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Welcome to the 27th International Conference on Flexible Automation and Intelligent Manufacturing

June 27 – 30, 2017

The 27th International Conference on Flexible Automation and Intelligent Manufacturing (FAIM2017) is a leading international forum to disseminate the most recent and relevant research, theories and practices on Automation and Manufacturing.

The conference theme is “Intelligent Manufacturing and Engineering Methods for Industry 4.0”. It will be hosted by the University of Modena and Reggio Emilia and will be held on June 27-30, 2017 in Modena, Italy. The conference will link researchers and practitioners from industry and academia specialising in automation, manufacturing and other related engineering disciplines from around the world.

Modena is located into the Emilia region, which is famous for Advanced Manufacturing (packaging machines, robotics, gearboxes, fluid power, ceramics tiles, pharmaceutics, etc.), Automotive and Food industries. In particular, Modena is the beating heart of the “Motor Valley”, which includes companies like Ferrari, Lamborghini, Maserati, CHN industrial, Ducati, Pagani.

The FAIM2017 conference will offer regular scientific conference sessions and special sessions (workshops) focused on specific FAIM topics (for more information see the Submission pages).

It also includes industrial visits on June 30 and a variety of social events to discover the excellences of Modena and the Emilia region area.

FAIM2017 is supported by EFFRA, the European Factories of the Future Research Association, which promotes the development of new and innovative production technologies among its industrial partners.

Welcome!

Prof. Marcello Pellicciari
General Chair

Dr. ing. Margherita Peruzzini
Program Chair
CONFERENCE CHAIR
Marcello Pellicciari, University of Modena and Reggio Emilia (IT)

HONORARY CHAIRS
William Sullivan, Virginia Tech, VA (USA)
Munir Ahmad, Teesside University, Middlesborough (UK)
Angelo O. Andrisano, University of Modena and Reggio Emilia (IT)

PROGRAM CHAIR
Margherita Peruzzini, University of Modena and Reggio Emilia (IT)

SCIENTIFIC COMMITTEE
Américo Azevedo, INESC Porto (PT)
Amy Trappey, National Tsing Hua University (TWN)
Andrea Matta, Shanghai Jiao Tong University (PRC)
Antonio Lanzotti, University of Naples, Federico II (IT)
Cesare Fantuzzi, University of Modena and Reggio Emilia (IT)
Chike F. Oduoza, University of Wolverhampton (UK)
Chun-Hsien Chen, Nanyang Technological University (SGP)
Dong-Won Kim, Chonbuk National University (KOR)
Dusan Sormaz, Ohio University (USA)
Egon Muller, Chemnitz University of Technology (DE)
Esther Alvarez de los Mozos, Universidad de Deusto, Bilbao (SP)
Francisco Silva, Polytechnic of Porto (PT)
Frank Chen, The University of Texas at San Antonio (USA)
George Chryssoulouris, University of Patras (GR)
Gianni Caligiana, University of Bologna (IT)
Giovanni Berselli, University of Genoa (IT)
Joerg Franke, Friedrich-Alexander University of Erlangen-Nuremberg (DE)
Lapo Governi, University of Florence (IT)
Leonid Chechurin, Lappeenranta University of Technology (FI)
Lihui Wang, KTH Royal Institute of Technology (SW)
Lorenzo Molinari Tosatti, Italian National Research Council (IT)
Michele Germani, Polytechnic University of Marche (IT)
Mika Lohtander, Lappeenranta University of Technology (FI)
Milton Borsato, Universidade Tecnológica Federal do Paraná (BR)
Monica Bordegoni, Politecnico di Milano (IT)
Osiris Canciglieri, Pontifícia Universidade Católica do Paraná (BR)
Paul Eric Dossou, ICAM Paris-Senart (FR)
Paolo Pedrazzoli, Technology Transfer System srl (IT)
Pedro Neto, University of Coimbra (PT)
Saigopal Nelaturi, Palo Alto Research Center (USA)
Sandro Barone, University of Pisa (IT)
Sangwon Yoon, State University of New York (USA)
Stephen T. Newman, University of Bath (UK)
Stefan Wiesner, BIBA - Bremer Institut für Produktion und Logistik (DE)
Yi-Chi Wang, Feng Chia University (TWN)
The International Conference in Flexible Automation and Intelligent Manufacturing (FAIM) is the leading international forum for dissemination of current research on all aspects of automation and manufacturing, and highlights how theoretical models and principles underpin practice in a production environment. The conference will link researchers and practitioners both from industry and academia specializing in automation, manufacturing, and other related engineering disciplines from around the world.

