New Robot & Cobot Functionality for Manufacturing Systems

Description of Project
Procter & Gamble (P&G) operates many high speed and highly automated manufacturing facilities around the world. We utilize robotic systems in our manufacturing, packing, and logistics operations. Robot and cobot capabilities are expanding at an exponential pace. The 2017 MDP student team will deliver an implementation of the best emerging robot / cobot technology to address some of our most compelling manufacturing challenges.

This project will provide students the opportunity to learn about near-term robot / cobot application technologies and develop implementation plans for state of the art manufacturing facilities.

Robot / cobot technology is often used for repetitive tasks with defined geometry, such as transferring bottles from a conveyor into a carton for shipping, welding the same locations of an assembly, painting similar parts, deliveries within hotels and hospitals, etc. To fully leverage the technology, however, the capabilities need to be expanded to better emulate the more versatile actions of humans. The enhanced capability targets include greater mobility, higher load capability, increased work envelope, interaction with other machines, and accelerated growth in Artificial Intelligence (AI). This project will focus on developing and demonstrating the enhanced capabilities.

The project will include evaluation and selection of robot/cobot technology, designing and building equipment specific to the manufacturing system tasks, and testing, refining, and validating the complete system.

**Phase 1**
Select, procure, and start up the robot/cobot. Test and validate that the system operates as intended. Develop the program for operating the robot/cobot per the manufacturing system requirements (motion path, acceleration, velocity, loads). P&G will fund the purchase and installation of the robot/cobot in a lab on the UofM campus.

**Phase 2**
Design, build, and install the ancillary equipment required to implement the technology into the P&G manufacturing system (end-of-arm tooling, sensors, etc.).
Phase 3

Design and build a system that accurately simulates the manufacturing system to enable lab scale qualification of the integrated system. Test, refine, and validate that the complete system works as intended. Develop an installation and startup plan for relocation of the system into the manufacturing environment.

Location
Work will take place on campus and at Procter & Gamble’s Engineering Labs in Cincinnati.

Project Faculty Mentor

tbd

Project Sponsor Mentor

Kevin McNeil
Associate Director
Family Care Engineering
Procter & Gamble

39 years experience at P&G. Expertise areas include manufacturing system equipment design, product development, process development, development facilities, innovation processes, and intellectual property. Currently manages a group of 20 engineers developing breakthrough technologies focused on product, process, and manufacturing capabilities.

Key Skills & Project Roles

MDP Sponsored Projects are both a professional and academic learning experience for students. By participating in this program, students are actively preparing for graduate school and a professional career. As part of the experience, MDP expects professional behavior. To best prepare you for future professional opportunities, your experiences on this MDP team will be very broad. In addition to key technical skills that you will bring to the team, you will engage deeply in the self-directed learning of new and important concepts, demonstrate flexibility, collaboration, and cooperation, and develop strong professional communication skills. This also means that you will need to be able to work outside of your traditional area of study in the true multidisciplinary nature of our projects. You won’t always be able to anticipate how your skills and expertise will be used, so the MDP Sponsored Project will challenge you to grow and develop as a professional.
<table>
<thead>
<tr>
<th>Project Roles</th>
<th>Key Skills and/or Knowledge</th>
<th>Likely Majors</th>
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<tbody>
<tr>
<td>Mechanical Design (1-2 Students)</td>
<td>Mechanical design, statics, dynamics, and state of the art quick prototype /assembly techniques.</td>
<td>Mechanical Engineering</td>
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<tr>
<td>Robotics/Mechatronics (2-3 Students)</td>
<td>Robotic design and control, mechatronics, controls, Systems integration, sensor integration, programming</td>
<td>Robotics, Mechanical Engineering, Electrical Engineering</td>
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<tr>
<td>Controls</td>
<td>Motion control, sensors, programming</td>
<td>Electrical Engineering</td>
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**Additional Desired Skills/Knowledge/Experience**

Interest in state of the art large scale manufacturing technologies, excellent “hands-on” engineering design and build skills, Solid Edge CAD experience, experience with 3D modeling and printing, experience with robotics systems, experience with Experimental Design and basic statistics applied in engineering validation, excellent programming skills.

**Company Overview**

Procter & Gamble manufactures a broad range of consumer products. We leverage a broad range of technologies to create consumer preferred product performance and provide safe manufacturing systems that are both high throughput and cost effective. The manufacturing technologies used to produce high quality and high volume consumer good products in P&G are among the most sophisticated production systems in the world. We leverage leading edge technologies from a multitude of global suppliers. We also develop a broad range of new capabilities beyond what is commercially available to meet our needs. P&G has an extensive and growing intellectual property portfolio, with hundreds of patent applications and granted patents each year. Overall, there are a wide range of very challenging and intriguing technical opportunities for candidates with technical degrees.

**Legal Requirements**

Citizenship and Right to Work:

Student must have authorization to work in the United States without restriction.

Intellectual Property Agreements / Non-Disclosure Agreements

Student must agree to a non-disclosure agreement to ensure protection of proprietary capabilities resulting from this effort. All rights to inventions developed within this effort will be assigned to P&G.

**Internship Information**

Summer Internships available. Candidates must successfully complete interview process (this includes an on-line screening skills test). More information is available at [www.experiencepg.com](http://www.experiencepg.com)
Some P&G Products