

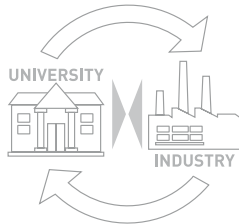
INTELLIGENT MOTION CONTROL PLATFORM FOR SMART MECHATRONIC SYSTEMS



I-MECH (Intelligent Motion Control Platform for Smart Mechatronic Systems) is one of the Research and Innovation topics supported and co-financed by both Member States and the European Commission.

The project is part of the ECSEL (Electronics Components and Systems for European Leadership) Joint Technological Initiative, which is the cornerstone of the EU industrial strategy for electronics.

BRIDGING THE GAP BETWEEN THE MOST RECENT RESEARCH RESULTS AND INDUSTRIAL PRACTICE



Gefran S.p.A. is an active member of the I-MECH project, which aims to provide European industry with an augmented intelligence platform for wide range of cyber-physical systems with actively controlled moving elements, thus supporting the development of smarter mechatronic systems. Such systems face increasing demands in terms of size, motion speed, precision, adaptability, self-diagnostics, connectivity, and new cognitive features, etc.

Fulfillment of these requirements is essential for building smart, safe and reliable production facilities.

This also implies completely new demands on the underlying layers of employed motion control systems, which cannot be routinely handled by available commercial products.

The main mission of the I-MECH project is to bring novel intelligence into Instrumentation and Control Layers, mainly by bridging the gap between the most recent research results and industrial practice in model based engineering fields.

ROLE OF GEFRAN

As a manufacturing company with complete ownership of its intellectual property, Gefran will be mainly involved in and will contribute to:

- CREATING METHODS FOR PRECISE ESTIMATION OF POSITION AND VELOCITY
- IMPLEMENTING AND VALIDATING MODERN CONTROL ALGORITHMS (ROBUST, VIBRATION AND ADAPTIVE LEARNING CONTROL) TO IMPROVE PERFORMANCE OF ELECTRICAL DRIVES
- DEVELOPING NEW AUTOMATIC TUNING CONTROL STRATEGIES FOR RAPID DRIVE COMMISSIONING ON ITS INDUSTRIAL DRIVE PLATFORM
- MODEL BASED DRIVE DIAGNOSTICS AND FAILURE DETECTION (INDUSTRY 4.0).

BENEFITS FOR GEFRAN'S PRODUCTS

The development of advanced control strategies will improve performance on all industrial applications.

This development will mainly focus on industrial cranes and residential elevator systems, with an aim to overcoming the main issues in this context.

Innovation will be shared through commercial links to several European and International company customers.

The potential benefits of the solution applied will include:

- BETTER PRECISION, FAST MOVEMENT AND REDUCED CYCLE TIME
- QUICK DRIVE SETUP WITH HIGH PERFORMANCE
- REDUCTION OF LOAD OSCILLATIONS
- CONTINUOUS MONITORING AND PREVENTIVE MAINTENANCE OF THE PLANT.

I-MECH • INTELLIGENT MOTION CONTROL PLATFORM FOR SMART MECHATRONIC SYSTEMS

OBJECTIVES

The broad I-MECH challenge is to bridge the gap between the latest research results and best industrial practice in advanced mechatronic motion control systems.

Software and Hardware building blocks, featuring standardized interfaces, will be developed to deliver a complete I-MECH reference platform.

The key Scientific and Technical objectives are:

- to develop techniques for employment of advanced model-based methods for the design, real-time control and self-diagnosis of cyber-physical systems
- to develop a smart Instrumentation Layer gathering visual and/or sensor information from supplementary instrumentation installed on the moving parts of the controlled system to enhance the achievable performance of the system
- to develop modular unified, Hardware and Software motion control building blocks implementing a service-oriented architecture paradigm, i.e. smart Control Layer.

To make I-MECH sustainable, the project outcomes will be available for European industry also through the envisioned I-MECH Center, after completion of the project.