The 1st International FAIM conference in 1991 resulted from collaboration between the University in Limerick (UL) and the Virginia Polytechnic Institute. Prof. Munir Ahmad (then UL), and Prof. Bill Sullivan (then Virginia Tech.) have been central to the development of the Conference since its inception. Since 1991 FAIM has been hosted in many prestigious Universities on both sides of the Atlantic:

The 26th FAIM conference (Seoul, Korea) will build on the success of earlier conferences held annually at various locations around the world. The list of previous FAIM conferences, by year and location are as follows:

1. 1991 University of Limerick, Ireland
2. 1992 Virginia Tech (in Washington DC), USA
3. 1993 University of Limerick, Ireland
4. 1994 Virginia Tech, Blacksburg, Virginia, USA
5. 1995 University of Stuttgart, Germany
6. 1996 Georgia Institute of Technology, Atlanta, USA
7. 1997 Teesside University, Middlesbrough, UK
8. 1998 Portland State University, Portland, Oregon, USA
9. 1999 Tilburg University, Tilburg, Netherlands
10. 2000 University of Maryland, Maryland, USA
11. 2001 Dublin City University, Dublin, Ireland
12. 2002 Dresden University of Technology, Dresden, Germany
13. 2003 University of South Florida, Tampa, USA
14. 2004 Ryerson University, Toronto, Canada
15. 2005 University of Deusto, Bilbao, Spain
16. 2006 University of Limerick, Limerick, Ireland
17. 2007 Penn State Great Valley, Philadelphia, USA
18. 2008 University of Skovde, Sweden
19. 2009 University of Teesside, UK
20. 2010 University of California, San Francisco, USA
21. 2011 Feng Chia University, Taiwan
22. 2012 Tampere University of Technology, Finland
23. 2013 University of Porto, Portugal
24. 2014 University of Texas, San Antonio, USA
25. 2015 University of Wolverhampton, UK
26. 2016 Chonbuk National University, Republic of Korea
Programme

MONDAY · JUNE 26

06.00 (PM) - 8.00 (PM)  Welcome reception at Complesso San Geminiano

TUESDAY · JUNE 27

08.30 - 09.30 (AM)  Registration, welcome coffee

09.00  Opening Ceremony
Marcello Pellicciari · University of Modena and Reggio Emilia, Italy
Munir Ahmad · Teesside University, UK

10.00  Keynote Speech 1
From Racetrack to Road - How CRP Group and Windform® composite SLS materials drive manufacturing
Franco Cevolini

10.55  Coffee break

11.20  Parallel Sessions:
SES 1.1: Data science in manufacturing
SES 1.2: Production Planning and Scheduling
SES 1.3: Additive Manufacturing
SES 1.4: ICT-enabled technologies in Smart Factories
SES 1.5: Robotics and Computer Integrated Manufacturing
SES 1.6: Manufacturing Process and Technology

01.00  Lunch break

01.50  Parallel Sessions
SES 2.1: Collaborative Robotics in Smart Manufacturing
SES 2.2: Smart Factories and Industrial IoT
SES 2.3: Manufacturing Operations, Supply Chain and Logistics
SES 2.4: Lean and Agile Manufacturing
SES 2.5: Digital Product and Process Development
SES 2.6: Reliability and Predictive Maintenance
Programme

03.10 (PM)  Keynote Speech 2
*Manufacturing big data analytics for smart production*
Chen-fu Chien

04.05 (PM)  Coffee break

04.30 (PM)  Parallel Sessions
SES 3.1: *Robotics and Computer Integrated Manufacturing*
SES 3.2: *Smart Factories and Industrial IoT*
SES 3.3: *Product and Process Design*
SES 3.4: *Manufacturing Operations, Supply Chain and Logistics*
SES 3.5: *Reliability and Predictive Maintenance*
SES 3.6: *Quality engineering and management*

07.30 (PM)  Welcome social event @ MUSEO ENZO FERRARI (Enzo Ferrari Museum)

WEDNESDAY · JUNE 28

08.30 - 09.00 (AM)  Registration, welcome coffee

09.00  Parallel Sessions
SES 4.1: *Digital Product and Process Development*
SES 4.2: *Production Planning and Scheduling*
SES 4.3: *Collaborative Robotics in Smart Manufacturing*
SES 4.4: *Quality engineering and management*
SES 4.5: *Zero Defect Manufacturing*
SES 4.6: *Manufacturing Process and Technology*

