



Fostering partnerships and pathways to educate the advanced manufacturing workforce.

Researching  
Developing  
Training and Educating  
Dissemination  
Mentoring  
Consulting  
Partnerships  
Deploying

Preparing the Next Gen  
Manufacturing Workforce

## Mechatronics Careers & Trends Webinar

*Karen Wosczyzna-Birch, Executive Director, Connecticut College of Technology and Executive Director & PI, National Center for Next Generation Manufacturing*

*Jerry Muller, Industrial Technology Coordinator, Central Community College*

*Doug Pauley, Associate Dean of Training and Development, Central Community College*

*Steven Lichon, Business Lead, Intelligent Devices, Rockwell Automation*





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## CT State Colleges & Universities and College of Technology

- Working with Office of Workforce Strategies and Governor's Workforce Council and participating in Regional Sector Partnerships to meet their workforce development goals and objectives
- Regular participation in industry association initiatives (e.g. CT Manufacturers' Collaborative) and educational advisory meetings (e.g. CT Technical Education & Career System)
- Developing strategic plan for community college manufacturing programs to address the need manufacturing employees



## Industry-Driven Curriculum

- College of Technology (COT) Site Coordinators Council
- Stackable Credential Model-driven by industry and workforce
- Career Pathways
- Microcredentials, Certificates, A.S. Degrees through Community Colleges with partnerships with secondary schools
- Oversees Community College Engineering and Technology Curriculum including all Manufacturing certificates and degrees
- Prepares Students for Immediate Employment as well as seamless transfer to four-year colleges/universities as juniors
- Address the recruitment and retention of underrepresented populations
- Programs include:
  - Mechatronics
  - Machine Technology
  - Welding,
  - Electronics Technology
  - Electro-Mechanical Maintenance
- Programs are added and modified in response to industry needs





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## National Science Foundation Funding

- Recognizes infrastructure of COT as a national model
- First funded in 2004 to establish the Regional Center for Next Generation Manufacturing
- Four rounds of funding including award in 2018 to create a National Resource Center for Next Generation Manufacturing
- In 2021, NSF awarded the COT \$7.5M for a National Center for Next Generation Manufacturing – Focus on Industry 4.0
- Focus on professional development for educators and counselors and outreach programs for high school and community college students



## National Center for Next Generation Manufacturing

### Goals:

- Develop a national manufacturing leadership network
- Create an advanced manufacturing education repository
- Provide Faculty and instructor professional development
- Improve the image of advanced manufacturing
- Provide resources and strategies to develop a diverse workforce
- Partners:
  - College of the Canyons (CA)
  - Columbus State CC (OH)
  - Central CC (NE)
  - Indian River State College (FL)
  - Manufacturing Extension Partnerships (MEPS) with FLATE
  - Diversity Consultants
  - Manufacturing USA Institutes
  - NST ATE National Centers and Projects
  - Industry - including professional associations and organizations using the BILT model to ensure engagement



Contact:

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## National Center for Next Generation Manufacturing Technology Teams

### 1. Design Team

CAD: 2D/3D & Blueprint Reading  
Additive Manufacturing  
Laser Scanning/ Reverse Engineering

### 2. Fabrication Team

CNC Machining/Precision Machining/ Assembly/Metal forming  
Welding

### 3. Processing Team

Mechatronics/Robotics/Automation  
Industrial Maintenance  
Instrumentation/ Plastics  
Laser & Fiber Optics  
Biomanufacturing

### 4. Supply Chain, Logistics & Quality Control Team

Metrology, Process Control  
Supply Chain & Logistics

### 5. Industry 4.0 Team

Virtual & Augmented Reality  
Smart Manufacturing/Big Data/AI/Machine Learning  
Internet of Things/Communications Protocols  
Cybersecurity

