
Title: Integrated processing and Control Systems for Sustainable Production in Farms and Forests: the SLOPE project

Type: Research Contribution

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Summary of the presentation:

Forest production in mountainous areas has a significant role in the world economy being these areas the 23% of the total Earth forest but differs from the traditional one for the limits imposed by morphology, for both operation planning and hardware requirements. This presentation will introduce an integrated forest information system, backed into a shared forest data model, for the optimization of forest production, where remote sensing and on-field surveying systems are used to build a 3D forest model to support the entire wood process, from tree RFID tagging to cut and debranched logs ready for the sawmills.

Extended Abstract:

In the last decades, the market has been subject to a remarkable global growth in production and consumption of wood products. Projections suggest that this trend will not change before 2030 with the major production growth in Europe, Russian Federation, Eastern Europe and South America and highest consumption in Africa, Asia and the Pacific. This growth involves all the major wood sectors like wood-based panels, paper, industrial round wood and bioenergy and is caused by increasing energy resource needs together with a rediscovery of wood properties in the building sectors. Forest production in mountainous areas has a significant role in this economy, being these areas the 23% of the total Earth forest, but its management differs from the traditional schemes due to the limits imposed by terrain morphology, both for the operation planning aspects and the hardware requirements. Harvesting and extracting systems like manual chainsaws, cable cranes, processor heads are more expensive and less flexible compared to the cut-to-length systems based on wheeled machines commonly adopted on flatland forests and are usually handled manually or through proprietary software. Additionally, planning is relatively poor due to the reduced mobility and productivity of the machines deployed up to recent years, while a wider strategic and detailed level of planning would be crucial to reach the forest operation techniques applied on flatlands. In order to optimize the harvesting process in these conditions, the establishment of a communication between actors and machines becomes essential for macro and local analysis.

The SLOPE project (Integrated proceSsing and control systems fOr sustainable forest Production in mountain arEas) aims at the definition of an integrated forest information system (FIS) for the optimization of forest production, consisting in an accurate tool for forestry planning that combines multi-scale geographical information of terrain and

vegetation, real-time information coming from machineries involved in forest harvesting and logistic models to increase the planning efficiency in mountainous areas.

Starting from remote sensing analysis of satellite and UAVs surveys, as well as terrestrial laser scans (TLS) of the forest, a three-dimensional digital forest model is reconstructed from digital surface model and canopy. Using this model, visualized in real-time on modern web browsers through an interactive harvesting and monitoring interface, every forest product, from the marked standing tree to the log shipped to the sawmill can be monitored thanks to a RFID traceability system and used by foresters, planners and operators for what-if analysis and decision making. The forest information system backed into a common forest data model, improves the whole forestry planning chain providing a series of service like multisensory real-time quality control of logs directly on the processor heads, stumpage price evaluation, harvesting planning with cable crane placement simulation within a fully discoverable three-dimensional forest tools, logistic management through real-time truck tracking, real-time information streams and purchasing of timber and biomass.

The SLOPE System represents a novel approach to the wood harvesting in mountainous scenarios, combining forest geographic data, going from wide area spatial information to single tree details, within a three-dimensional virtual globe and a structural model for continuous and real-time assessment of the resource characteristics. Specific human machine interaction studies ensure good usability of the toolset by all the involved actors and the upload and retrieval of the data collected during the entire process for continuous monitoring and analysis.

The SLOPE projects, aiming at an overall optimization of the forest production will improve the wood output from forest, adapting the available wood quality with the market demands. The integrated process will reduce manual work, increase productivity, speed up monitoring and quality assessment and introduce new actors like surveying companies to the forest production, thus increasing the opportunities for new job positions

Additional Information

Website:

www.slopeproject.eu

Video:

https://youtu.be/1GHO_YkHEwg

Social Profile:

<https://www.facebook.com/pages/SLOPE-Project/351131505025437>

<https://twitter.com/SLOPEProject>

<http://www.linkedin.com/groups/SLOPE-Project-7450879>



Short Curriculum Vitae

Personal information

First name(s) / Surname(s) **Daniele Magliocchetti**
Address Via Sottomonte 59 I-39055 Laives (Italy)
Telephone(s) (+39) 347 7840040
Nationality Italian
Date of birth 27 June 1983
Gender Male

