Human Machine Teaming from the Perspective of the Human: Strategies for Engaging Students and Communities with Emerging Technology

Prof. Michael A. Gennert
Robotics Engineering Program
Worcester Polytechnic Institute
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About WPI

Private, founded in 1865
Focus on
  • Engineering
  • Science
  • Management
Granting
  • BS, BA
  • MS, MEng
  • PhD
50+ disciplines
WPI Robotics

- 1st US Robotics major
- BS, MS, PhD
- Project-based

Robotics Enrollment

- RBE MS, PhD
- RBE BS

Year
Collaborative Robotics to Foster Innovation for Seafood Handling (FISH)

Project Lead: Taskin Padir, Associate Professor of Robotics at Northeastern University

Problem: Fish caught in US processed overseas, returned for sale to US

Concept: Robotics to inspect, sort, fillet – reduce cost, improve food safety

Educational gap: Fisheries workforce not trained in robotics & adv mfg

Opportunity: Educate K-12 now in collaborative robotics for future need

“Need to reskill / upskill today’s workforce for tomorrow’s job”
Next Generation Aircraft

6th Generation Fighter

B-21 Bomber

Problem: Next Gen aircraft impossible/unaffordable with current mfg tech
Concept: Collaborative robotics for composites, assembly – reduce cost
Educational gap: Aerospace workforce not trained in robotics & adv mfg

“Need a skilled robotics workforce to build / supply / maintain these planes at reasonable cost.”
Advanced Robotics for Manufacturing (ARM) Institute

1. Assert U.S. leadership in advanced robotics manufacturing
2. Empower American workers to compete with low-wage workers abroad
3. Lower the technical, operational, and economic barriers for companies to adopt robotic technologies
4. Aid in the creation and sustenance of valuable manufacturing jobs

ARM Institute funding model 2:1 matching non-Federal funds
ARM Institute – Workforce Needs

Strategies for strengthening talent supply

- **Adopt digital technology** to make training available any time, any place
- **Collaborate with academia** to upskill current workers, build pipeline of future workers
- **Standardize skill sets**, engage employees w/ certification programs
- **Build highly skilled workforce via apprentice programs**
- **Expand candidate pool** by hiring for potential
CoBots for Kids

**Engage** middle & high school students with collaborative mfg robots

**Enable** future workforce motivated, skilled, receptive to advanced robotics in manufacturing

**Empower** American workers, create and fill future jobs, lower barriers, US leadership in advanced robotics for mfg

**Employ** WPI & QCC students as teachers

**Partner** with Quinsigamond C.C., MA Mfg Innovat’n Initiative (M2I2), MassMEP, MassRobotics, Worcester CoC, Worcester Public Schools
FIRST / VEX / PLTW

FIRST, VEX
- FIRST: 600,000+ students
- VEX: 1,000,000+ students

Project Lead The Way
- 10,000s of teachers
- Millions of students

“Kids love robotics. It’s the gateway drug of STEM education!”
**Massachusetts Approach**

**Challenge:** Inadequate career awareness / education around mfg

**Concept**
- **Align** graduates / labor markets
- Build **intentional** course taking, **capstones, internships**
- More & clearer **links** to post-secondary partners

**Solutions**
- **Vocational/Technical Frameworks**
  - Advanced Manufacturing / Robotics / Engineering
- **Innovation Pathways**
  - Sector-focused / 4 course sequence / Internship or capstone
- **Co-fund costs**

**Expected Benefits**
- **Double** % students in pathways
- More **intentional & informed**
- **Systematic & scalable**
Call to Action

Effective Approaches

• **Jumpstart** programs via seed funds
• **Leverage** investment with industry, academia, state, local
• **Continue** to invest

Results

• Students have best prospects for **rewarding careers**
• **Maintain leadership** in advanced manufacturing, technology, deployment

“Encourage & support a ‘maker mentality’ so students can create with their hands, think logically, and gain confidence now for STEM jobs of the future.”
Thank You

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