10.00  Keynote Speech 3
*Smart toolings and machines, and smart manufacturing*
Kai Cheng

10.55  Coffee break
Programme

11.20  Parallel Sessions
SES 5.1: *Data science in semiconductor manufacturing*
SES 5.2: *Production Planning and Scheduling*
SES 5.3: *Collaborative Robotics in Smart Manufacturing*
SES 5.4: *Digital Product and Process Development*
SES 5.5: *Sustainable Manufacturing*
SES 5.6: *Smart Factories and Industrial IoT*

1.00 (PM)  Lunch break

01.50 (PM)  Parallel Sessions
SES 6.1: *Collaborative Robotics in Smart Manufacturing*
SES 6.2: *Digital Product and Process Development*
SES 6.3: *Manufacturing Process and Technology*
SES 6.4: *Engineering Collaboration for Smart Manufacturing*
SES 6.5: *Smart Factories and Industrial IoT*
SES 6.6: *Product and Process Design*

03.10 (PM)  Keynote Speech 4
*Proactive decision making in future production enterprises: the role of big data, internet of things and cyberphysical systems*
Aydin Nassehi

04.05 (PM)  Coffee break

04.30 (PM)  Parallel Sessions
SES 7.1: *Robots in AVM*
SES 7.2: *Production Planning and Scheduling*
SES 7.3: *Robotics and Computer Integrated Manufacturing*
SES 7.4: *Data Analytics in Manufacturing and Services*
SES 7.5: *Smart Factories and Industrial IoT*
SES 7.6: *Product and Process Design*

06.00 (PM)  Guided tour of Modena downtown · Modena city center

07.30 (PM)  Aperitif @ Caffetteria Giusti

FAIM2017
Programme

THURSDAY · JUNE 29

08.30 (AM)  Registration, welcome coffee
09.00  Parallel Sessions
  SES 8.1: Permeating lean thinking into value networks: an Asian perspective
  SES 8.2: Robotics and Computer Integrated Manufacturing
  SES 8.3: Smart Factories and Industrial IoT
  SES 8.4: Risk Management
  SES 8.5: Manufacturing Process and Technology
  SES 8.6: Digital Product and Process Development

10.00  Keynote Speech 5
  Physical Field-based Machine Perception for Intelligent Manufacturing
  Kok-Meng Lee

10.55  Coffee break

11.20  Parallel Sessions
  SES 9.1: Robots in AVM
  SES 9.2: Collaborative Robotics in Smart Manufacturing
  SES 9.3: Human-centred manufacturing
  SES 9.4: Sustainable Manufacturing
  SES 9.5: Additive Manufacturing
  SES 9.6: 3D reverse engineering

01.00  Lunch break

01.50 (PM)  Poster Session

02.20 (PM)  Parallel Sessions
  SES 10.1: Robots in AVM
  SES 10.2: Production Planning and Scheduling
  SES 10.3: Lean and Agile Manufacturing
  SES 10.4: Engineering Collaboration for Smart Manufacturing
  SES 10.5: Training, Education and Innovation
  SES 10.6: AR Applications in Industry 4.0
Programme

04.00 (PM)   Closign Ceremony

08.00 (PM)   Gala Dinner & Awards Ceremony at Corte di Villa Spalletti

FRIDAY · JUNE 30

Industrial Tours:
IMA 8.30 - 1.00 PM
DUCATI 9.00 - 1.00 PM
PAGANI 9.00 - 1.00 PM
LAMBORGHINI 9.00 - 4.00 PM

for more information: www.faim2017.org/programme/industrial-tours

Meeting Point for Industrial Tours:

8.30 am (IMA tour)
9.00 am (All the others)

@ Largo Garibaldi 15 (in front of the Storchi Theatre)
How to get the updated Scientific Programme

1) Type “Conference 4me” in Google Play Store/ Windows Phone Store/ iTunes App Store or scan the code below

2) Install the app

3) Choose your conference: “FAIM2017”

4) Get the Program on your smartphone or laptop!
Welcome reception @ Complesso San Geminiano

June 26, 2017 · 6.00 (PM)

In ancient times used as a hospital and then by the nuns of San Geminano from 1448 and 1798, on entering the old monastery, there is a wonderful Renaissance Cloister. Here, the columns are original like the capitals; the bell tower of the old church was built in 1586.