**Academic Teams with Industry**

**Professional Skills**

**Mentoring**

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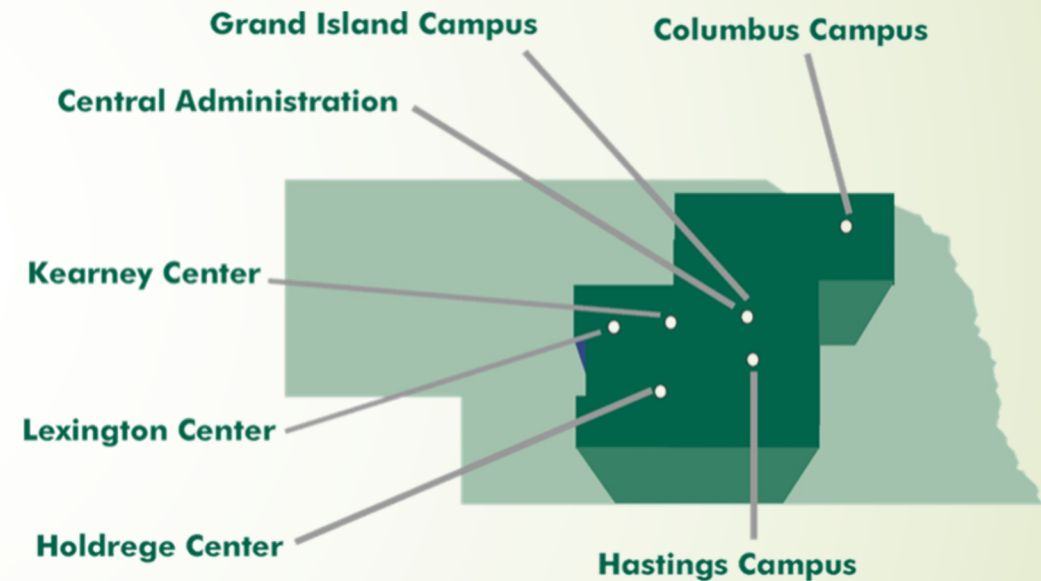


# Enhancing the Independent Mechatronics Technical Curriculum and Creating a New Pathway from Rural High Schools into Mechatronics Careers (iMEC 2.0)





CCC is also a multi-campus, comprehensive community college serving a 25-county area in central Nebraska with a population of more than 300,000. CCC has three campuses and three educational centers within their 14,000 square mile service area.





# Goal

Increase the number of Mechatronics and Process Instrumentation and Control (PIC) technicians to meet workforce demands in Minnesota and Nebraska by enhancing and expanding a high-quality/low-cost distance education model to create a new pathway to Mechatronics programs in partnership with rural high schools.



