About us

National Center for Scientific Research “Demokritos”
About us

➡️ **NCSRD: National Center for Scientific Research “Demokritos”**
- Largest public research organization in Greece
- 5 Institutes: Science to Engineering
- Over 1000 staff (300 permanent; >700 on contract)

➡️ **IIT: Institute of Informatics & Telecommunications**
- Geo-spatial & Multimedia Information Processing, Understanding and Visualization; Large Database Data Mining; Security; Data Fusion; Location Based Services & Transportation; Indoor Localization & Navigation; Wireless Communications; RF & Antenna Design; Embedded Systems

➡️ **ISL: Integrated Systems Laboratory**
- GIS & Geo-spatial Information Management
- LBS, Transportation Optimization, Data Fusion
- Mobile Applications Development & Embedded Systems
- Security, Asset Tracking, Crowd Modeling
- Indoor Localization, Routing & Navigation;
- Signal Propagation & Antennae Design
Integrated Systems Laboratory

ACTIVE AREAS OF RESEARCH

- GIS & Geo-spatial Information Management
- LBS, Transportation Optimization, Data Fusion
- Mobile Applications Development
- Embedded Systems Design & Implementation
- Security, Asset Tracking, Crowd Modeling
- Indoor Localization, Routing & Navigation
- Signal Propagation & Antennae Design

FUNDING 2000 - 2012

- Over 24 Projects out of which 20 EU funded
- Total Funding for ISL: Over 11 Million Euro
- Total Funding for Projects: Over 95 Million Euro

Personnel

Director:
Stelios C. A. Thomopoulos, PhD

Office Manager:
Ms. Nadine Simatou

Senior Researchers & Project Managers:
Dimitiris Kyriazanos, PhD
Sotiris Kanellopoulos, PhD
Stelios Panagiotou, PhD
Giorgos Vardoulias, PhD

Senior Scientific Staff:
Nick Argyreas, MS
George Vastianos, MS
Vassilis Kountouriotis, PhD
Stavros Katsoulis, MS
Thisas Papadopoulos, PhD
Konstadinos Rodogiannis, PhD

Scientific Staff:
Olga Segou, MS (PhD candidate)
Kostas Dimitros, MS
Dafni Polyzou, MS
Betty Evaggelinou, DEngr
Dionysis Motos, BS
Tasos Kanellos, MArch
Christina P. Thomopoulos, BFA
Christos Margonis, MS
Anastassios Bravakis, BS
Mr. Adam Doulgerakis, MArch
Manolis Paterakis, MArch
Vassilios Lampropoulos, BS
Eftyxia Georgiou, MS
Panagiotis Tsibiridis, BArch, MS
Giorgos Farazis, Barch, MS
Marilena Kouvikou, Barch, MS

PhD Candidates:
Olga Segou, MS
Giorgios Thanos, MS
Vassilis Chantzis, MS
Security Related R&D Funded Projects

- **PERSEUS**: Maritime border surveillance System of Systems, Demonstration Project FP7-SEC-2010.3.1-1-261748
- **PACT**: Public perception of security and privacy: Assessing knowledge, Collecting evidence, Translating research into action, FP7-SEC-2011 Collaborative Project
- **TASS**: Airport Security Monitoring and Biometric Access Control systems, Flow Management and Crowd Behavioural Simulation tools, security personnel mobile applications, FP7-Theme 10-Security-241905
- **DITSEF**: ICT Support for First Responders, FP7-ICT-SEC-2007-1
- **BioAthletics**: Intelligent Biometric identification system for large scale athletic events, National Research Project
- **HIT-GATE**: Heterogeneous Interoperable Transportable GATEway for First-Responders, STREP FP7-SEC-2011.5.2-1
- **HIPOW**: Protection of critical infrastructure against High Power Microwave threats - FP7-SEC-2011-1-Capability Project
- **ACRIMAS**: Aftermath Crisis Management System of Systems Demonstration Phase I, CSA FP7-SEC-2010.4.1-1-261669
- **PRONTO**: Event Recognition for Intelligent Resource Management, FP7-ICT
- **SHARE**: Mobile Support for Rescue Forces Integrating Multiple Nodes of Interaction, FP6-IST
- **ALICANTE**: Media Ecosystem Deployment Through Ubiquitous Content-Aware Network Environments, FP7-ICT
- **IMOSAN**: Integrated Multi-Layer Optimisation in Broadband Satellite Networks, FP6-IST
- **LIAISON**: Indoor-Outdoor Location Based Services of Emergency Response Teams (Fire Fighters/Police), FP6-IST
OptiTrans: A Multi-Modal Journey Planner

