2024 INDUSTRY 4.0 FORUM AND ERP SHOOTOUT

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Artificial Intelligence in Manufacturing Systems

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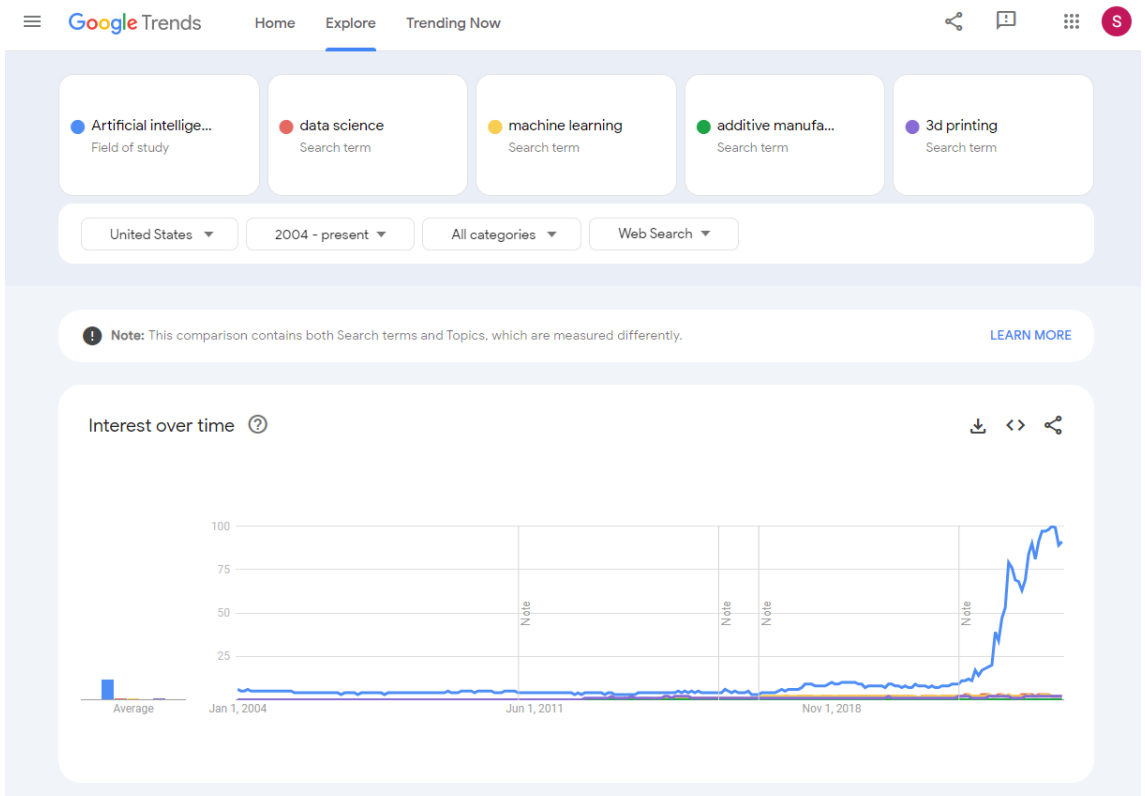
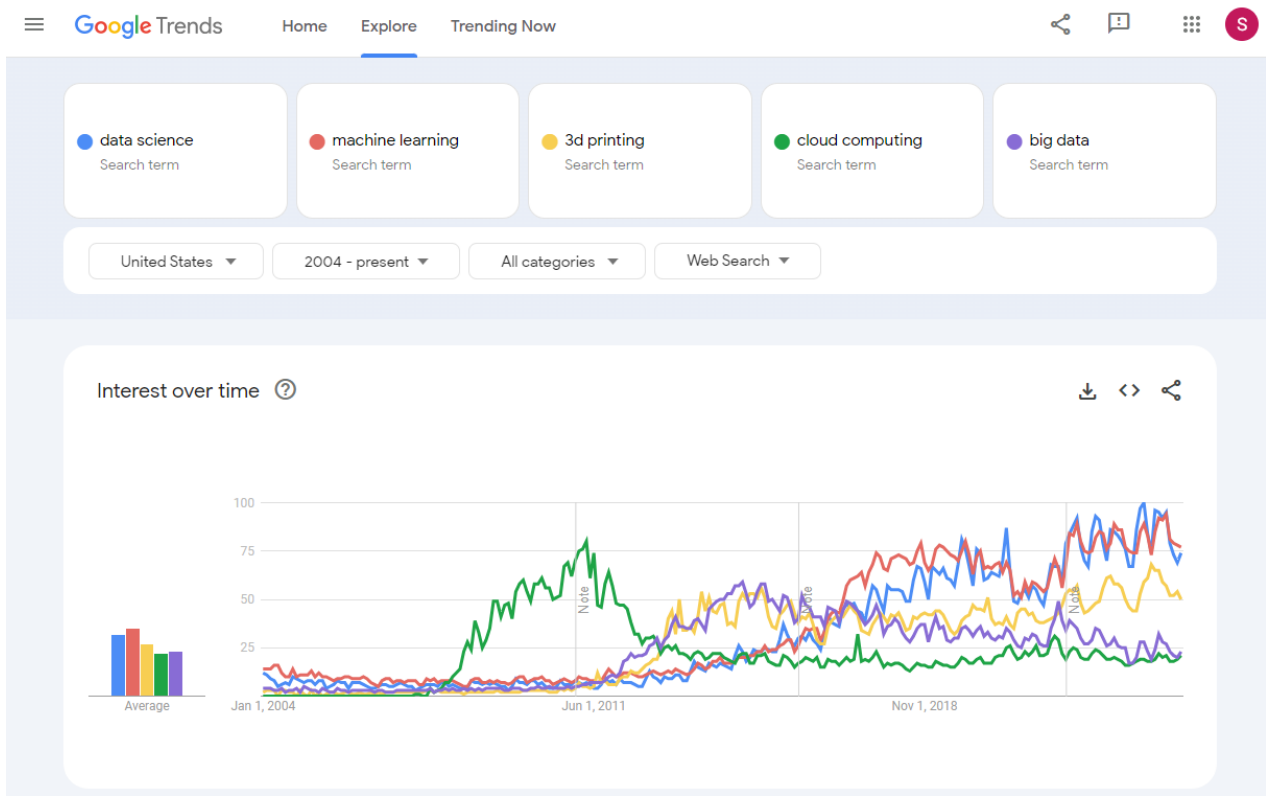
OSU Center for Design and Manufacturing Excellence (CDME)

