Industry
Manufacturing

Technology
Workforce Development

CESMII
THE SMART MANUFACTURING INSTITUTE

PROJECT CASE STUDY

Scalable Curricula for the Smart Manufacturing Shop Floor

PROJECT LEAD

FESTO

PROJECT TEAM

West Virginia University

PROJECT OBJECTIVE

The goal of this project is to create a modular and scalable curriculum that allows students of diverse backgrounds to learn in a hands-on manner how Industry 4.0 technologies and data-driven analytics are applied in smart manufacturing systems.

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Public-Private Partners Develop Novel Smart Manufacturing Training Course

BENEFITS TO OUR NATION

Providing smart manufacturing engineering training to students of all ages is a strategic investment in America's future. By equipping students with the skills and knowledge needed to excel in cutting-edge manufacturing technologies, the nation can build a highly skilled workforce ready to tackle the challenges of the digital age. This not only ensures a steady pipeline of talent for industries but also enhances America's global competitiveness. These students become innovators, driving forward technological advancements and fostering economic growth. Smart manufacturing training at an early stage doesn't just empower individuals; it positions the entire nation for sustained prosperity and leadership in the evolving landscape of modern manufacturing.

BENEFITS TO INDUSTRY

Integrating smart manufacturing engineering training into high school and university curricula offers immense benefits to American industry. By nurturing the skills and knowledge of the future workforce in emerging technologies like IoT, automation, and data analytics, the American manufacturers will maintain their position as manufacturing technology leaders and innovators. Preparing students for smart manufacturing careers not only secures their future but also fortifies the nation's economic and technological prowess, promising a prosperous future for American industry.

PROJECT DESCRIPTION

TECHNICAL APPROACH

Develop a novel composition framework that allows course designers to individually create curriculum based on modules and sub-modules for the unique needs of educational stakeholders and their students in a scalable and expandable way. This will provide a comprehensive series of modules for Manufacturing and Energy data analytics on top of basic smart manufacturing & foundational content. The composition framework will feature an open design to allow for expansion with additional modules and content beyond the original modules developed in this project.

ACCOMPLISHMENTS

- Surveyed all accredited Industrial Engineering programs in the United States regarding Smart Manufacturing curricula.
- Created Smart Manufacturing curriculum modules and templates.
    - Smart Manufacturing Basics
    - Connectivity & Manufacturing Data Acquisition
    - Manufacturing Data Analytics
    - Energy Analytics
- Installed and validated Festo CP Lab Industry 4.0 Learning System at WVU. (First installation in North America.)
- Created curriculum composition framework that outlines the entire Smart Manufacturing curriculum, including modules, exercises, and required resources.
- Taught combined undergraduate and graduate Industrial Engineering course (IENG493C/IENG593B).
- Conducted summer Engineering camps for 100+ middle and high school students.

DELIVERABLES

- Delivered course requirements document and scope report.
- Delivered complete curriculum package.
- Delivered Internal Review Board Approval Process Documentation.
- Delivered Course Composition Framework.
- Delivered course evaluation results.

REUSABLE OUTCOMES / SM MARKETPLACE

- Course Composition Framework
- Smart Manufacturing curriculum modules and templates
    - Smart Manufacturing Basics
    - Connectivity & Manufacturing Data Acquisition
    - Manufacturing Data Analytics
    - Energy Analytics

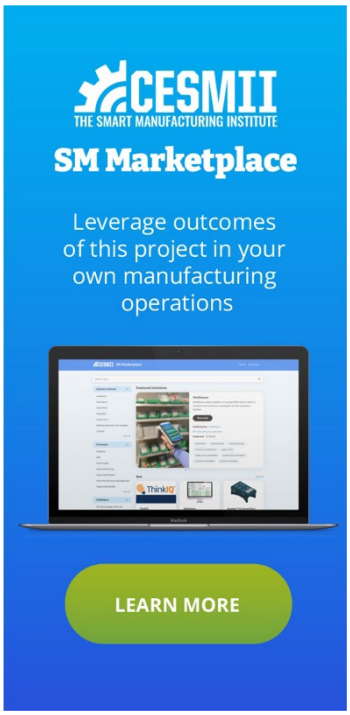
RESULTS

New Course

Developed and taught new WVU Industrial Engineering course IENG493C/IENG593B.

100+

Over 100 high school and middle school students participated in summer Engineering camps.



PROJECT DETAIL
Budget Period: BP4 – BP5
Submission Date: 3/1/2023
Sub-Award (contract) Number:
4550 G YA227
SOPO: 2319

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