http://www.optitrans-fp7.eu/

http://newyork.optitrans.net
http://london.optitrans.net
http://athens.optitrans.net

London_new.optitrans.net

Integrated Systems Laboratory

http://www.youtube.com/watch?v=rnGaGYsbz9I
http://www.youtube.com/watch?v=zIf_Eb8zyyM
http://www.youtube.com/watch?v=FGySvBuGJgw

ATHENS
MADRID
LONDON
NEW YORK
In the last few years location based services have become essential in order to build applications with richer user experience.

Applications have been developed in that direction:

- Information about a user’s surroundings
- Journey planning solutions
- Time tables – Nearby Stops: Ready for release
- Bus & Metro Stops
- Real time bus arrival info – smart stops: New App
- E-ticketing
- Indoor localization systems & indoor maps
New Optitrans Mobile Editions: Android 3 tablet
New Optitrans Mobile Editions: Windows 7

Integrated Systems Laboratory Technologies © 2012-2013
Integration of Optirans journey planning services with other information and smart city systems in order to enrich user experience

Integration with cultural information systems, augmented reality and serious games

Indoor localization systems using Kinect technology

...
GIS Knowledge Extraction System & Mobile Apps for Security, Emergencies & First Responders

Mobile Application for Security Personnel
for Emergency Reporting and Handling, with camera photo and video capabilities

GIS Knowledge Extraction System
Live Feedback and Geo-tagging capabilities, Map Reconstruction and dynamic re-routing for safe routes during and after a crisis
ISL Indoor Localization & Sensor Communication Technologies

DITSEF SAL - Sensor Abstraction Layer Demo (v2)

FR indoor localisation sensors, charging station & Sensor Abstraction Layer and Sensor Emulator

http://www.youtube.com/watch?v=NDqsdMA7UQY&hd=1

ISL Indoor Localization & Sensor Communication Technologies
ISL Indoor Localization & Sensor Communication Technologies
ELECTRA Indoor Localization & Tele-presence and Telemetry Extension

- **SAL - Sensor Abstraction Layer**
  - Web-based front end that allows uniform representation and access to sensor data
  - Based on open source technology (gSOAP, Axis)
  - OS and Framework Independent
  - 2 Implementations:
    - (a) SAL Emulator - [http://www.youtube.com/watch?v=NDgsdMA7UQY&hd=1](http://www.youtube.com/watch?v=NDgsdMA7UQY&hd=1)

- **Tele-presence & Telemetry ELECTRA-X Module**
  - Tele-presence via wireless video monitoring
  - Telemetry for on-site sensor monitoring and sensor data transmission

- **Enhanced Location Estimation and Centralised TRAcking (ELECTRA) system** [http://vimeo.com/49823254](http://vimeo.com/49823254)
  - Based on Chirp Spread Spectrum technology (IEEE 802.15.4a)
  - Indoor localisation by Time of Arrival measurements in the 2.4 GHz ISM band.
  - Integrated audible alarm and failsafe communications channel
  - Easy-to-use Command and Control Graphical User Interface

*FIGURE 1: The ELECTRA components, presented clockwise : a) the Charging Station, b) the Beacons, c) the Base Station and d) the Tags.*
ELECTRA Indoor Localization & Tele-presence and Telemetry Extension

- ELECTRA hardware and software tested in real conditions during the “International Hotel” & “Chemical Plant” scenarios
  - Robust performance in operational conditions [http://vimeo.com/49823254](http://vimeo.com/49823254)
- SAL as an underlying technology
- ELECTRA-X: Localization + telemetry + telepresence & autonomy [C:\Users\scat\Desktop\electra.mp4](C:\Users\scat\Desktop\electra.mp4)

