Italy Chapter of the IEEE Sensors Council: objectives and opportunities for students and a case study on the combined use of force, ultrasound and vision sensors for anatomopathological analyses in the IMEROS project

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Bressanone, July 26, 2018
Italy Chapter of the IEEE Sensors Council: objectives and opportunities for students

Calogero Maria Oddo, Vice-chair of the IEEE Sensors Council – Italy Chapter

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Bressanone, July 26, 2018
Summary

- Introduction to the Italian Chapter of the IEEE Sensors Council
- Chapter Organization
- Chapter Activities
For more than 125 years...

IEEE has been the trusted source for researchers in academia, corporations, and government

Past and present IEEE Members include nearly two dozen Nobel Prize-winning innovators
A milestone directly related to the credibility of content

IEEE Xplore surpassed 3 million documents

Authors add more than 1,000 articles daily
IEEE Society / Technical Council
Worldwide Membership
(As of December 2013)

All Members (431,191)

- Region 1-6: 47%
- Region 10: 26%
- Region 8: 18%
- Region 9: 5%
- Region 7: 4%

Student Members (120,389)

- Region 1-6: 27%
- Region 10: 43%
- Region 8: 19%
- Region 9: 7%
- Region 7: 4%

Regions 1-6: USA
Region 8: Europe, Africa, Middle East
Region 10: Asia & Pacific
Region 7: Canada
Region 9: Latin America
Societies and Technical Councils

Societies
- Promote and foster technical communities within a specialized field of interest through conferences, publications, events, educational activities, and services

Technical Councils
- Groups of Societies working together in a technical area across technological lines, disseminating knowledge through conferences, publications, events, educational activities, and services
Societies

- Aerospace & Electronic Systems
- Antennas & Propagation
- Broadcast Technology
- Circuits & Systems
- Communications
- Components, Packaging, & Manufacturing Technology
- Computational Intelligence
- Computer
- Consumer Electronics
- Control Systems
- Dielectrics & Electrical Insulation
- Education
- Electromagnetic Compatibility
- Electron Devices
- Engineering in Medicine & Biology
Societies

- Geoscience & Remote Sensing
- Industrial Applications
- Information Theory
- Instrumentation & Measurement
- Intelligent Transportation Systems
- Engineering in Medicine & Biology
- Geoscience & Remote Sensing
- Industrial Applications
- Information Theory
- Instrumentation & Measurement
- Intelligent Transportation Systems
- Magnetics
- Microwave Theory & Techniques
- Nuclear & Plasma Sciences
- Oceanic Engineering
Societies

- Photonics
- Power Electronics
- Power & Energy
- Product Safety Engineering
- Professional Communication
- Reliability
- Robotics & Automation
- Signal Processing
- Social Implications of Technology
- Solid-State Circuits
- Systems, Man, & Cybernetics
- Ultrasonics, Ferroelectrics, & Frequency Control
- Vehicular Technology
Technical Councils

- Biometrics
- Electronic Design Automation
- Nanotechnology
- Sensors
- Superconductivity
- Systems
- Technology Management
Society/Technical Council Chapters

- Technical community within a specific geographic area
- Consist of members from one or more IEEE Societies/Technical Councils who share technical interests and geographical proximity

Chapter activities include:
- Guest speakers
- Workshops
- Seminars
- Conferences
- Tutorials

Foundation
- Chapters are established via a petition and subsequent review
IEEE Sensors Council

• Founded in 1998 by 14 IEEE societies
• Affiliated to 26 societies with >260000 membership
• Objectives:

“.. to serve the sensor community with new publications, conferences, and technical committees. Its fields of interest and activities are the theory, design, fabrication, manufacturing, and application of devices for sensing and transducing physical, chemical, and biological phenomena, with emphasis on the electronics and physics aspects of sensors and integrated sensor-actuators.”
IEEE Regions

- R1-6 IEEE-USA
- R7 Canada
- R8 Af, Eu, ME
- R9 Latin America
- R10 Asia, Pacific
Chapters of the IEEE Sensors Council

- 16 Chapters
- 5 Joint Chapters
- 3 Student Branch Chapters

Spain (2013)
UK and Ireland (2015)
Italy (2018)
France (2018)
Italy Chapter IEEE Sensors Council

Founders
✓ Emiliano Schena (chair)
✓ Calogero Oddo (vice chair)
✓ Danilo Pani (treasurer)
✓ Paola Saccomandi (secretary)

Petition
✓ Business plan
✓ Signatures among the members
✓ Endorsement
  T. Tambosso
  (Chair IEEE Sec Ita)
✓ 2 approvals
  F. Labeau
  (Council President)
  M. Eriksson
  (Op Com Director)
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Italy Chapter IEEE Sensors Council

Business Plan

1. What was the motivating factor that led to forming this geographic unit? What member needs will be fulfilled as a result of forming this unit?

