Robotic Connector Assembly

Overview
TE Connectivity tasked a team at Penn State to introduce a robotic connector assembly to automatically assemble parts of a product. The goal was to use the provided components and the current operator process video to find the automated process that was optimal. There were three main constraints: budget, schedule, and costs. The team introduced a fabricated gripper from tweezers and 3D printed end-effector mounts along with fixture designs to evolve the automated process. The process design was developed with the final end-effector and fixture design. The introduced prototype and process aimed to decrease cycle time, increase savings, and reduce manual labor.

Objectives
The goal of this project is to introduce a robotic connector assembly. The team designed and prototyped an end-effector and fixture designs using SolidWorks to then establish an efficient process design.

Approach
• Understand and satisfy all customer needs – analyze scope against time constraint (Site-Visit)
• Analyze current manual process using given operator video and work instructions
• Evaluate all alternatives using comparison matrix – quality, cost, functionality, durability, etc.
• Design tweezer gripper and SolidWorks model of end-effector mount and fixtures
• Develop software for parts identification system for all possible part orientations
• Adjust Process Design, end-effector, and fixture as needed to complete assembly
• Calculate cycle time, labor costs, idle time, and up-time for new automated process.
• Provide work on Vision System as Future Work Recommendation with updated robot controller

Outcomes
The automated process design will help TE Connectivity standardize assembly process, reduce human labour, increase product quality, and increase throughput.
• TE Connectivity would save at least $449,020 over a 6-year period.
• Reduced idle time to 0%, increased utilization by 33%.
• Increased throughput by 36%.
• Introduced new designs of an end-effector and fixtures.