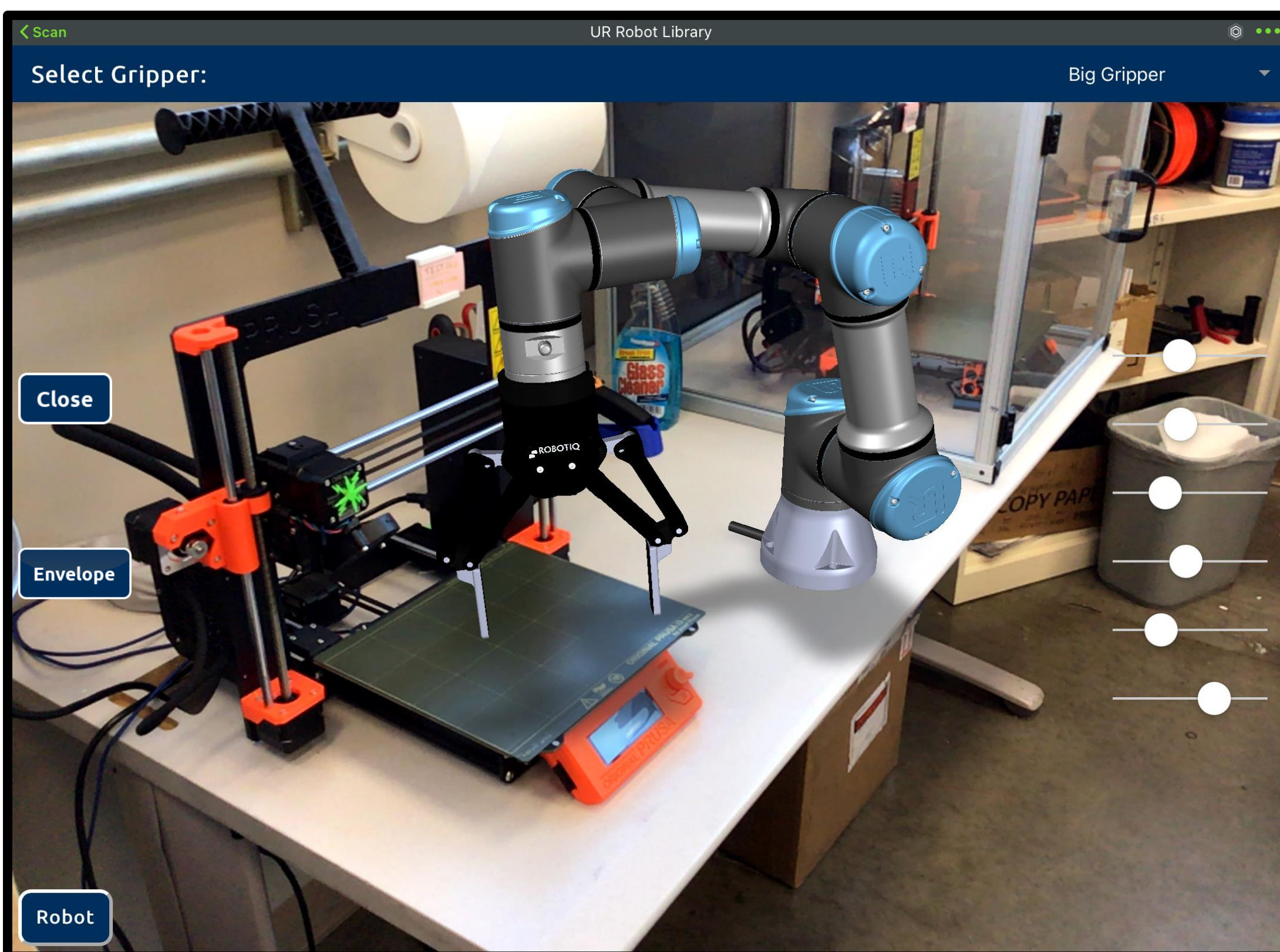
## DIGITAL TWIN #3 (LEFT)

This digital twin is fully-connected and allows the user to control the physical robot using a smart device. There are six on-screen sliders that allow the user to create a program with up to four waypoints. The digital twin is considered "closed-loop" because the defined program is sent back to move the physical robot. This AR experience allows those who lack expertise in manipulating industrial robots to generate simple programs through a user-friendly GUI.



## DIGITAL TWIN #2 (ABOVE)

This digital twin is data-rich and allows the user to effortlessly monitor a robot's current operating conditions. It is enabled by real-time data flow coming from a physical robot and displays the rotation, temperature, and current of each of the six joints. This AR experience provides a simple data display that allows operators to quickly check that an industrial robot is operating within specifications.



## PROJECT SUMMARY

This poster explores a novel approach to integrating industrial robots in a production facility, using augmented reality digital twins. The AR digital twins depicted herein are intended to simplify the process of spatially planning a workstation, display real-time performance metrics for a robot in operation, as well as provide an intuitive user interface for creating basic robotic programs. This digital twin package is enabled by PTC's smart manufacturing software suite and was created specifically for Universal Robots' collaborative robot family.

The following digital twin classes are included in this package: (1) dimensionally-accurate, moveable AR models of the UR robot family, (2) a data-rich, real-time 3D dashboard for the physical robot's operational data, and (3) a closed-loop, fully-connected programming interface that is capable of controlling the physical robot. These elements work together to enable inexperienced users to plan for, monitor, and interact with industrial robotics in a way that is much more intuitive than other, more traditional methods.