2. List the activities the unit will focus on for the first six months. What activities will engage the members of the unit with one another?

3. What accomplishments will this unit strive to meet in its first year?

4. What level of local support is engaged in support of the unit activities?
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2 approvals

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Data (May 29, 2018)

✓ 21 Student
✓ 36 Graduate student
✓ 3 Affiliate
✓ 92 member
✓ 30 Senior
✓ 4 fellow
✓ 1 life fellow
✓ Total 187
Chapter Organization

IEEE Italy Section

Chapter ExCo

Services (website management, ...)

Committees
Chapter Taxonomy
Technical Committees: Objectives

- To maintain a database of persons, institutions, contacts of the scientific community related to the chapter, in academia, research centers and industries.

- To propose awards and evaluate the applications.

- To organize activities and initiatives.

- To serve as a reference point within the activities towards the definition of international technical standards in the sensors domain (link with IEEE Standards Association).
Technical Committees of our Chapter: Examples of active committees

- Wearable sensors
- Ultrasound sensors
- Soft sensors
- Textile sensors
- Physiological sensors
- Biosensors
- Nanosensors
- Fiber optic sensors
- Sensors for biomechanics
- Tactile sensors
- Vibration and acoustic sensors
- Sensing systems
- Smart sensors & edge computing
- Chemical sensors development and applications
- Inertial Measurement Unit
- Electronic Interfaces and Signal Processing for Sensors
Technical Committees of our Chapter: Examples of active committees

› Electronics for sensors

SCOPE
...This technical commission will take in deep consideration innovation aspects of the electronic interfaces as well as new ideas, even expressed at theoretical level, of detection-interface paradigms. Other scopes are: dissemination of the latest news on the research topics of ELECTRONICS FOR SENSORS, improving the dialogue and promote cohesion and collaboration among research groups as well as the organization of technical events, evaluation of award candidates and activation of a fruitful interaction with the industrial world...

Chair

Giuseppe Ferri was born in L’Aquila, Italy. He received the “Laurea” degree (cum laude) in electronic engineering in 1988. In 1991, he joined the Department of Electronic Engineering, University of L’Aquila, L’Aquila, Italy, where he is actually a full professor of Electronics and Microelectronics. His research activity mainly concerns the design of analogue electronic circuits for sensor and biomedical applications both in voltage and in current mode...
Activities for the first year: Plan

- Founding Assembly
- Periodic EXCo Meetings (monthly) and with chairs of technical committees (3-months)
- Start-up and maintenance of website
- Newsletter
- Distinguished Lecturers
- Meeting with industry representatives to start consultations about standards of relevant national interest
- Chapter organization and participation for events relative to different sectors of interest (international schools and conferences)
Activities for the first year: Results so far (organization/support)

✔ Distinguished Lectures (7)
V. Lumelsky “Whole-body sensing in robotic systems operating in an unstructured environment”
V. Lumelsky “Human-Robot Interaction and Human-Robot Teams”
D. Stratos “Nuclear Medicine Instrumentation: SPECT and PET technologies”
M. Nikl “Inorganic scintillation materials: R&D state-of-art and trends”
K. Taesung “Development of Optical Fiber Sensors for Various Applications”
D. Tosi “Fiber optic sensors for real-time medical diagnostic and treatments: towards new multiplexing and spatial resolution limits”
A.P. Silvatti “Breathing biomechanics: optical measurement systems for thoracoabdominal analysis”

✔ International summer schools (3)
2018/07/02-07, Pula. “Technologies and signal processing in perinatal medicine”
2018/07/23-27, Bressanone. “Summer School of Information Engineering (SSIE)”
Activities for the first year:
Results so far (organization/support)

