



Company Information

Company Name	<i>Electrolux Home Products Inc.</i>	Date Submitted	<i>03/15/2024</i>
Project Title	<i>Automated User Interface (UI) Touch Calibration Fixture and Test Procedure Development (Electrolux_ROBOT)</i>	Planned Starting Semester	<i>Fall 2024</i>

Senior Design Project Description

Personnel

Typical teams will have 4-6 students, with engineering disciplines assigned based on the anticipated Scope of the Project.

Please provide your estimate of staffing in the below table. The Senior Design Committee will adjust as appropriate based on scope and discipline skills.

Discipline	Number	Discipline	Number
Mechanical	2	Electrical	1
Computer	2	Systems	

Company and Project Overview:

Electrolux shapes living for the better by reinventing taste, care, and wellbeing experiences, making life more enjoyable and sustainable for millions of people.

As a leading global appliance company, we place the consumer at the heart of everything we do. Through our brands, including Electrolux, AEG, Anova, Frigidaire, Westinghouse and Zanussi, we sell more than 60 million household and professional products in more than 150 markets every year.

Electrolux has been doing business since 1919. The global headquarter is in Stockholm, Sweden and its North American headquarter is in Charlotte, NC. The following products are sold in North America under the Electrolux and Frigidaire brand.



Project Requirements:

This project will concentrate on the development of a specialized test fixture tailored for calibrating the User Interface (UI) of washers and dryers. The calibration procedure will deploy a Kuka KR 3 R540 robotic arm to meticulously achieve repeatability and consistency. See image below:



The student team will design an end effector for the robot and program it to accomplish the test calibration



tasks for washers and dryers being tested in the test lab. The system must precisely apply a force of 8-9 Newtons on the exact center of the capacitive touch buttons of the UI; this will necessitate the incorporation of variable-sized brass "fingers" within the fixture design. All fixtures must work with existing robot arm and cart, allowing arm to be mobile due to various test chambers required for validation testing.

The project will task the students with formulating and implementing a test fixture that seamlessly interfaces with the robotic arm for the execution of calibration tasks and measurement. Developing automatic software packages that work with existing data logging equipment and compatible with Lab3000. Project must be completed within profile and operating parameters of Kuka model robot arm, mounting cart, and compatibility of existing Electrolux test equipment and lab software. Students to be allowed into Electrolux labs as needed for equipment review, robot needs, testing, and any other development activities. Available lab times to be established and open scheduling as needed. Electrolux will supply training material to the student team for robot programming and other lab resources. Electrolux will furnish the team a laptop computer with needed computer applications.

Expected Deliverables/Results:

- Graphical program logic layout using MS graphical software
 - o PowerPoint or Visio
- UI Test Fixture/Jig incorporating Robotic Kuka Arm and cart.
 - o Component/assembly prints
- Test program
 - o UI Surface detection (touch off program) with robot.
 - o Force detection with load cell
 - o Data logging in Lab3000 or 4GE Neo reader for all variables
- Touch program sequence repeatability for each finger probe.
 - o Specific program for each finger size
- Robotic arm detection within .2mm of UI capacitive touch button
- Program / arm to record finger touches at ambient temperature and humidity

Disposition of Deliverables at the End of the Project:

Depending on results of this project it will either be implemented directly within the R&D process to automate the testing procedure or act as a knowledge base for continued development of the test process. This project is considered Phase 1 to automate touch calibration test procedure at ambient temperatures using pre-existing equipment.

List here any specific skills, requirements, specific courses, knowledge needed or suggested (If none please state none):

- Ability to travel to Electrolux site as needed to work with the Kuka robot in their lab (8 miles from campus)
- Interest in Robotics/Automation