

OMIC R&D TECHNOLOGY BOARD

CONCEPTUAL ABSTRACT



TITLE: Implementation Robot haptic (sense of touch) feedback for study of texture analysis and gripping.

RELATED ROAD-MAPPING DESIGNATION ID#: R1.

SUPPORTIVE INDUSTRY: Boeing

PROJECT TYPE: General Project - Robotics & Sensors

PROBLEM STATEMENT (What Are We Trying to Solve?): Robotic end effectors are often dummy grippers. They do not possess sensors to inform the robot what is happening to the part during manipulation. Undetected movement can lead to part dropping or misalignment before final placement. Some grippers have means to detect torque in their joints, but this does not provide a direct measure of forces experienced on a part surface. Having the ability to sense forces at the point of contact helps identify a good grasp from a bad one and mitigating the risk of part slippage during transfer. Furthermore, grippers lack the ability to sense a parts textured surface or the heat of the part. This project seeks to implement sensors that can sense force, vibration, texture, and heat. Adding sensors adds another variable of reliability to the system, so evaluation of sensor durability, wear and life expectancy will be needed.

PROJECT DESCRIPTION: This work will require a robot, an end effector, and a haptic sensor to be mounted to the end effector. Researcher will work with SME & industry to find best texture, and part geometry to analyze. Similarly, if industry has an existing automated process, researcher shall consult for existing grip methods and robot paths being used for consideration in the experiment. It is recommended for the scope of the project to keep prior mentioned variables at a minimum. Consider 1-2 non-complex geometries, and 1-2 material types.

Identify Related OMIC R&D Resources:

- Cobot team Sawyer robot, electronics lab
- Robotics Researcher – Jordan Meader, Machining Researcher – Cody Apple

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PROJECT DELIVERABLES:

1. Fingertips operational. Power and data present.
2. Fingertips operational on end effector.
3. Process for testing texture & grip.
4. Texture functionality explored.
5. Grasp functionality explored: Grasp performed with fingertips, demonstrating force feedback and insight to grip function.
6. Report & Presentation