## iMEC 2.0

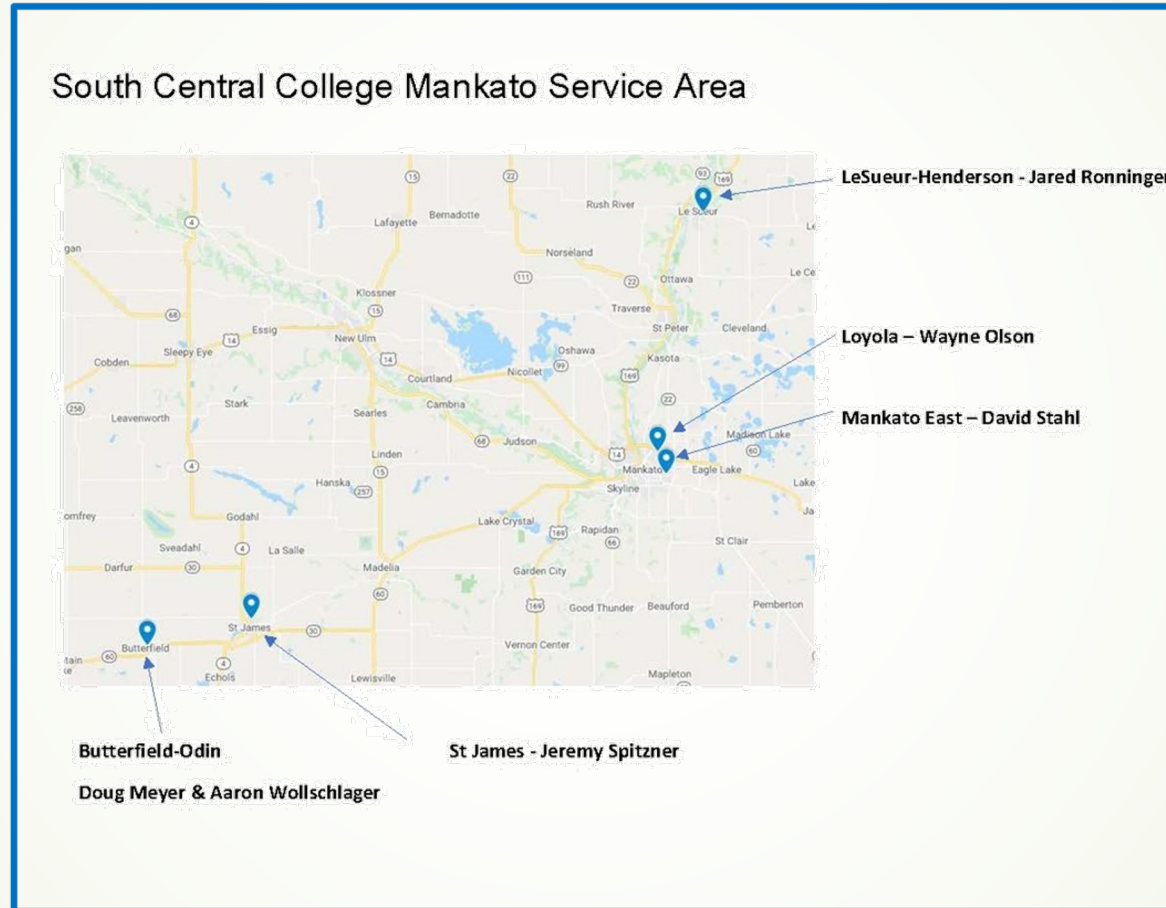
Proposes to create a distance learning-based technical career pathway for secondary students in at least twelve high schools in two states. The pathway will ladder into the Mechatronics Associated of Applied Science (AAS) degree programs at South Central College (SCC) in Minnesota and Central Community College (CCC) in Nebraska