Now completely restored, the edifice is the splendid seat of the Law Faculty.
Welcome social event @ Enzo Ferrari Museum

June 27, 2017 · 7.30 (PM) · Via Paolo Ferrari, 85, Modena

Meeting point at Museo Enzo Ferrari at 7.30 (PM) - walking distance from San Geminiano (1,4 km - 15 minutes) and from all hotels in the Modena downtown

Modena, the capital city of the Italian “Motor Valley” is waiting for you! During this social event, you will visit the “Museo Enzo Ferrari” in Modena, inaugurated in 2012 where the birthplace house of Enzo Ferrari was located, the “Ferrari Museum” in Maranello which hosts the F1 World Champion Cars and throphies, and the “Umberto Panini” collection, the most important classic Maserati cars collection in the world! Now completely restored, the edifice is the splendid seat of the Law Faculty.

musei.ferrari.com

Guided tour of Modena downtown

June 28, 2017 · 6.00 (PM) · Departure from San Geminiano (conference venue)

A guided tour of Modena, and its most important visiting sites such as the Romanesque Cathedral (Duomo di Modena) which is UNESCO World Heritage Site, Piazza Grande, and Piazza Roma with the beautiful Ducal Palace.
Aperitif @ Caffetteria Giusti
June 28, 2017 · 7.30 (PM) · via Farini, 83 · Modena guided tours will end here

Gala Dinner & Awards ceremony @ Corte di Villa Spalletti
June 29, 2017 · 8.00 (PM) · Via Franceschini, 11 - San Donnino di Liguria Casalgrande (RE)
7.15 pm - Departure from Largo Garibaldi 15 (in front of the Storchi Theatre)

The Court of Villa Spalletti is an ancient building dating from the 17th century, which is particularly interesting for its artistic characteristics and its harmonious dimensions. Recognized as one of the most important architectural complexes in Emilia Romagna, Villa Spalletti finds a strong correlation with the great English residences (Wobur Abbey). Cited in history books to be used in 1887 as the seat of the Great Arms of the Italian Army. Villa Spalletti rises in a vast park with secular landscapes, ideal for any kind of event or for an unforgettable wedding filled with charm and magical atmospheres that remind your mind from time to time. The courtyard, nestled in a secular park of dozens of hectares, is the ideal venue for corporate meetings, corporate conventions, corporate dinners, gala dinners, parties Private, fashion Shows, concerts. It can accommodate up to 600 people thanks to its structure and its spacious halls.
Practical information
**Wi-Fi**

**Instructions to attendees of FAIM2017**

Join wi-fi network (SSID) “UNIMORE”.

A login page pops-up.

Fill the personal information asked in the form. Please double check your mobile telephone number as the password will be texted there. The “code” for FAIM2017 is: *fuksb*.

After registration, it could allow 5 minutes for a text message with your password to reach you. Your username is the mobile telephone number. Return to login page and use the credentials you received.

**Istruzioni per i partecipanti a FAIM2017**

Connettiti al segnale (SSID) “UNIMORE”.

Appare una finestra di login.

Segui il link nel cartiglio nell’immagine.

Compila il modulo con le informazioni personali richieste. Per favore, controlla il numero di telefono cellulare perché la password sarà inviata a quel numero come SMS.

Il “codice” per FAIM2017 è: *fuksb*.

Dopo la registrazione potrebbero essere necessari 5 minuti affinché ti arrivi lo SMS con la password. La username è il numero di telefono cellulare. Ritorna alla pagina di login e usa le credenziali ricevute.

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**PS: eduroam**

If your institution joined eduroam, ignore the instruction above and just connect to “EDUROAM” network with your home credentials.

Se la tua istituzione è federata con eduroam, salta le istruzioni di auto-registrazione e connettiti al segnale “EDUROAM” con le credenziali della tua istituzione.
Wi-Fi

Quick link to self-registration

Or visit https://selfaccess.unimore.it and register with code fuksb.
The university of Modena and Reggio Emilia has joined eduroam. If your institution is part of eduroam as well, simply join EDUROAM SSID with your home credentials. No registration needed.
COFFEE BREAK
Coffee breaks will be available at the conference venue during all scientific sessions, from 8.30 (AM) to 5.00 (PM). They will be serve at the first floor (Balcony).

LUNCH BREAK
Lunches will be available at the conference venue from 1.00 to 1.50 (PM), served at the ground floor (Courtyard).

POSTER SESSION
Posters should have a maximum size of 70 cm wide and 100 cm high. Posters will be on display throughout the whole conference. Each poster will have a board number: a legend will be available in the Conference book and on the FAIM2017 website. Poster authors are kindly requested to bring their posters on June 26th afternoon and leave it on display for the whole conference. Authors are required to stand by their posters during the viewing time.