Occupational field **Multimedia/Computer Graphics/Developer/Mobile Devices**

Work experience

Dates	01/02/2014 - Onwards
Occupation or position held	Senior Research Manager
Main activities and responsibilities	Project manager of the SLOPE project an FP7 European project on forest production optimization
Name and address of employer	Fondazione Graphitech. Via alla Cascata 56/c 38123 Povo (TN) Italy Website: www.graphitech.it
Type of business or sector	Research Center - Computer Graphics, GIS, Mobile
Dates	04/11/2009 – 01/02/2014
Occupation or position held	Analyst and Developer
Main activities and responsibilities	Lead developer and Software Engineer for <i>I-Tour</i> an FP7 European Project on urban mobility www.itourproject.com Technical Manager for the Smart-Islands project development www.smart-islands.eu Developer of several editions of the GeoBrowser 3D platform www.graphitech.it/geobrowser3d : <i>Festival dell'Economia di Trento</i> (june 2010), <i>Bruxelles Museum</i> (october 2010), <i>Mostra in 3D Etruschi in Europa, Trento</i> (2011) Researcher on mobile human computer interaction and 3D visualization on mobile devices
Name and address of employer	Fondazione Graphitech. Via alla Cascata 56/c 38123 Povo (TN) Italy Website: www.graphitech.it
Type of business or sector	Research Center - Computer Graphics, GIS, Mobile

Education and training

Dates	18 September 2006 - 14 October 2009
Title of qualification awarded	Class of second level degree/Master in Computer Science
Principal subjects / occupational skills covered	General: Mathematics. Occupational: Algorithms, Machine Learning, Data Mining, Logic for Knowledge Management, Information Systems, and Computer Graphics.
Name and type of organisation	University of Trento, faculty of Mathematical, Physical and Natural Sciences. Via Sommarive 14,
providing education and training	38100 Povo (TN), Italy
Level in national or international classification	105 out of 110
Dates	16 September 2002 - 19 July 2006

Title of qualification awarded	Class of first level degree/Bachelor in Computer Science
Principal subjects / occupational skills covered	General: Mathematics, Physics, English Language. Occupational: Computer Programming, Algorithms, Databases, Operating Systems and Software Engineering
Name and type of organisation providing education and training	University of Trento, faculty of Mathematical, Physical and Natural Sciences. Via Sommarive 14, 38100 Povo (TN), Italy
Level in national or international Classification	103 out of 110
Thesis and Publications	<p>Daniele Magliocchetti. <i>A Mobile Approach to 3D Terrain Visualization on Android Devices</i>. Master Thesis, The University of Trento, 2009.</p> <p>D. Magliocchetti, G. Conti and R. de Amicis. "<i>I-Move: A framework for Interoperable Mobile 3D Geobrowsers</i>". In proceeding of the IDMM Virtual Concept Conference 2010, Bordeaux, France. 2010. pp. CD-ROM.</p> <p>R. Fabio, R. Alessandro, A. Giorgio, R. de Amicis, D. Magliocchetti, G. Girardi and B. Giorgio. "<i>Geomatics and Geoinformatics for the Digital 3D Documentation, Fruition and Valorization of Cultural Heritage</i>". in proceeding of Euromed 2010 workshop on "Museum Futures: Emerging Technological and Social Paradigms". 2010.</p> <p>G. Conti, D. Magliocchetti, F. Devigili and R. de Amicis. "<i>i-Tour: un client 3D per dispositivi portatili a supporto della mobilità urbana sostenibile</i>". In proceeding of ASITA2011, Parma, Italia. 2011.</p> <p>D. Magliocchetti, M. Gielow, F. Devigili, G. Conti and R. de Amicis. "<i>A Personal Mobility Assistant based on Ambient Intelligence to Promote Sustainable Travel Choices</i>". Ambient Intelligence at the services of inFo-mobility and Critical Transportation networks (ARTIFACT), Niagara Falls, Canada. 2011.</p> <p>R. de Amicis, G. Conti, D. Taglioni, D. Magliocchetti and G. Girardi. "<i>Development of an open framework to provide intelligent multi-modal mobility services</i>". REAL CORP 2011, Essen, Germany. 2011.</p> <p>G. Conti, D. Magliocchetti, F. Devigili and R. de Amicis. "<i>The role of SDIs as enablers of new generation intelligent transport systems</i>", SDI, Communities and Social Media. 2011.</p> <p>Daniele Magliocchetti, Martin Gielow, Federico Devigili, Giuseppe Conti, Raffaele De Amicis. "<i>Ambient Intelligence on Personal Mobility Assistants for Sustainable Travel Choices</i>". IASKS 2011. Journal of Ubiquitous Systems & Pervasive Networks Volume 3, No. 1.</p> <p>D. Magliocchetti, G. Conti and R. de Amicis. "<i>I-MOVE: Towards the use of a mobile 3D GeoBrowser framework for Urban Mobility Decision Making</i>". International Journal on Interactive Design and Manufacturing (IJIDeM). Springer. Issue 150. 2012.</p> <p>A. Fiorentino, C. De Gioia, M. Gaido, G. Conti, D. Magliocchetti. "<i>Mobile integration platform concept: the Naples pilot test site</i>". Transport Research Arena 2012, Athens, Greece.</p> <p>D. Magliocchetti, M. Gielow, F. Devigili, G. Conti, Raffaele De Amicis. "<i>Ambient Intelligence on Personal Mobility Assistant for Sustainable Travel Choices</i>". In Journal of Ubiquitous System and Pervasive Networks (JUSPN).</p> <p>F. Devigili, D. Magliocchetti, G. Conti, R. de Amicis. "<i>Empowering people through mobile devices for smarter places</i>". Human Computer Interaction International (HCII 2013). Las Vegas, USA, 2013.</p> <p>U. Di Staso, D. Magliocchetti, R. de Amicis. "<i>SMART-ISLANDS: Enhancing User Experience for Mediterranean Islands for Tourism Support</i>". Human Computer Interaction International (HCII 2014). Crete, GR, August 2014.</p> <p>G. Panizzoni, D. Magliocchetti, F. Prandi, R. De Amicis. "<i>Interactive Virtual Planning Tools for Sustainable Forest Production in Mountain Areas</i>". Human Computer Interaction International (HCII 2015). Los Angeles, USA, August 2015.</p> <p>F. Prandi, D. Magliocchetti, R. de Amicis. "<i>Sperimentazione di rilievo UAV a supporto della pianificazione forestale</i>". GEOmedia magazine, the first Italian magazine on geomatics and intelligent geography. 1/2015.</p>