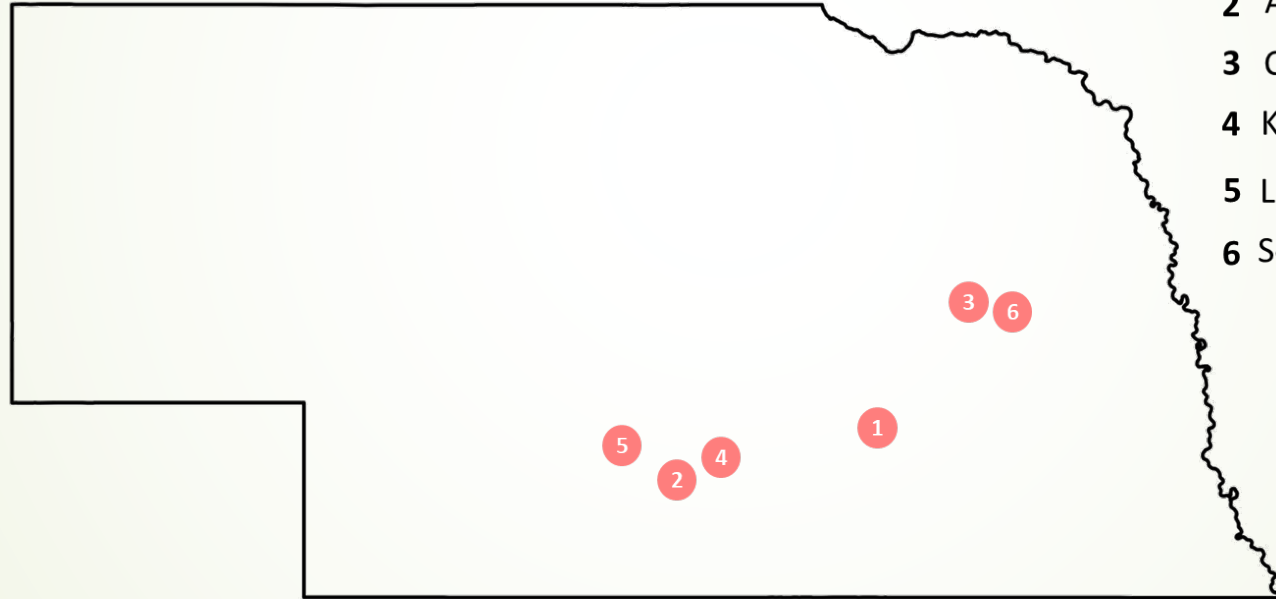
# iMEC 2.0 Minnesota High Schools





# iMEC 2.0 Nebraska High Schools

(170 miles)



- 1 Aurora HS – Tate Erbst
- 2 Axtell HS – Josef Philippi
- 3 Columbus Lakeview HS – Joe Haschke
- 4 Kearney HS – Andrew Olson
- 5 Lexington HS – Tim Potter
- 6 Schuyler HS – Donald Seehusen



South Central  
COLLEGE



Central  
COMMUNITY  
COLLEGE



# Objective 1 Curriculum

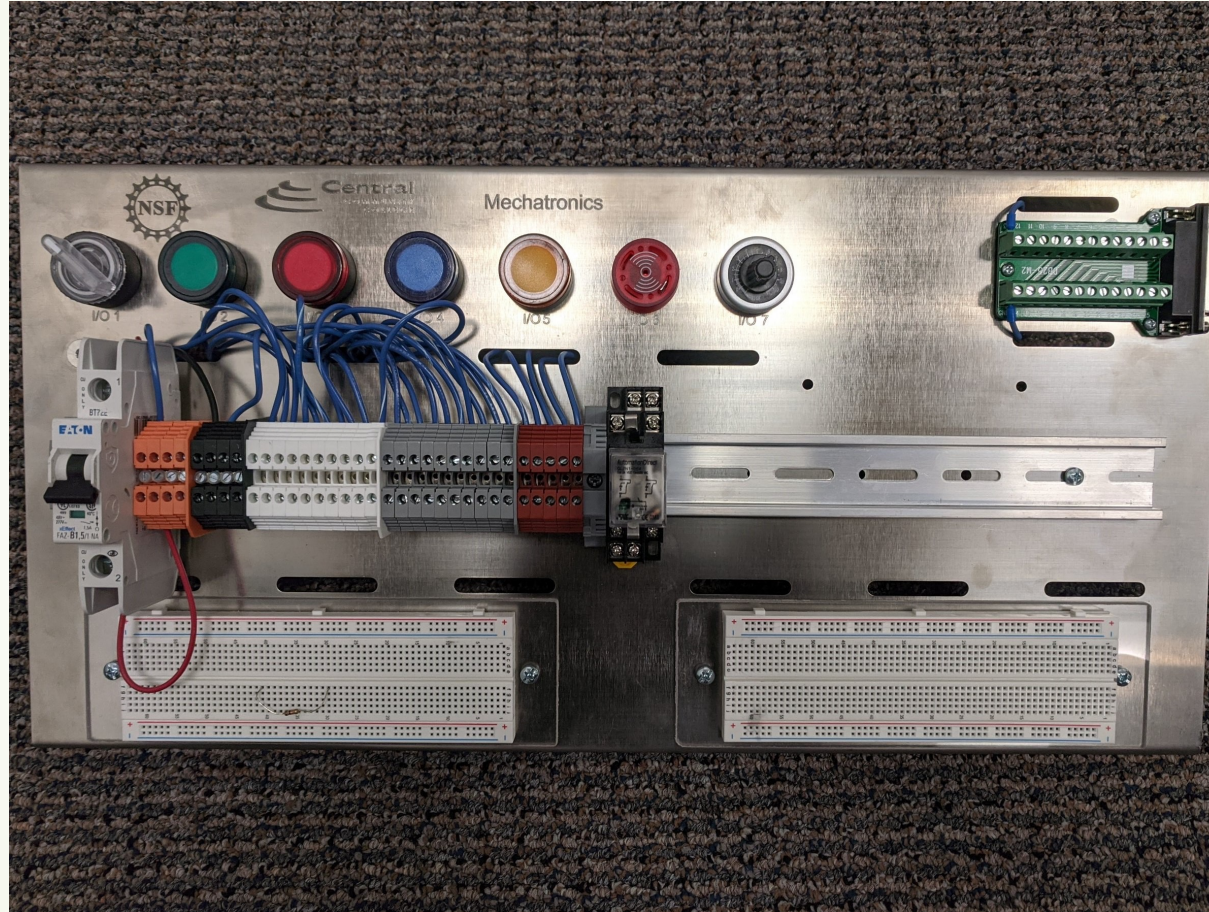
- ▶ Establish distance-based Mechatronics and Process Instrumentation and Control (PIC) Technology programming that prepares high school students for occupations by utilizing advanced interactive hands-on and simulation equipment with distance learning strategies.