RELEVANCE AND IMPACT

I-MECH will significantly strengthen European industrial competitiveness through the design and implementation of improved mechatronic smart systems.

I-MECH will lead to improved machine performance and reliability as measured by a whole variety of parameters including response time, reliability, control bandwidth, control accuracy and error.

Furthermore, the model based approach will produce an expected 50% reduction in development time for control (sub) systems for mechatronic applications.

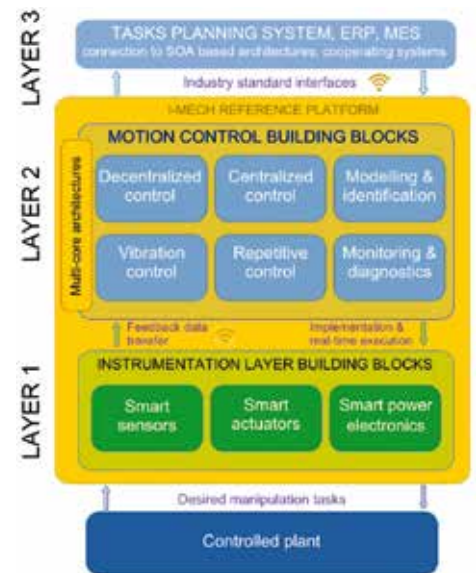
The project outputs will impact on the entire value chain of the production automation market.

The high added value of I-MECH reference platform will be directly verified in the fields of:

- high-speed/big CNC machining
- additive manufacturing
- semicon
- high-speed packaging
- healthcare robotics.

TECHNICAL INNOVATION

I-MECH will develop a set of smart building blocks, embedding leading edge capabilities from our academic partners, which can be used for rapid development of the lower layers of these high performance motion control systems.



Service Oriented Architecture (SOA) concepts will be used to achieve a high degree of configurability, scalability and interoperability of the individual components, while maintaining the reliability, safety, certifiability and time-to-market benefits of off the shelf solutions.

The project vision is to provide enhanced motion control intelligence for wide range of CPS involving actively controlled moving elements. In consequence, such CPS will:

- be able to measure the performance of its individual instrumented parts (drives, sensors, actuators, electronics)
- optimize and adapt control actions according to condition and machine dynamics changes
- be able to actively detect and reject residual vibrations when pushing machine performance to the physical limit
- learn during repeating tasks and optimize its performance automatically
- accommodate new sensors and actuators with different performance profiles
- integrate multiple motion and control activities on multi-many core platforms

I-MECH CONSORTIUM PARTNER

Gefran is a member of a consortium of 31 European partners in research and industry.

Belgium

- OPEN ENGINEERING SA

Czech Republic

- UNIVERSITY OF WEST BOHEMIA
- BRNO UNIVERSITY OF TECHNOLOGY
- TECO A.S.

France

- SIEMENS

Greece

- ITML G.P.

Italy

- GEFAN SPA
- UNIVERSITA DEGLI STUDI DI BRESCIA
- IMA SPA
- UNIVERSITY OF MODENA
- EVIDENCE SRL

Ireland

- TYNDALL, UNI. COLLEGE CORK (UCC)
- J&J VISTAKON

Latvia

- ELEKTRONIKAS UN DATORZINĀTŅU INSTITŪTS

Netherlands

- CCM, MEMBER OF THE SIOUX GROUP
- REDEN B.V.
- EINDHOVEN UNIVERSITY OF TECHNOLOGY
- TECHNOLUTION B.V.
- NXP SEMICONDUCTORS NETHERLANDS B.V.
- ELECTROMAGNETIC COMPATIBILITY MCC B.V.
- TNO
- PHILIPS

Portugal

- INTERNATIONAL IBERIAN NANO
- TECHNOLOGY LABORATORY
- EDILASIO CARREIRA DA SILVA

Spain

- IK4-TEKNIKER
- ROVIMATICA S.L.
- INGENIA MOTION CONTROL
- FAGOR AOTEK S. COOP.
- GMV AEROSPACE AND DEFENCE
- IK4-IKERLAN
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