Artificial Intelligence – The Latest Buzz





OSU CDME

CDME FACILITIES

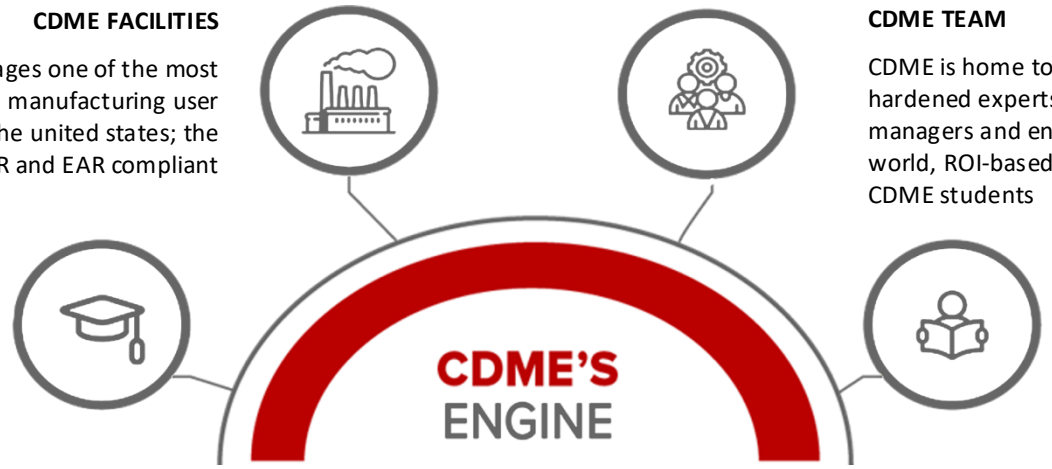
CDME manages one of the most expensive manufacturing user facilities in the united states; the center is ITAR and EAR compliant

CDME TEAM

CDME is home to more than 35 industry hardened experts; these program managers and engineers guide real-world, ROI-based projects and mentor CDME students