Europass Curriculum Vitae

Personal information

First name(s) / Surname(s)	Federico Prandi
Address	VIA delle Ghiaie 3, 28122 TRENTO (Italy)
Mobile	+393293469174
E-mail(s)	federico.prandi@graphitech.it
Nationality	Italian
Date of birth	15/3/1975
Gender	Male

Desired employment / Occupational field

Work experience

Dates	01/11/2009 →
Occupation or position held	Senior Scientist
Main activities and responsibilities	Research activities in GIS Project management Development and research activities of SDI Publications and presentations at scientific events Seminars in academic institutions
Name and address of employer	Graphitech via alla cascata, Trento (Italy)
Type of business or sector	ITC, geographic information
Dates	01/01/2009 - 31/10/2009
Occupation or position held	Temporary Researcher
Main activities and responsibilities	Research activities in GIS, photogrammetry and cartography Project management and development in GIS for Municipality Project management and development in Cultural Heritage survey Publications and presentations at scientific events Seminars in academic institutions
Name and address of employer	Politecnico di Milano Dept BEST p.zza leonardo da vinci 32, 20133 Milan (Italy)
Type of business or sector	Education
Dates	01/01/2006 - 31/12/2008
Occupation or position held	PhD Student in geomatic and Geodesy
Main activities and responsibilities	Research in field of the 3D cartography and 3D GIS and Generation of DTM/DSM from different source of data (Digital maps, Photogrammetry Lidar) Consultant in GIS project Publications and presentations at scientific events Seminars in academic institutions From 01/05/07 to 31/07/2007 guest to ETH Zurich at Institute of Geodesy and Photogrammetry
Name and address of employer	Politecnico di Milano dept DIAR

Type of business or sector p.zza leonardo da vinci 32, 20133 Milan (Italy)
Education

Dates 01/12/2002 - 31/12/2005

Occupation or position held Tempoary researcher

Main activities and responsibilities Research activities in GIS, photogrammetry and cartography
Project management and development in GIS for Municipality
Publications and presentations at scientific events
Seminars in academic institutions

Name and address of employer Politecnico di Milano dept DIIAR
p.zza Leonardo da vinci 32, 20133 Milan (Italy)

Type of business or sector Education

Education and training

Dates 01/01/2006 - 31/12/2009

Title of qualification awarded Phd in Geodesy and Geomatic

Principal subjects / occupational skills covered Final thesis topic: 3D Object recognition and reconstruction for digital mapping and 3D GIS

