Manufacturing is becoming digital: challenges and opportunities

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Keynote / interactive lecture
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About me

Assistant Professor at FEUP and a researcher at SYSTEC.

Principal researcher (PI) in several European and Portuguese R&D projects

More than 25 years of experience in systems development, specialised in systems engineering, control architectures and design of software for industrial applications.

Coordinator of the Digital and Intelligent Industry Research Lab.
The automotive industry employs 38% of existing industrial robots.
Based on mass production enabled by the division of labour and the use of electrical energy.

Based on the use of electronics and IT to further automate production.

Based on the use of cyber-physical systems.
machine vision
embedded electronics
industrial internet of things
cyber physical systems
cyber-physical production systems
Assessing the health status of machinery and proposing: methods, tools and services for appropriate life time extension strategies by the creation of a Decision Support Framework.

Increased production efficiency
Re-use of production equipment
Environmental recovery efficiency
Life time extension

RECLAIM’s Core Technical Elements
Refurbishment and Re-manufacturing process

User Layer
Visualization
DSS Files

Real Time Decision-Making Layer
Cost Modelling
Prognostic & Health
Prediction Failures
Optimization Plan

Physical Layer
Circular economy strategies
Repository Information
Digital Retrofitting Infrastructure (IoT)

Demonstration cases in multiple industries across Europe

Follow our journey @reclaim_FoE Reclaim project www.reclaim-project.eu
The openZDM solution will allow manufacturers to increase the capacity for cost savings through waste reduction, while increasing company's productivity and competitive leverage.

openZDM is an initiative that aims to provide an open platform to support production networks’ zero-defect processes, bringing together existing R&D and creating an innovative state-of-the-art integrated solution.

Discover more at openzdm.eu
New technologies for smart manufacturing

SP1 – Intelligent Robotic Systems

Process Adaptation to Human Movement Prediction
3Q 2021 Robot Order Growth (Units, NA, YoY)

- Metals: 184%
- All Other Industries: 97%
- Food & Consumer Goods: 43%
- Semi & Electronics/Photonics: 26%
- Automotive Component: 22%
- Plastics & Rubber: 11%
- Automotive OEM: -30%
- Life Sciences/Pharma/Biomed: -38%
Jeff Burnstein
President at Association for Advancing Automation
Ann Arbor, Michigan, United States · Contact info

“BUSINESSES JUST CAN’T FIND THE PEOPLE THEY NEED, THAT’S WHY THEY’RE RACING TO AUTOMATE!”
Humans vs robots: share of jobs

Source

Machines are predicted to play an increasing role by 2025. Image: World Economic Forum
Transformation of the workplace

Total hours worked in Europe and United States, 2016 vs 2030 estimate, billion

- Physical and manual skills: 203 (2016), 174 (2030)
- Basic cognitive skills: 115 (2016), 97 (2030)
- Higher cognitive skills: 140 (2016), 151 (2030)
- Social and emotional skills: 119 (2016), 148 (2030)
- Technological skills: 73 (2016), 113 (2030)

Change in hours spent by 2030, %

- Physical and manual skills: -14%
- Basic cognitive skills: -15%
- Higher cognitive skills: 8%
- Social and emotional skills: 24%
- Technological skills: 55%

Source: McKinsey Global Institute Workforce Skills Model; McKinsey Global Institute analysis
Waves of automation

Job automation potential

Automation potential by type of worker

Wave 1 (by early 2020s)

Wave 2 (by late 2020s)

Wave 3 (by mid 2030s)

Share of jobs that could potentially be automated (%)

45%

47%

42%

Male (%)

Female (%)

High education (graduates)

19%

Medium education

48%

Low education (GCSE level or lower)

60%

Source: PwC estimates based on analysis of OECD PIAAC data
Automation is making human labour more valuable than ever

SOURCE: Brewers Association
Manufacturing your future!
Skills.move - empowering individuals with the right skills for the future

Explore Skills.move searching by Topic

**Additive Manufacturing**
Discover the revolutionary 3D printing method and its commercial applications.

**Artificial Intelligence**
Explore the world of artificial intelligence and its applications across the manufacturing industry.

**Augmented Reality**
Learn the fundamentals of applying AR technology in production and research.
We support the digital transformation of SMEs towards Industry 4.0.

We establish and develop learning factories. University-based facilities equipped with technology demonstrators and adapted to upskill the personnel via targeted training.

Bratislava, Slovakia
Porto, Portugal
Prague, Czech Republic
Vienna, Austria
OUR GOALS

The challenge of labor displacement driven by technological innovation has a long and storied history...

...and is currently a strong challenge for companies digitalisation!

TURING programme will contribute to address this challenge by promoting personalised and flexible digital enhancement training programmes...

...co-created with digital technology providers, companies adopting those technologies and their mature established customers that use similar technologies.

CONTACT US

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WELCOME TO TURING
Course that offers a specialisation for future T-shaped professionals, combining high-tech skills in Cyber-Physical Systems, IoT and Artificial Intelligence with transversal skills across multiple domains such as creativity, innovation and entrepreneurship.

Self-Made aims to deliver innovative training courses and tailored technical consulting to manufacturing companies. This will enable the exploitation of EIT-M-supported educational assets and the deployment of disruptive technologies to support the digital transformation of such companies.
• # of industrial robots in Europe grew 400% over the past 25 years (from around 95,000 to over 430,000)

• 14% of jobs in OECD countries are automatable | 32% of jobs could face substantial change

• Automation and AI are accelerating the demand for technological skills over the next 10-15 years

• 45%-60% of all workers in Europe could see themselves replaced by automation before 2030

• 96% of all workers at threat could find similar or better work with adequate training

While there are less new jobs created directly by technological progress, one additional technology job creates around five new, complementary jobs in the local non-tradable sector.
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