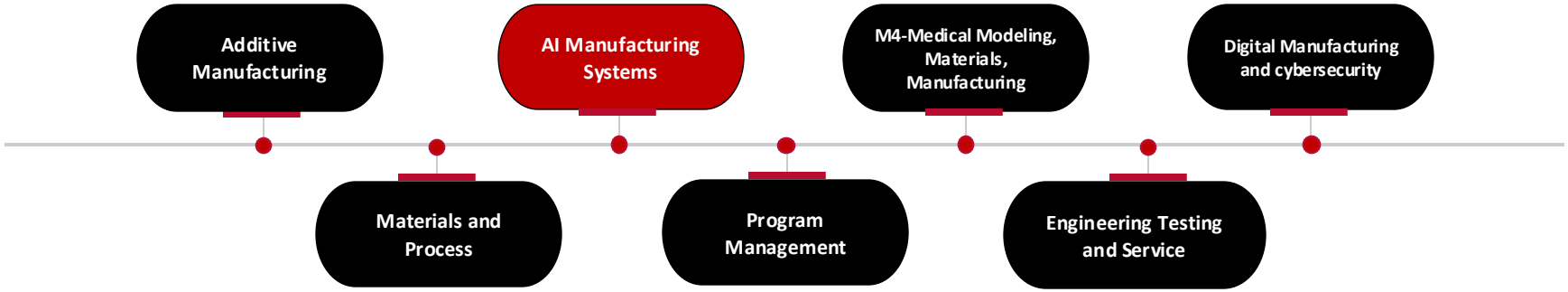
STUDENTS

Undergraduate student employees gain hands-on, mentor experience integrating new technology into industry applications



AFFILIATED FACULTY

Students and industry gain access to Ohio State's world-renowned faculty for collaboration and consultation



CDME Experiential Education

Project Management

- Proposal and report writing
- Creating a project plan
- Contingency planning
- Managing to deadlines and milestones
- Budgeting and cash flow
- Legal
  - Contracts, intellectual property, non-disclosure, trade secrets, HIPPA, ITAR

Project Execution

- Continuous quality control
- Conducting literature reviews
- Supply chain / logistics foresight
- Fail fast
  - Learn and improve without wasting significant resources
- Significance of “great” design
  - Appeal, size, operation, maintenance, environment, sustainability, human interface etc.

Personal Skills

- Working as a leader, with a team, and with constant collaboration
- Asking for help
- Informed decision-making
- Internal / external communication
  - Setting expectations and communicating issues and progress
  - Debate with an open-mind

Artificially Intelligent Manufacturing Systems - AIMS Division

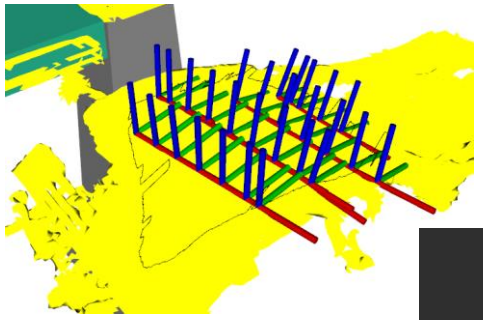
AIMS is dedicated to the research and development of ***manufacturing systems*** that utilize or are controlled by various types of artificial intelligence.

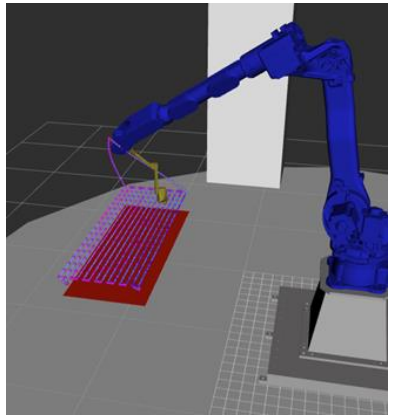
Mission

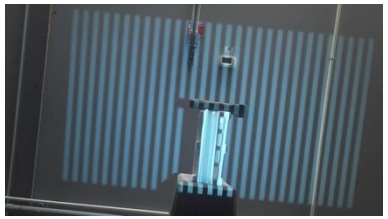
To improve manufacturing methods through advanced sensing and control while preparing the next generation of workers through experiential educational initiatives.