Name and type of organisation providing education and training Politecnico di Milano (University)
P.zza Leonardo da vinci 32, 20133 Milan (Italy)

Dates 01/09/1994 - 21/12/2001

Title of qualification awarded Master Degree in Environmental and Land Planning Engineering

Principal subjects / occupational skills covered Energetic and Thermodynamic planning

Name and type of organisation providing education and training Politecnico di Milano (University)
P.zza Leonardo da vinci 32, 20133 Milan (Italy)

Dates 01/09/1989 - 01/07/1994

Title of qualification awarded High school Degree in electrotechnic

Name and type of organisation providing education and training Alessandro Volta (ITIS)
Lodi (Italy)

Personal skills and competences

Mother tongue(s) **Italian**

Other language(s)

Self-assessment
European level ()*

English

French

Understanding				Speaking				Writing	
Listening		Reading		Spoken interaction		Spoken production			
B1	Independent user	B2	Independent user	B1	Independent user	B1	Independent user	B1	Independent user
A1	Basic User	A2	Basic User	A1	Basic User	A1	Basic User	A2	Basic User

(*) [Common European Framework of Reference \(CEF\) level](http://www.cedefop.europa.eu/en/files/questdocument)

Social skills and competences I have worked in various types of research team projects with people with different competences.

Technical skills and competences Knowledge of: geographic data structure, elaboration of geographic data, GIS data model, SDI, generation of DTM / DSM and acquisition and elaboration of GPS data. Aerial and terrestrial photogrammetry, topographic monitoring of structure

Computer skills and competences Operating systems: Windows, linux, iOS

	<p>Others:</p> <p>Complete Office, Matlab</p> <p>Mapserver:</p> <p>Openlayer, Geoserver, Geonetwork, ArcGIS server, Mapfish</p> <p>Graphic</p> <p>AutoCAD 14 e 2000, Adobe Photoshop</p> <p>GIS</p> <p>ArcInfo, ArcView 3.2, ArcGis 8.1-9.3, AutoCAD Map, Qgis, Udig, GvSig, Grass</p> <p>Photogrammetry</p> <p>Apex, Socet Set 5.2, PCI Geomatica 9.0, Photomodeller</p> <p>Other GPS and survey software</p> <p>StarNet, GeoGenius, Trimble Pathfinder office, Trimble Terrasync, GPS configurator</p> <p>Web-Design</p> <p>Fireworks, Jhoomla</p>
Artistic skills and competences	I play electric bass in a band from 15 years.
Other skills and competences	Teaching support at the topography course at the Politecnico of Milano.
Driving licence(s)	B
Additional information	<p>November 2007 DIAR Department Awards for young researcher.</p> <p>November 2009 DIAR Department Awards for young researcher.</p> <p>References</p> <p>Prof. Dr. Carlo Monti (Doctorate referent) e-mail: carlo.monti@polimi.it</p>
Annexes	<p>PUBBLICATIONS</p> <p>F. Prandi, R. de Amicis, G. Conti, S. Piffer, A. Debiasi and M. Calderan. "BRISEIDE a spatio-temporal framework to support environmental analysis and emergency management". In proceeding of EnviroInfo 2011.</p> <p>R. de Amicis, F. Prandi, G. Conti, D. Taglioni, S. Piffer, M. Calderan and A. Debiasi. "Landslides and spatio-temporal processing of geographical information". The second world landslide Forum. 2011.</p> <p>O. Melnikova, F. Prandi (2011). 3D Buildings Extraction from Aerial Images. In proceedings of High-Resolution Earth Imaging for Geospatial Information ISPRS Workshop. Hannover, Germany June 14 - 17, 2011</p> <p>R. de Amicis, G. Conti, S. Piffer and F. Prandi (2011). "Service Oriented Computing For Ambient Intelligence To Support Management Of Transport Infrastructures", Journal of Ambient Intelligence and Humanized Computing, DOI: 10.1007/s12652-011-0057-z</p> <p>M. P. Riggio, F. Prandi, R. de Amicis and M. Piazza (2011). "Use of High Resolution Digital Images and NDT Imaging Techniques for the Characterization of Timber Structural elements". Proceedings of the NDTMS-2011 International Symposium on Nondestructive Testing of Materials and Structures.</p> <p>R. de Amicis, F. Prandi, G. Conti, D. Taglioni, S. Piffer, M. Calderan and A. Debiasi (2011). "Landslides and spatio-temporal processing of geographical information". The second world landslide Forum.</p> <p>M. P. Riggio, F. Prandi, R. de Amicis and M. Piazza (2011). "Close Range</p>

