CESMII
THE SMART MANUFACTURING INSTITUTE

PROJECT CASE STUDY
Smart Manufacturing Skills Ladder for Community College Students and Incumbent Workers

Basic Concepts & Skills

Vocabulary & Definitions
Problem Solving
Sensors & Actuators
Data Acquisition
Use Machine Vision
Process Models & Control
Use IIoT & Digital Twin
Data Visualization & Analytics
Careers in High-tech Ecosystems

Intermediate Concepts & Skills

System Response/Design
Design & Build Subsystems
Build IIoT systemUse and Build
Digital Twins
Use Digital Supply Network
Quality Improvement
Industrial Cyber Security
Build Control Systems
Predictive Analytics
Complex Problem Solving

PROJECT LEAD

Finger Lakes Community College

PROJECT TEAM

Amatrol

PROJECT OBJECTIVE

Develop basic and intermediate resources that can be used for educating incumbent workers and community college students. Accelerate adoption of Smart Manufacturing (SM) techniques at small and medium size businesses through targeted co-op experiences.

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Finger Lakes Community College Trains Incumbent Workers on Smart Manufacturing Skills

BENEFITS TO OUR NATION

Training community college students and incumbent workers in smart manufacturing technologies will enhance workforce readiness and drive economic growth. Equipping workers with advanced knowledge in smart manufacturing creates a skilled labor force capable of meeting the demands of modern manufacturers. These types of training initiatives lead to higher-paying jobs and career advancement opportunities for workers, thereby improving their quality of life and contributing to the overall economic prosperity of the nation.

BENEFITS TO INDUSTRY

American workers that possess smart manufacturing skills are more adept at optimizing production processes, improving product quality, and reducing operational costs. All these outcomes increase industrial efficiency and competitiveness. With a workforce skilled in smart manufacturing, industry can more quickly adapt to changing market demands, implement cutting-edge solutions, and drive continuous improvement. This investment in human capital boosts productivity and ensures industry growth and resilience.

PROJECT DESCRIPTION

TECHNICAL APPROACH

Develop Smart Manufacturing educational resources which can also be used by incumbent workers and community college students. Students will be introduced to basic concepts and intermediate skills in use of sensors, data acquisition, data analytics, process modeling and control, digital twins, and industrial application of machine learning and Artificial Intelligence. The program will leverage educational resources shared through prior CESMII educational projects.

ACCOMPLISHMENTS

- Developed learning modules for community college students and incumbent workers to introduce Knowledge, Skills and Abilities (KSA) required for technicians in Smart Manufacturing Industry 4.0 environments.
- Introduced students to physics and calculus concepts needed to design system models and control processes.
- Introduced students to digital twin concepts via a hands-on lab for developing a table-top digital twin at the edge.
- Utilized and extended capability of the Smart Manufacturing Learning System (SMLS Amatrol 990 SM10), and through use of inexpensive sensors interfaced with Arduino Wi-Fi - transferring sensor data over MQTT to Borg Hub
- Delivered six Co-op Case Studies of Growing the SM Workforce, especially at Small Medium Enterprises (SMEs).

DELIVERABLES

- Delivered Complete Learning Modules for the following Smart Manufacturing topics:
  - Data Sources & Analytics
  - System Models and Control
  - IIoT and Industrial Cybersecurity
  - Digital Twins
  - Connected Workers

REUSABLE OUTCOMES / SM MARKETPLACE

- Smart Manufacturing Technology training materials and manuals
- Complete program materials to establish an Associate of Applied Sciences (AAS) Degree in Smart Systems Technologies
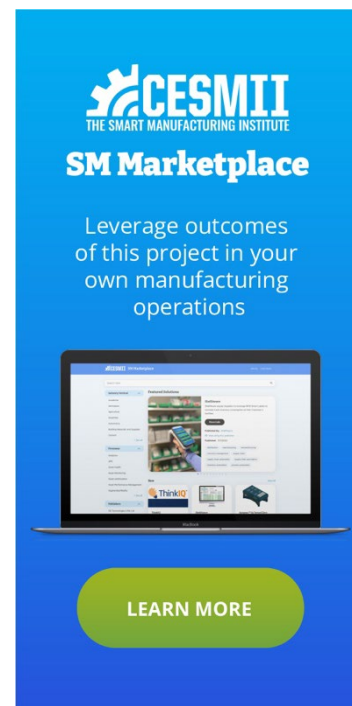
RESULTS

New Degree

Developed complete program materials for the Associate of Applied Sciences (AAS) Degree in Smart Systems Technologies.

6 Case Studies

Completed case studies of 6 community college students who utilized the Smart Systems Technologies AAS degree to enter the manufacturing workforce.

SM Marketplace

Leverage outcomes of this project in your own manufacturing operations

LEARN MORE

PROJECT DETAIL
Budget Period: BP5
Submission Date: 7/22/2024
Sub-Award (contract) Number:
4550 G LA097
SOPO: 2355

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