AIMS Division Thrust Areas

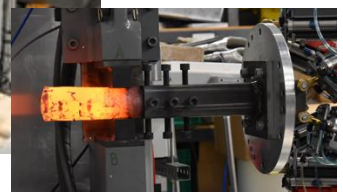
Sensing and Intelligent Control

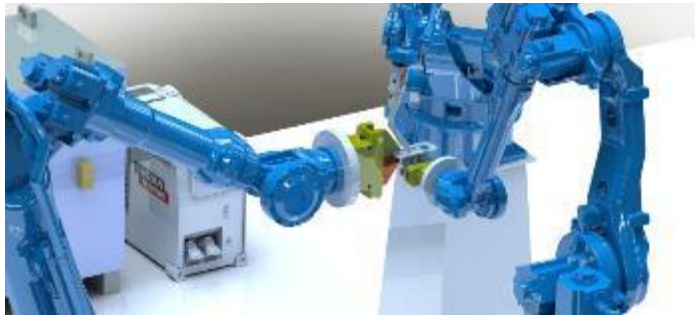




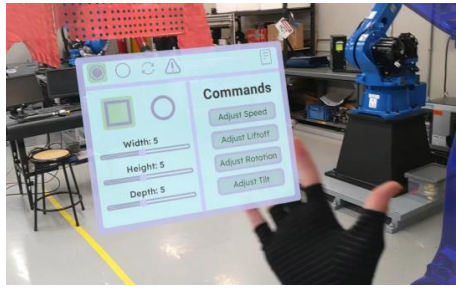


Intelligent Manufacturing Processes



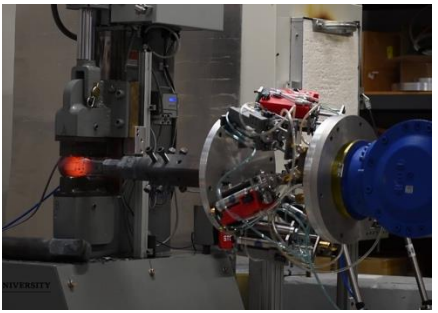


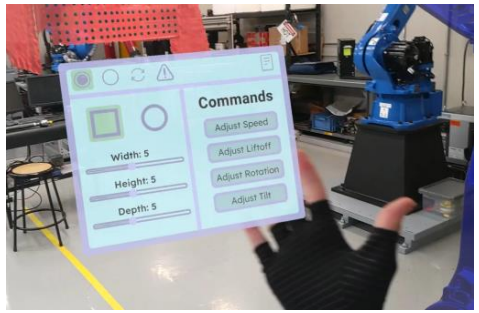
Human-Machine Teaming



--- Systems Design and Integration ---

Examples

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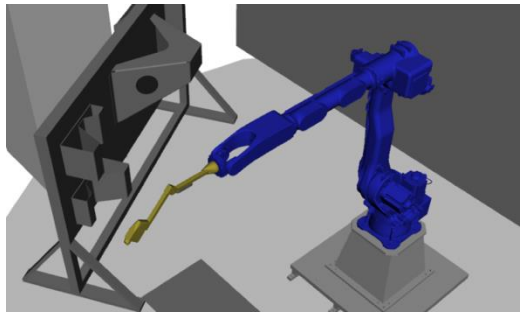
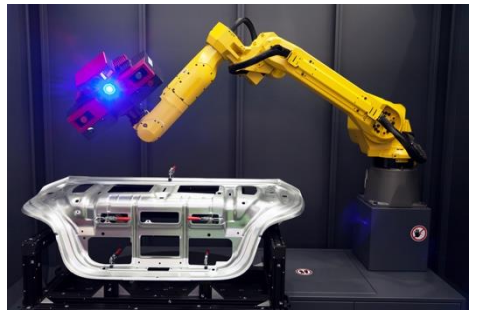
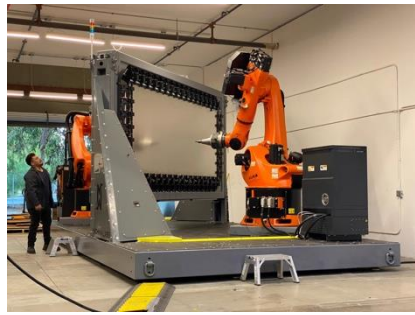
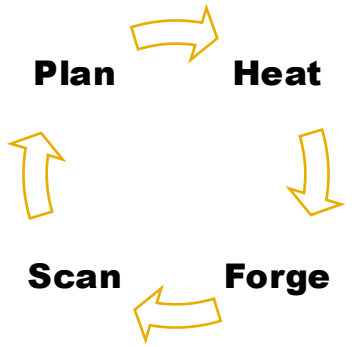