✅ **International Conferences/Workshops (4)**
2018/06/11-13, Roma. 2018 IEEE International Symposium on medical measurements & applications (MeMeA)
2018/06/14, Novi Sad. Italian-Serbian Collaboration Platform in Advanced Manufacturing (ISCP) Annual Conference
2018/06/18, Torino. Laser-enabled mini-invasive treatments of tumors: from thermal ablation to photo-dynamics therapies
2018/09/26, Roma, First Workshop on Electronics for Sensors
2018/10/08-10, Bari. 2018 IEEE International Workshop on metrology for the Sea

✅ **Officers Meetings (2)**
2018/02/06, call. Planning activities
2018/06/13, Roma. Planning activities

✅ **Founding Assembly (1)**
2018/02/16, Pontedera. Chapter presentation and elections

✅ **Ex Co Meetings (3)**
2018/04/06, call. Meetings among all officers and chairs of technical committees
2018/05/31, call. Meetings among all officers and chairs of technical committees
2018/06/26, call. Meetings among all officers and chairs of technical committees
Activities for the first year:
Results so far (organization/support)

✓ Awards (2)
2018/07/02-07, Pula. “Technologies and signal processing in perinatal medicine”, assigned to Paul Hamelmann, Eindhoven University of Technology, for the abstract and poster “Fetal heart rate measurements using a flexible ultrasound transducer matrix”

2018/10/08-10, Bari. 2018 IEEE International Workshop on metrology for the Sea. Award to be assigned to the “Best Student Paper”. Submissions are open!
Activities for the first year: Results so far (organization/support)

✅ Special Issue (1)
We are organizing a special issue on State of the Art of Sensors in Italy, to be hosted by the IEEE Sensors Journal. Be ready to submit papers!

CALL FOR PAPERS
IEEE Sensors Journal Special Issue on

*Advances and Current Trends on Sensors and Sensing Systems in Italy*

✅ Open positions
Paola Saccomandi
calogero. oddo@santannapisa.it
Scuola Superiore Sant’Anna

Calogero Oddo
calogero. oddo@santannapisa.it
Scuola Superiore Sant’Anna

Emiliano Schena
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Danilo Pani
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Università di Cagliari

http://sites.ieee.org/italy-sensors/
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A case study on the combined use of force, ultrasound and vision sensors for anatomopathological analyses in the IMEROS project

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Head of the Neuro-Robotic Touch Lab
Neuro-robotics Area

The BioRobotics Institute
Scuola Superiore Sant’Anna
Pisa, Italy

Finanziato dalla Regione Toscana nell’ambito del bando FAS Salute 2014
The neuro-robotics discovery engine and artificial touch

Science-engineering loop

Neuroscience driver
Investigation of the human somatosensory system

Biorobotic model
Artificial model of human touch

Applications in Bionics
Touch restoration in limb amputees

Applications in Industry 4.0

Applications in Bioelectronic medicine

Applications in Surgical Robotics

Derivative key enabling technology
Neuromorphic encoding of tactile information

Experted force
Texture recognition

Human Brain Limbs Nerves

Neuro-Robotic Touch Laboratory
Neuro-Robotics Area
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Artificial Touch
from bionic prostheses to surgical and industrial robotics
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Neuro-Robotic Touch Laboratory
Neuro-Robotics Area
Combined use of force, ultrasound and vision sensors for anatomopathological analyses

To enhance the efficiency of intra-operative histopathological evaluations through a biomechatronic platform

Massari et al., *A biomechatronic platform for detection of nodules in anatomopathological analyses via force and ultrasound measurements* (under submission). In collaboration with Prof. Lorenzo Capineri (UniFI) and Prof. Arianna Menciassi (SSSA)
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Gesture-based control in telepresence with neuromorphic haptic feedback

In collaboration with Dr. Eduardo Palermo
La Sapienza University of Rome
Dicebat Bernardus Carnotensis nos esse quasi nanos gigantium humeris insidentes, ut possimus plura eis et remotiora videre, non utique proprii visus acumine, aut eminentia corporis, sed quia in altum subvehimur et extollimur magnitudine gigantea. » John of Salisbury, Metalogicon (1159)