ORAL PRESENTATION
Oral presentations will take 20 minutes included Q&A. They could be supported by PDF or Powerpoint files. It is possible to show audio/video material too. Presentation have to be upload on Easychair before the conference, or delivered to the SLIDE CENTER during the conference (close to the Registration Desk). A Windows Pc will be used for presentations, with Microsoft Office Suite installed.
Maps
Exhibitors
1. CRIT
2. DASSAULT SYSTEMES ITALIA
3/4. CAD SOLUTION PROVIDER
5. ENERGICA
6. ESI ITALIA
7. HAPTION
8. LIAM
9. ORDINE INGEGNERI MODENA
**Emergency Plan**

**Complesso San Geminiano**: via San Geminiano, 3 – 41121 Modena

**Complesso San Paolo**: via Camatta 16 / via Selmi 67 – 41121 Modena.

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**LIST OF EMERGENCY NUMBERS**

<table>
<thead>
<tr>
<th>Type of Event</th>
<th>WHO TO CALL</th>
<th>Tel. Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fire, collapse, gas leak</td>
<td>Fire Brigade</td>
<td>115</td>
</tr>
<tr>
<td>Injury</td>
<td>First Aid</td>
<td>118</td>
</tr>
<tr>
<td>Law and order</td>
<td>Carabinieri</td>
<td>112</td>
</tr>
<tr>
<td>Public Aid and Safety</td>
<td>Police</td>
<td>113</td>
</tr>
<tr>
<td>Poisoning</td>
<td>Milano Niguarda Poison Centre (MI)</td>
<td>02/66101029</td>
</tr>
</tbody>
</table>

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**TYPE OF EMERGENCY**

<table>
<thead>
<tr>
<th>INITIAL PHASE</th>
<th>WHO</th>
<th>DOES WHAT</th>
<th>DEVELOPMENT</th>
<th>ACTION PLAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 FIRE</td>
<td>Outbreak of fire</td>
<td>The nearest E.O. sprays the fire extinguishers and informs the E.C.</td>
<td>Emergency abated</td>
<td>Return to normality</td>
</tr>
<tr>
<td>2 TERRORIST ATTACK</td>
<td>Warning of (probable) ongoing attack</td>
<td>The E.O. informs the E.C.</td>
<td>False alarm</td>
<td>Awaits instructions.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The E.C. calls the 112 or the 113 and waits for instructions.</td>
<td>False alarm</td>
<td>Awaits instructions.</td>
</tr>
<tr>
<td>3 EARTHQUAKE</td>
<td>Perception of the emergency</td>
<td>All E.O. urge the public not to panic.</td>
<td>When the shaking is over</td>
<td>Awaits instructions.</td>
</tr>
</tbody>
</table>

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**EVACUATION**

| On hearing the fire alarm | All E.O. | calls the 115, 118, 2222, Polyclinic of Modena (only through internal telephone system) | Make sure evacuation is complete and reach the assembly area. |

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**INJURY / SUDDEN ILLNESS**

<table>
<thead>
<tr>
<th>Warning of a sudden illness</th>
<th>The F.A.O. checks on the conditions of the patient.</th>
<th>The patient recovers</th>
<th>Return to normality</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>The F.A.O. calls the 118 (Modena First Aid)</td>
</tr>
</tbody>
</table>

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**ABBREVIATIONS**

- E.C. > EMERGENCY COORDINATOR: Giancarlo Bergamini;
- E.O. > EMERGENCY OPERATOR: Lucio Prandini, Giancarlo Bergamini, Stefano Malaguti and Franco Gozzi;

**ASSEMBLY AREA** > GREEN AREA, PLACED ON THE OTHER SIDE OF THE MAIN ENTRY, AT THE BACK OF THE BUILDING (SOUTH SIDE).
Airbus to the Marconi Airport

One way ticket: € 15,00
Visit: aerbus.it

From Modena to Marconi Airport

<table>
<thead>
<tr>
<th>Da Modena Autostazione a Bologna Aeroporto Marconi</th>
</tr>
</thead>
<tbody>
<tr>
<td>MODENA AUTOSTAZIONE Corsia 1</td>
</tr>
<tr>
<td>Modena Stazione FS - Via Monte Kosica</td>
</tr>
<tr>
<td>Modena - Viale Caduti in Guerra (CUP)</td>
</tr>
<tr>
<td>Modena - Stazione Piccola</td>
</tr>
<tr>
<td>BOLOGNA AEROPORTO</td>
</tr>
</tbody>
</table>

FAIM2017