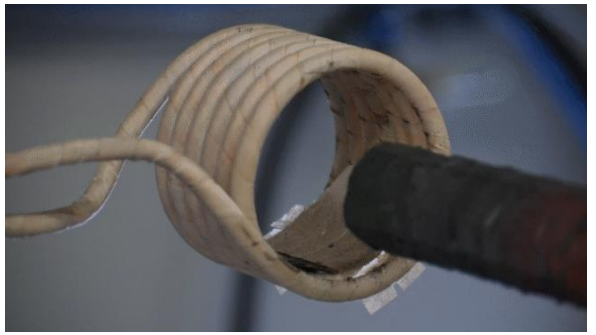


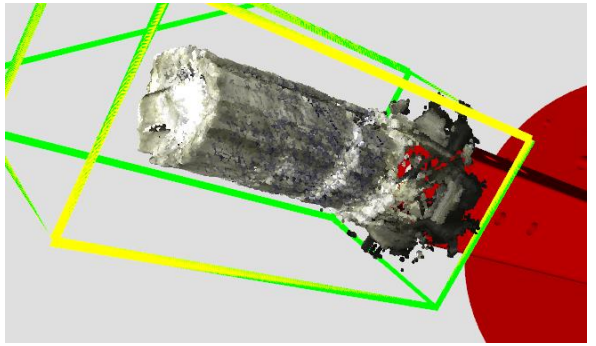


Robotic Forging/Blacksmithing

AIMS and HAMMER are exploring the future of open-die forging to enable manufacturing capability of low-volume high-strength parts.

