

Faculty of Engineering

Summer Research Program 2024-2025

Project Title: AI-Enhanced Human-Machine Collaboration for Optimized Assembly and Disassembly Processes

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Objective

The objective of this project is to develop and implement an AI-aided human-machine collaboration system for assembly and disassembly processes, enhanced by the integration of a large language model (LLM). This system aims to improve efficiency, accuracy, and safety in manufacturing environments by leveraging advanced AI capabilities to support human operators in complex tasks. The project will focus on integrating LLMs with robotic systems and human-machine interfaces to create a seamless and intuitive collaboration platform that continually learns and adapts to new situations.

Project Details

This project aims to enhance assembly and disassembly operations by integrating AI algorithms, collaborative robots, and a large language model. The LLM will facilitate natural language interactions, providing real-time instructions and feedback, and continuously learning to improve system performance.

Key Components:

AI Algorithms and LLM for Task Optimization:

Develop and integrate AI algorithms capable of analyzing and optimizing assembly and disassembly sequences. Implement a large language model to understand, interpret, and provide real-time instructions and feedback to human operators and robotic systems.

Robotic Systems Integration:

Utilize collaborative robots (cobots) equipped with sensors, AI capabilities, and LLM integration to assist human operators.

Enable robots to perform repetitive and high-precision tasks, reducing the physical strain on human workers and minimizing errors.

Human-Machine Interface (HMI):

Design intuitive HMI that allows seamless communication between human operators, AI systems, and the LLM. Incorporate augmented reality (AR) and virtual reality (VR) technologies to provide real-time guidance and feedback during assembly and disassembly tasks.

Prerequisites

No

Additional Information