# Course Sequence and Development Team

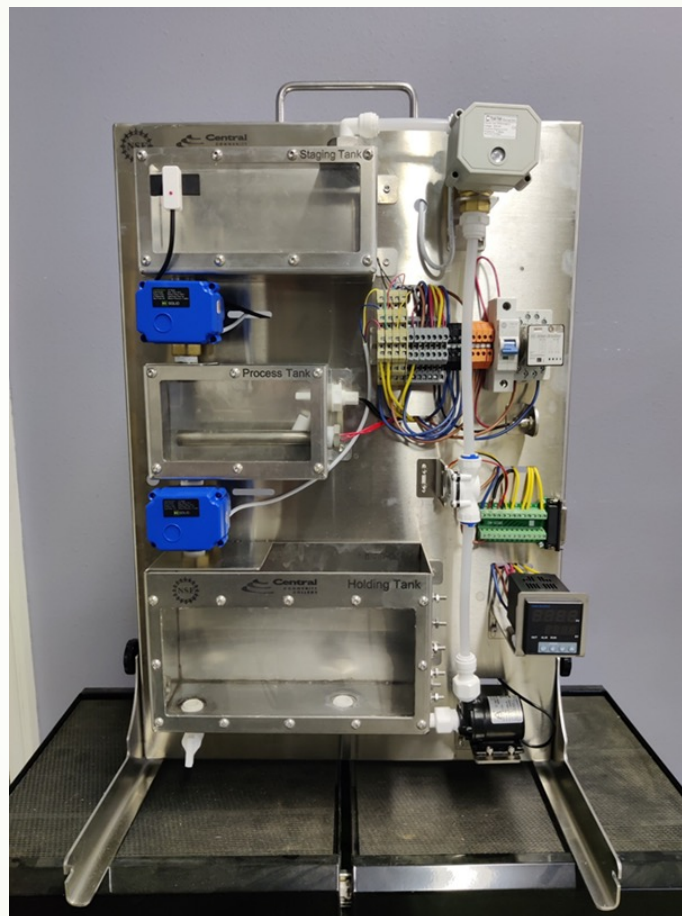
- ▶ Concepts of Electronics
- ▶ Intro to Instrumentation
- ▶ Intro to Programmable Logic Controllers (PLCs)
- ▶ Industrial Sensors
  
