

Robot Manipulators and Automation

AUTO4507

Group Project	Industrial Robot Manipulator	weeks 6-12
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GROUPS: Form groups of 4 students
EQUIPMENT: UR5 Robot
TTGO controller
Your developed input device.

Design and build a scaled model of a UR5 robot that will serve as an input device to a real UR5 robot.



Project Brief and Requirements

Your task is to build the 6-DoF robot model from 3D-printed or laser-cut parts.
Consider signing up for the Maskers Club and required inductions.

Each of the 6 axes should be equipped with a sensor (e.g. potentiometer), which is to be fed as an input to a TTGO ESP32 controller (provided).

Write a program on the TTGO to display the 6 joint angles.

With the forward-kinematics calculate and display the gripper position in x,y,z for the real UR5.

Visualize the robot configuration graphically on the TTGO.

Link your TTGO via WIFI to the UR5's router.

The UR5 should copy the movements of your model robot in real time.

Use button-1 on the TTGO for establishing and stopping a link to the real UR5.

Use button-2 on the TTGO close/open the gripper on the real UR5. Implement a recording & playback function on the TTGO for a robot movement sequence.

This should be paired with your real-time movement code, allowing you to move the model and robot to different positions and recording them. You should then be able to play them back by having the robot move between the positions using joint or linear moves (your UI should allow this to be selected).

BUDGET

The maximum budget for this project is \$40 per group.

If you would like to get your expenses reimbursed, please submit a reimbursement request with invoices via Concur, details to be provided at a later date.

DEMONSTRATION

During your lab session in week 12.

VIDEO

Produce a video of approximately 1 minute demonstrating the complete functionality of your developed UR5 input device, including its interaction with the real UR5 robot.

SUBMISSION

Submit one report per team as a softcopy plus hardcopy with official coversheet incl. declarations of all team members:

1. Project design report (*pdf*), which includes:

- Report on which team member did what
- CAD design
- Software design
- Diagrams, photos, screenshots, plots, etc.
- Bill of Material with costing (budget)
- User Manual

Include page numbers; max 10 pages plus 1 Title page

Do NOT include:

- o Program code
- o Table of contents, etc.
- o Half-empty pages

2. Source code (*email to project supervisor only, no hardcopy*), clearly marking any imported code with referencing the source.

MARKING

70% Functional Performance, Design, Complexity, Innovation

20% Project Design Report

10% Video