FIGURE 2: The ELECTRA Command and Control GUI

[http://www.youtube.com/watch?v=3anImlmCQ6wKk&feature=youtu.be](http://www.youtube.com/watch?v=3anImlmCQ6wKk&feature=youtu.be)

Integrated Systems Laboratory Technologies © 2012-2013
RFID Luggage Tracking System

- Low-cost, passive tag RFID Luggage Tracking System:
  - RFID-enabled (UHF passive RFID adhesive tags) boarding passes and luggage pieces are scanned and identified while going through RAPISCAN scanning equipment
  - The RFID tracking does not disrupt the typical security procedure and acted as an integral part.
  - The RFID system installed and successfully tested at RAPISCAN X-RAY laboratory at Surrey
  - Pilot trial under real conditions with Athens International Airport

http://vimeo.com/51434409
Multi-modal Biometric Identification system for Airport Staff:

- Compared to unimodal systems, the multimodal biometric system counters or mitigates risks connected to known biometric system problems such as: noise, incorrect user interactions, biometric similarities, spoof attacks and other.
- Includes both face recognition and fingerprint identification, successfully improving the performance by decreasing the False Rejection Rate (FRR) compared with single fingerprint and single face recognition systems.
- Integration between the Biometric system, the Gateway and the Data Fusion Event Manager is achieved through web services.
- (Work in Progress) Industrial design and construction of an Airport Staff Identification Kiosk, in collaboration with BAA and Touchstone.

http://vimeo.com/51434409
Mobile Application for Airport Security Personnel:

- Development of on Android platform, currently on Beta Version
- Prototyping: early low fidelity mockups followed by high fidelity prototype
- Implementation of XMPP protocol for portal-mobile message exchange (also setting up test XMPP server)
- Security Incident Management: handling of incoming alerts, incident generation and quick reporting
- Video streaming and connection with security cameras (work in progress)
- Use of 2D floor plan maps for visualizing personnel location (work in progress)
Antenna design & IEMI protection

Front-Door Coupling
- Through antennas, sensors etc.
- For microwave receivers: HPM frequency within receiving band.
- Protection: transient protectors, filters.

Back-Door Coupling
- Penetration through holes, joints etc.
- Resonance at approx. 1–3 GHz.
- Protection: shielding, filtering.
ISL Crowd Behavior Modeling, Simulation & 3D Animation Innovation

Crowd Density Analysis and Bottleneck prevention

Crowd & Individual Behavioural Modelling, Analysis and Simulation Tools with 3-D geo-temporal visualisation

http://vimeo.com/51434409

..\Users\scat\Desktop\TASSCrowd_Final.mov
ISL Interactive 3D Immersive Locative Games

https://vimeo.com/69793682

Integrated Systems Laboratory Technologies © 2012-2013
ISL Media Art Innovation

- Art design & ICT
- Digital Character Design & 3D Animation
- Integration of Architecture Design & Urban Planning with Behavioral Modelling, Analysis and Simulation Tools with 3-D geo-temporal visualisation
- Immersive Interactive Architectural Design
- Video Productions & Dissemination
- Hybrid Artistic Renderings

http://vimeo.com/51434409

..\Users\scat\Desktop\TASSCrowd_Final.mov
Different modes of collaboration

- **European Projects**
  - Identify areas of common interest
  - Participate in related working groups & EC info-days
  - Timely consortium building
  - Communicate with EU PO’s
  - Identify competent coordinator(s)

- **National Projects**
  - Monitor Greek Work Programs & Identify areas of interest
  - Set-up a winning proposal mechanisms

- **Bi-lateral Collaborative Projects** (Greece with another country)
- **Direct Service Contracts** (to industry & government)
- **Joint venture through spin-offs**
Contact Information

National Centre for Scientific Research “Demokritos”
Institute of Informatics and Telecommunications
Integrated Systems Laboratory

Contact information:

- Dr. Stelios C. A. Thomopoulos: scat@iit.demokritos.gr
- Tel: +30 210 650 3155
- Mob.: +30 6932 355554