- ▶ Faculty
- ▶ High School Facilitators
- ▶ Business and Industry

# Concepts of Electronics Trainer





# Introduction to Instrumentation Trainer

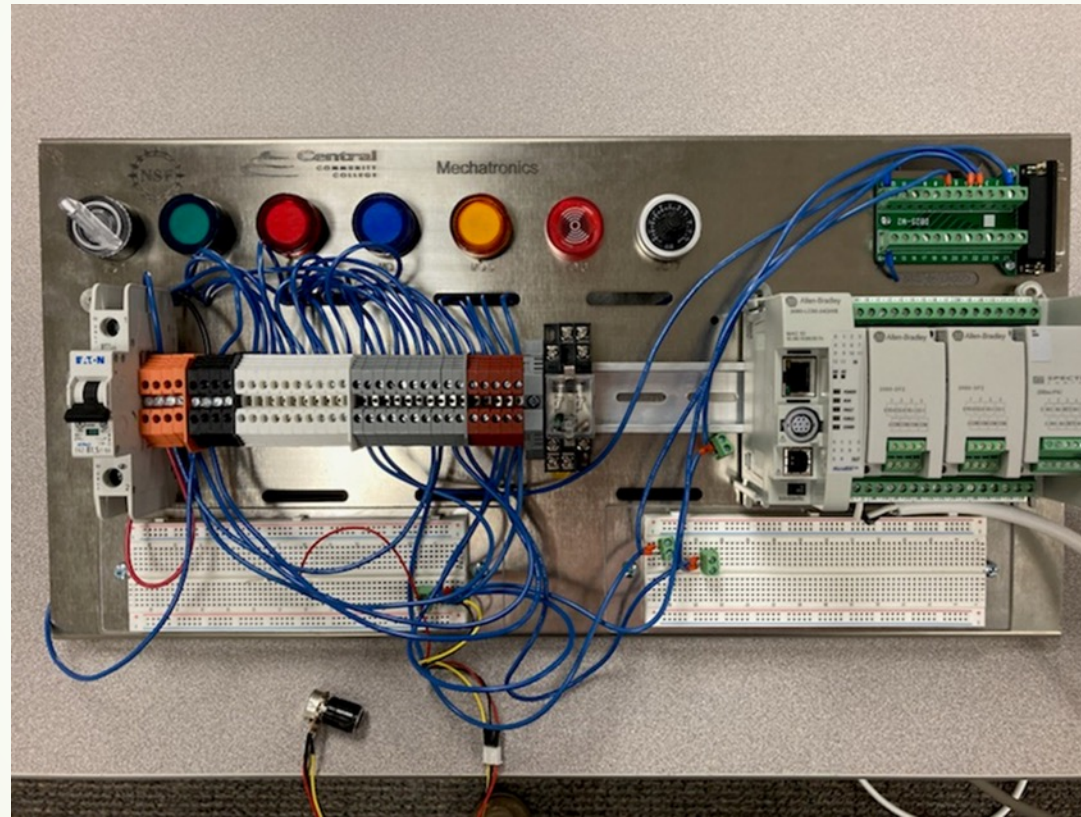


South Central  
COLLEGE



Central  
COMMUNITY  
COLLEGE

# Introduction to PLC Trainer



# Industrial Sensors Trainer



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Basic Proximity (Reed Switch)  
Inductive Proximity  
Capacitive Proximity  
Photoelectric  
Ultrasonic Proximity  
Force  
Photoresistor (LDR)  
Temperature







## Objective 2

# Business and Industry Leadership Team

Develop and utilize a Business and Industry Leadership Team (BILT) to:

- Curriculum Development
- Equipment Selection
- Professional Development
- Career Awareness
- Sustainability

# Industry Partners





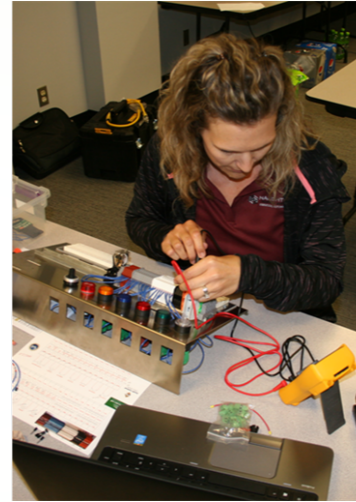
# Objective 3

## Recruitment of High schools and Faculty Professional Development

- Assign a teacher/facilitator to the classroom
- Commit classrooms and storage areas
- Have computers available to students
- Market classes to students
- Offer one course each semester the first year
- Offer two courses each semester the second and third year
- Attend six days of professional development



# Professional Development



South Central  
COLLEGE



Central  
COMMUNITY  
COLLEGE



# White Glove Videos





# Lessons Learned and Best Practices for Web-based STS courses

- Selecting facilitators
- Industry involvement
- Hands-on trainers- one-to-one
- Identify adjunct instructors early-on
- Web based courses opens new opportunities
- Waiving tuition-exposure to Mechatronics



