MobilE Applications & future InterneT

MEgAbIT

Research Activity

References: Fabio Lavagetto, Mario Marchese, Igor Bisio
Description

The MEgAbIT research unit focuses its activities in the areas of mobile signal processing and internetworking of heterogeneous networks. The research unit operates over three laboratories: Digital Signal Processing (DSP), Satellite Communication and Networking (SCNL) and Multimedia Communications (MC).

Research topics

• Mobile Signal Processing;
• QoS over Heterogeneous Networks;
• Satellite Communications and DTNs;
• Network Controls;
• Sensor & Actuator Networks;
• Network Security.

Reference people

Fabio Lavagetto, fabio.lavagetto@unige.it
Mario Marchese, mario.marchese@unige.it
Igor Bisio, igor.bisio@unige.it
Sandro Zappatore, sandro.zappatore@unige.it
MobilE Applications & future InterneT [MEgAbIT]

Description
The MEgAbIT research unit focuses its activities in the areas of mobile signal processing and internetworking of heterogeneous networks. The research unit operates over three laboratories: Digital Signal Processing (DSP), Satellite Communication and Networking (SCNL) and Multimedia Communications (MC).

Research topics
• Mobile Signal Processing;
• QoS over Heterogeneous Networks;
• Satellite Communications and DTNs;
• Network Controls;
• Sensor & Actuator Networks;
• Network Security.

Reference people
Fabio Lavagetto, fabio.lavagetto@unige.it
Mario Marchese, mario.marchese@unige.it
Igor Bisio, igor.bisio@unige.it
Sandro Zappatore, sandro.zappatore@unige.it
Staff Composition

- 2 Full Professors;
- 3 Associate Professors;
- 1 Assistant Professor
- Post Doc. Research Fellows;
- Ph. D. Students;
- Senior and Junior Engineers.
Research Laboratories

- Digital Signal Processing Laboratory (DSP)
  - www.dsp.dist.unige.it

- Satellite Communications and Networking Laboratory (SCN)
  - www.scnl.dist.unige.it

- Multimedia Communications Laboratory (MC)
Research Activities

• Networking
  – Quality of Service over Heterogeneous Networks
    • QoS Mapping
    • Vertical Handover
    • Power/Bandwidth Allocation
    • CAC and Traffic Control for LTE Networks
    • Satellite Communications and DTN
    • Software Defined Networking
Research Activities

• **Signal Processing**
  – Measuring, interpreting and influencing Human personal eXperiences (HX) with smart devices: processing, communications, storing and energy limits
  • Multimedia Flows over Heterogenous Communications Systems
  • Context-Aware Services over Smartphones: Audience Detection, Activity Detection, Emotion Detection, Localization Detection, Audio Processing for Safety
• **Security**
  
  – Honeypot Design and Attack Analysis
  – Study and Development of an Intrusion Detection System
  – Audio fingerprint based copy detection
Quality of Service over Heterogeneous Networks: from the Application to the Physical Layer

- Quality of Service over Heterogeneous Networks
  - QoS Mapping
  - Vertical Handover
  - Power/Bandwidth Allocation
  - CAC and Traffic Control for LTE Networks
  - Satellite Communications and DTN

Services: Sensor Measure Processing, Remote Control, Command and Control

Mobile Station

Satellite Network

Gateway

Aeronautical Network

Cable Network

Services: Monitoring and Measures

Services: Telemedicine, Teleteaching, Teletraining

Sensor Network
Model of Buffer Occupancy for ICNs

Average Packet Delivery Delay
**Research Activities**

- **Signal Processing**
  - Measuring, interpreting and influencing Human personal eXperiences (HX) with smart devices: processing, communications, storing and energy limits
  - Multimedia Flows over Heterogenous Communications Systems
  - Context-Aware Services over Smartphones: Audience Detection, Activity Detection, Emotion Detection, Localization Detection, Audio Processing for Safety
Measuring, interpreting and influencing Human personal eXperiences (HX) with smart devices: processing, communications, storing and energy limits.
Multimedia Flows over Heterogenous Communications Systems
Context-Aware Services over Smartphones

Emotion Detection
Activity Detection
Localization Detection
Audio Filtering for Safety

Audio Environment Recognition

Advanced digital signal processing methods together with pattern recognition approaches are applied to implement Context-Aware applications with limited computational load and energy consumption.

Audience Detection
Research Activities

• **Security**
  – Honeypot Design and Attack Analysis
  – Study and Development of an Intrusion Detection System
  – Audio fingerprint based copy detection
Honeypot Design and Attack Analysis Study and Development of an Intrusion Detection System


Research Results (journals 2008-2014)


Scientific Awards

• IEEE Communications Society, Satellite and Space Communications (SSC) Technical Committee, “2008 Satellite Communications Distinguished Service Award” in “recognition of significant professional standing and contributions in the field of satellite communications technology”. Mario Marchese

• IEEE International Workshop on Satellite and Space Communications 2006 (IWSSC 2006), Best Ph. D. Paper Award Winner:

• IEEE Global Communications Conference 2006 (GLOBECOM 2006), Best Student Paper Award Winner (Category Physical Communication System):
  – Igor Bisio, Mario Marchese, Giancarlo Portomauro, “Performance Evaluation of Sink Selection Techniques in Satellite Sensor Networks”.

• First International Conference on Advances in Satellite and Space Communications 2009 (SPACOMM 2009), Best Paper Award Winner:
  – Igor Bisio, Giuseppe Araniti, Mauro De Sanctis, “Towards the Reliable and Efficient Interplanetary Internet: a Survey of Possible Advanced Networking and Communications Solutions”.
Scientific Awards

• Second International Conference on Advances in Satellite and Space Communications 2010 (SPACOMM 2010), Best Paper Award Winner:
  – Igor Bisio, Fabio Lavagetto, Mario Marchese, “Introduction to Multi-Attribute Decision Making-Based Application Layer Joint Coding for Image Transmission over Deep Space Channels”.

• IEEE Global Communications Conference 2012 (IEEE GLOBECOM 2012), Best Paper Award Winner (Selected Area in Communications Symposium):
  – Igor Bisio, Stefano Delucchi, Fabio Lavagetto, Mario Marchese, “Capacity Bound of MOP-based Allocation with Packet Loss and Power Metrics in Satellite Communications Systems”.

• Fifth International Conference on Advances in Satellite and Space Communications 2013 (SPACOMM 2013), Best Paper Award Winner:
  – Igor Bisio, Stefano Delucchi, Fabio Lavagetto, Mario Marchese, “Capacity Saving Analysis of Lp-problem based Allocation with Packet Loss and Power Metrics in GEO-Satellite Communications Channels”.

• IEEE International Communications Conference 2014 (IEEE ICC 2014), Best Paper Award Winner (Symposia Paper):
Patents


- Alberto Civardi, Mario Marchese, Maurizio Mongelli, Giancarlo Portomauro, Achille Sogliani e Luca Spinacci, "PROCEDIMENTO DI GENERAZIONE DI UN ALBERO DI COPERTURA DEI COLLEGAMENTI TRA NODI DI UNA RETE DI COMUNICAZIONE, CON MIGLIORATO TEMPO DI REAZIONE", depositato presso la Camera di Commercio di Torino il 2 Dicembre 2009 (TO2009A000947).