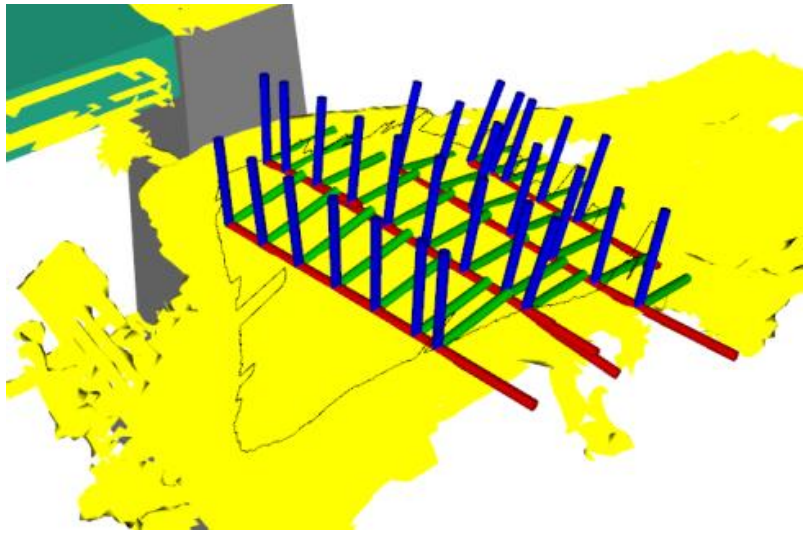


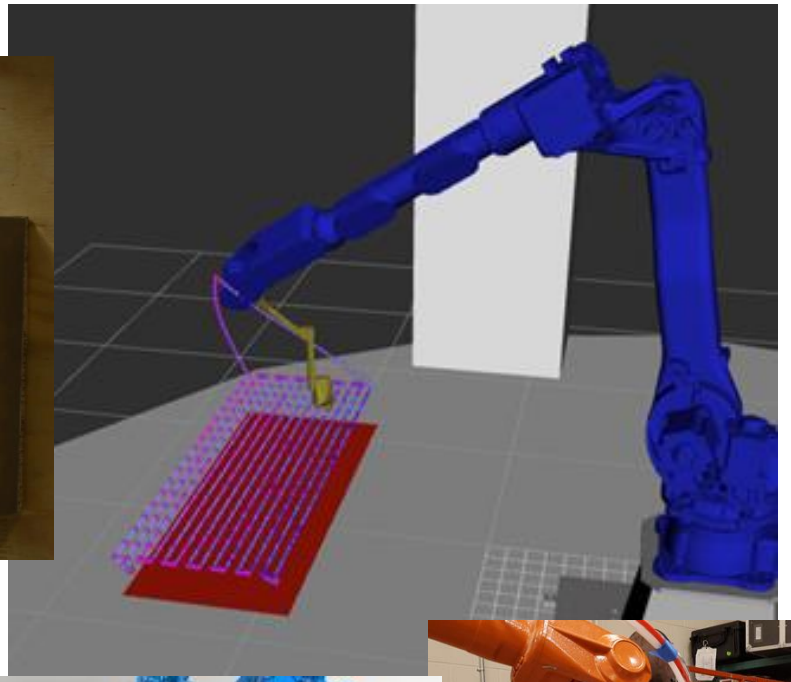


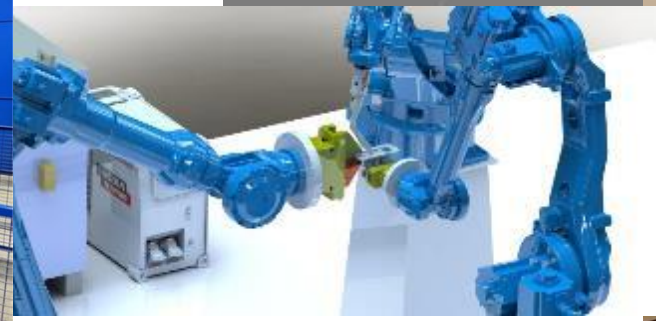


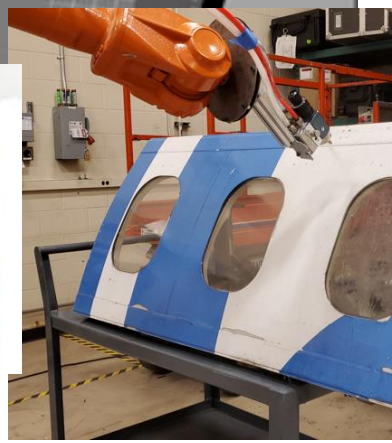
Digital Twins & Intelligent Motion Planning

- Coating and Dispensing
- Milling and Finishing
- Welding



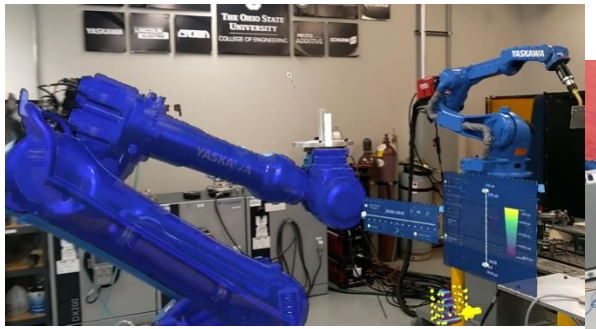


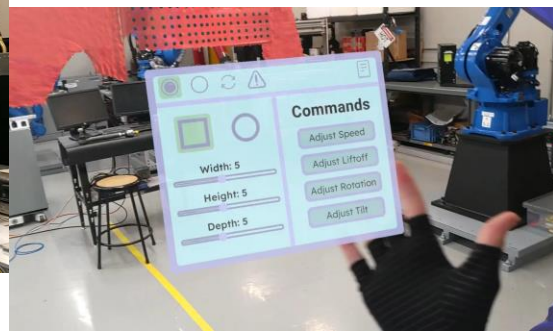




Human-Machine Teaming

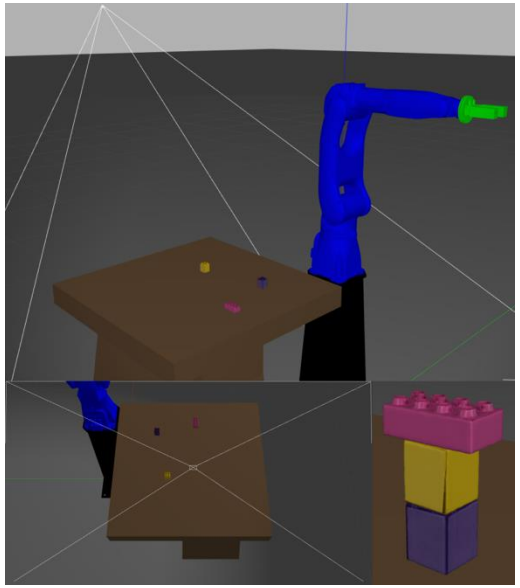
- Collaborative Path Planning using Augmented Reality
  - User feedback trains upstream ML models
  - Novel in-situ feedback of robotic operations