# Lessons Learned and Best Practices for Web-based STS courses

- Freeing up Faculty has been difficult-serving internal students
- Using laptops versus iPads
- Sharing grades with high schools-waiver forms
- Storage space in the high schools
- Building rapport with schools is critical
- Developing videos that are less than five minutes



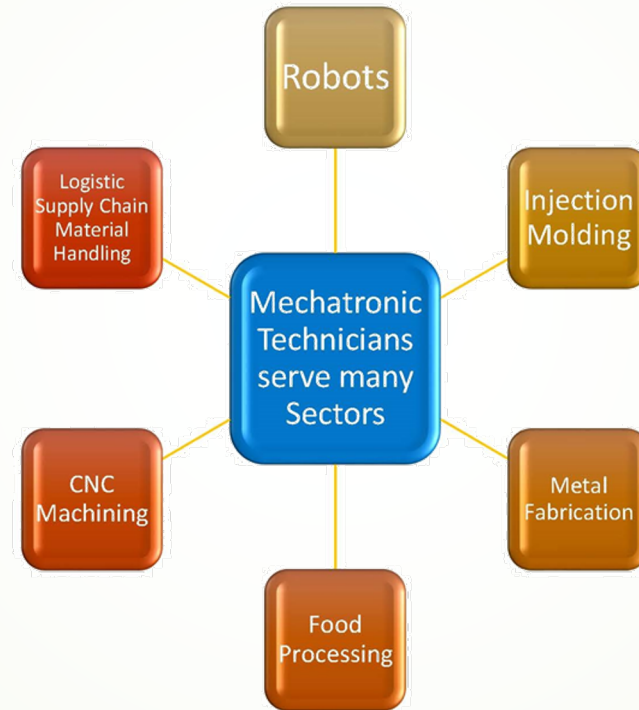
# Lessons Learned and Best Practices for Web-based STS courses

- Getting students registered
- Only allow students who are interested in credit
- High school facilitators are limited-they already have a full schedule





# Mechatronics Technicians Serve Many Sectors



# Steven Lichon

Business Lead – Sensing, Safety, Industrial Control  
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**Struggling to  
find great  
candidates for your  
open positions?**

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**YOU'RE  
NOT ALONE**

**60%**

of skilled production roles go unfilled – Talent is hard to find.

**21%**

of manufacturing workers are expected to retire in next 7 years

**75%**

of employers say new skills are required over the next 2 years

# Finding skilled workforce is a challenge complex and is costing you!

## Total Cost of the Workforce

### LABOR

- Wages
- Benefits
- Recruitment



### OPPORTUNITY

- Turnover
- Over Time
- Supervisor Time
- Talent Acquisition



### HIDDEN

- Safety
- Compliance
- Brand
- Training / Onboarding



+

**Opportunity  
Cost**

+

**Hidden  
Cost**

=

**1.5x  
Labor cost**

# Industry Observations- Workforce of the Future

- Industrial IoT will be transformative to manufacturing competitiveness
- Skills sets blur across traditional disciplines (engineering, business, data sciences)
  - Integration of digital and human elements (automation, augmentation, etc.)
- Additional focus needed on industry perception and attractiveness
  - Accelerate diverse participation and intentional building of talent pipeline
- Acceleration of hybrid learning (on-site and remote), especially the remote / digital aspect
- Applied skills are a key need
- Growing preference for industry recognized credentialing
  - For both upskilling and reskilling
- State (regional) strategies for pathways are increasingly important
  - K thru Grey

Industry-Academia collaboration is key to Digital Transformation in Advanced Manufacturing

# Digital Transformational Talent Requirements

Partnership between Industry and Academia

PHASE

1

- Fundamentals

PHASE

2

- Making All Things Digital
- Industrial Controls
- IoT

PHASE

3

- Connected Systems
- Data Contextualization
- Analytics
- Visualization

PHASE

4

- Business Integration

Development Hierarchy





# For more information, please contact

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## Upcoming Advanced Manufacturing Careers & Trends Webinars

Welding – March 18<sup>th</sup>

Lasers – April 22<sup>nd</sup>

Industry 4.0 – May 20<sup>th</sup>