



In the establishment of the Learning Factory, an industry-focused approach was followed to prioritise skills that underpin critical sectors such as automotive, manufacturing and health. Focal points thus include human-computer interfacing and computer-based learning, augmented reality, 3D printing at different sizes and in various materials, the internet of things and smart applications, as well as robotics – be that industrial, open source and in-house developed, autonomous or cobots.

FUTURE WORK REQUIRES FUTURE SKILLS: THE CSIR LEARNING FACTORY

The CSIR Learning Factory is a collaborative platform that has been established to support skills development and innovation, for leveraging opportunities of the 4IR. To date, the platform has yielded introductory modules to create awareness of the 4IR in South Africa, as well as practical stations, application cells and experience centres to support practical competency development in a modular and customisable manner.

THE NEED FOR LEARNING

The 4IR brought a wealth of new, digital and disruptive technology interventions to change the way societies and industries operate, engage and advance.

While it has opened new career pathways for technical and other skilled workers, it must also be used to enable development of low-skilled workers to conduct skilled work and create a workforce for the future. Especially in the South African context of significant unemployment, 4IR interventions in South Africa must account

for retaining the functionality of the workforce and avoiding job displacements, but also to arm more workers with skills to participate in the economy and the digital world.

The CSIR Learning Factory (LF) was established to support South African industries in acquiring the skills needed to maximise the benefits of the 4IR. It provides an environment for skills development and innovation applied to the research, design, implementation, and operation of 4IR technologies. The initiative has multiple stakeholders in industry, academia and government, and is in line with the CSIR's objective of driving innovation and skills renewal, localisation of technologies and re-industrialisation across sectors.

AT THE LEARNING FACTORY

The pilot, first physical site of the Learning Factory was established in March 2021 on the CSIR campus through a partnership between the CSIR and the Sector Education and Training Authority for Manufacturing, Engineering and Related Services (merSETA). Subsequently, more Learning Factories are sprouting at South African technical and vocational education and training (TVETs) institutes around the country, such as at the EastCape Midlands TVET College and False Bay TVET college



Training is undertaken in different modes – be that desk study, by demonstration or hands-on experiential projects. The CSIR site hosts demonstrations of technologies such as Robotics, the Internet of Things, Cyber-Security, Simulation and Additive Manufacturing, to name a few;

Theoretical training introduces candidates to generic 4IR applications from a South African perspective; as well as infrastructure for applications development - such as a modular and flexible, configurable manufacturing cell, assembly station using collaborative robots, a smart home and energy optimisation cell; research labs to support design, incubation, and prototyping;

Experience Centres support experiential learning by exposing students to working environments in which 4IR technologies have been employed;

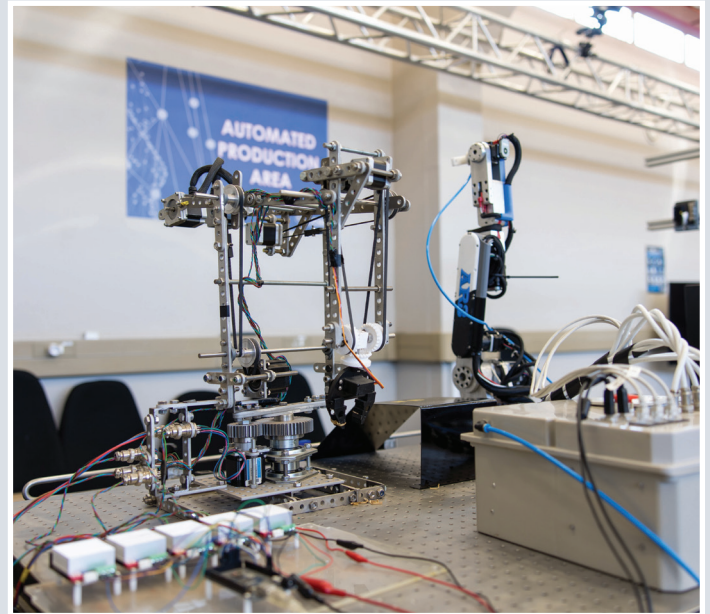
TRAINING OPPORTUNITIES

The first online training course was launched in early 2022. It was evident that, although the 4IR was widely heard of, its impact, benefits, the how and why of these technologies are lesser understood. Interested parties – including managers, technologists, engineers and trainers are invited to visit for more information;

Training covers:

- Artificial Intelligence
- Augmented Reality
- Robotics
- Additive Manufacturing
- The Internet of Things
- Big Data Analytics
- Cloud computing and Edge Processing
- System Integration
- Digital Twinning
- Simulation
- Cybersecurity

The course curriculum is presented in different modules to cover topics such as the 4IR and Industry 4.0, technologies of Industry 4.0, application areas, as well as challenges and opportunities in the South African context. More course info at www.4irsa.co.za



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COLLABORATIVE ROBOTICS

As part of the human-centered automation division of the Learning Factory, the CSIR has installed and commissioned two Franka Panda collaborative robots – or cobots. A cobot is able to 'learn' tasks to work in proximity or directly with human operators allowing for the undertaking of collaborative tasks. This is different from autonomous robots that undertake limited, repetitive tasks, away from humans, and remain static. The aim is further development of expertise in the use of cobots in both physical and virtual commissioning.