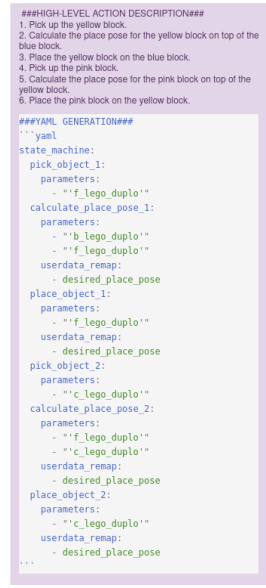




- Flexible Pick & Place Planning
  - Robot programming through verbal user input
  - Harnessing LLMs for translation and custom software for control

Combination of both leads to "low-code"/"no-code" programming





Intelligent Servo-Controlled Forming

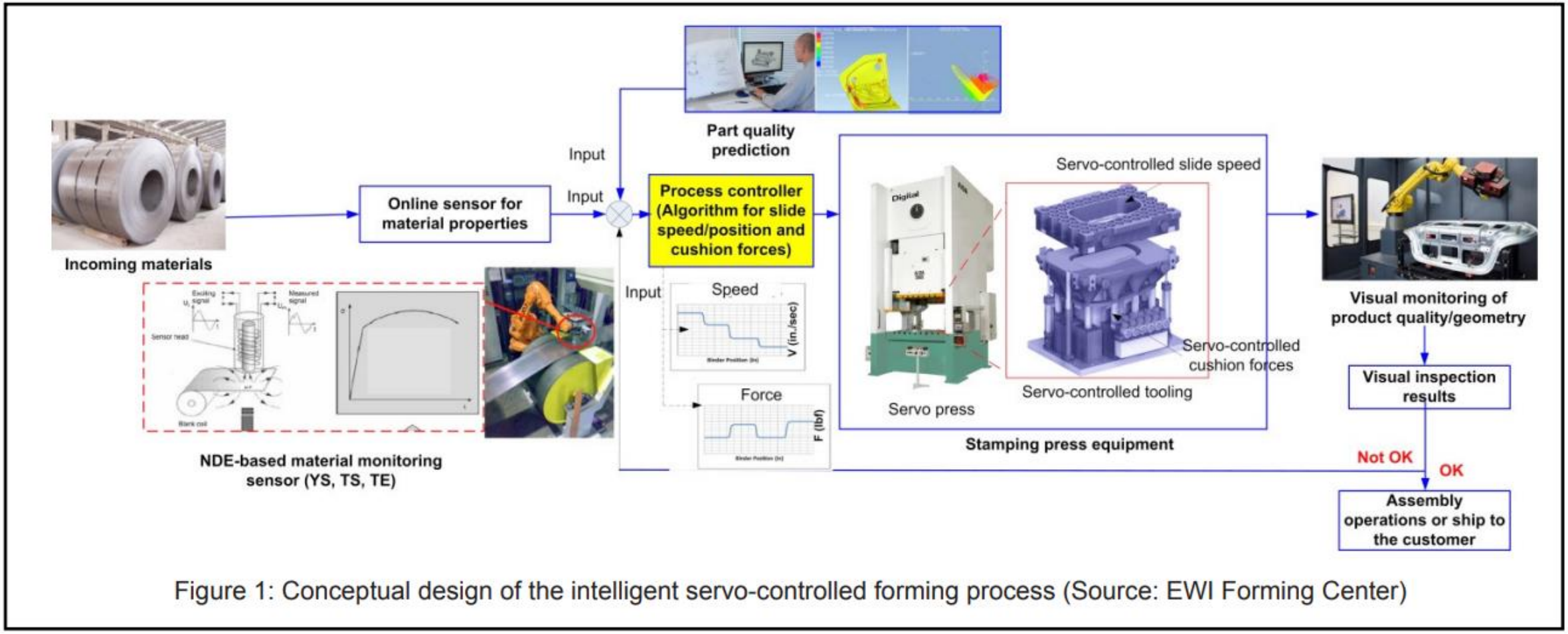
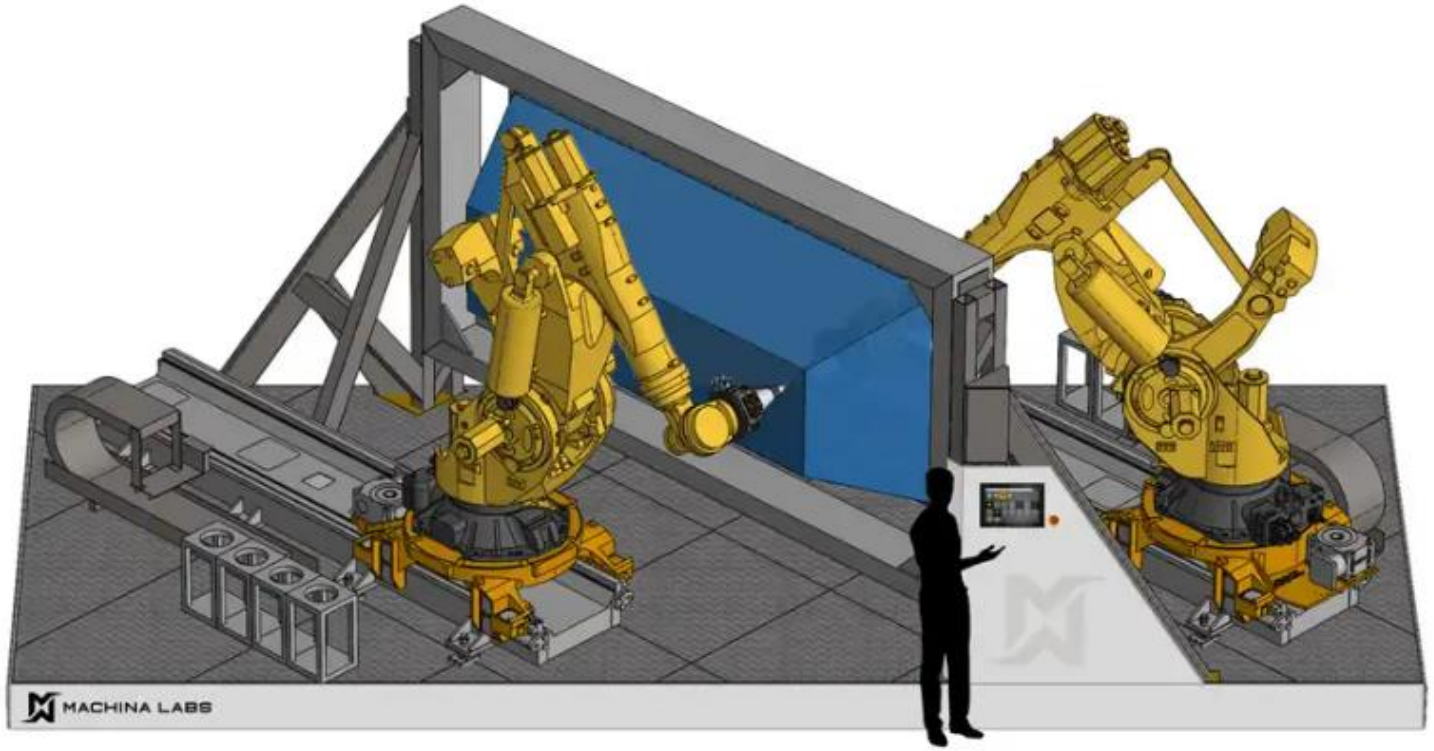


Figure 1: Conceptual design of the intelligent servo-controlled forming process (Source: EWI Forming Center)

https://ewi.org/wp-content/uploads/2018/12/The-Development-of-Intelligent-Servo-Controlled-Forming-Technology.pdf

Robotic Craftsman – Machina Labs



MACHINA LABS

CRAFTSMAN
FLEXIBILITY
AND AGILITY

CURRENT
MFG. TECH
PRECISION
& SCALABILITY

- Use of AI and advanced software
- Material science innovations
- Novel technology for precise control
- Proprietary robotic end effectors

Questions?

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