CURRICULUM VITAE

Raffaele De Amicis

Affiliation and official address: Fondazione Graphitech - Center for Advanced Computer Graphics Technologies, Via Alla Cascata 56C, Povo (TN) 38123- Italy

Nationality: ITALIAN

Education (*degrees, universities, dates*)

Doctorate in Design and Methods of Industrial Engineering, Faculty of Engineering University of Bologna, , Italy, 2001

Laurea in Mechanical Engineering, specialised on Mechanics of Materials, Faculty of Engineering University of Calabria, Italy, 1996

Career/Employment (*employers, positions and dates*)

2006- : INI-GraphicsNet Foundation, Darmstadt, Germany, Chairman of the Steering Committee

2004-06: INI-GraphicsNet Foundation, Darmstadt, Germany, Vice-Chairman of the Steering Committee

2004- : INI-GraphicsNet Foundation, Darmstadt, Germany, Members of the Board of Trustees

2003- : Foundation Graphitech - Center for Advanced Computer Graphics Technologies, Trento, Italy, Director

2003- : Department of Information and Communication Technology, University of Trento, Italy, Consulting Professor

2000-02: Interactive Graphics Systems Group, Department of Computer Science University of Darmstadt, Germany, Senior Researcher

1999-00: Fraunhofer Institute for Computer Graphics, Darmstadt, Germany, Researcher

1997-99: Mechanical Engineering Dept., Faculty of Engineering, University of Calabria, Researcher

1996-99: Molecular Biology Dept., Faculty of Science, University of Calabria, Research Assistant, Researcher

1994-96: Mathematics Dept., Faculty of Science, University of Calabria, Research Assistant, Researcher Assistant

Specialization

- (i) **main field:** Design and Methods of Industrial Engineering, Computer Graphics, Technology Transfer, Science and Technology Policy,
- (ii) **other fields:** Computer Aided Design, Geometrical Modelling, Interactive Graphics Systems, Human Computer Interaction, CAD-CAE process integration, Virtual/Augmented and Mixed Reality, CAD/VR Interfaces Virtual Product Development Process, Simulation-Optimisation and Interactive Visualisation, Computer Supported Co-operative Work, Management Control in Non Profit Organizations
- (iii) **current research interest:** Advanced 3D Interaction Techniques, Shape Semantics, Visual Analytics, Augmented Engineering, Real-time Visualization of Geo-referenced Data, Multimedia Content Engineering, Collaborative Architectural Design, Virtual Reconstruction Assessment and Restoration, Scientific Management, Innovation Management,

Honours, Awards, Fellowships, Membership of Professional Societies

1. Coordinator of BRISEIDE project – Bridging services, information and data for Europe (www.briseide.eu)
2. Director of NATO-ARW on NATO-ARW on Geographical Information Processing and Visual Analytics for Environmental Security, Trento (Italy) 13-17 Oct. 2008.
3. Invited Talks
 - a. NATO Ecoter Final Project Meeting Development of a Prototype System for Sharing Information related to Acts of Terrorism to the Environment, Agriculture and Water systems (Ecoterrorism) - Venice, 2007,
 - b. Workshop on Collaboration@Work by the European Commission New Working Environment Unit. Brussels, 2006, Workshop – From CAD to Virtual Reality, University of Naples Federico II, Napoli 2006 ,
 - c. Workshop COMSON - Coupled Multiscale Simulation and Optimisation in Nanoelectronics, Cosenza, 2006, Workshop Topics in Automatic 3D Modelling and Processing, Verona, 2006.,
 - d. Workshop on the Virtual Reality in the Vehicle Engineering – Virtual Reality Laboratory - FIREMA Trasporti S.p.A. - Caserta, 2005,
 - e. Workshop “ECOTER”, development of a prototype system for sharing information related to acts of terrorism to the environment, agriculture and water systems NATO Headquarter, Brussels, 2005,
 - f. Conference "Mathematics , Arts and Industry, Cetraro, 2005.
4. Computer Graphics Best Paper Award 2003, “Spacedesign: A Mixed Reality Workspace for Aesthetic Industrial Design”.
5. EC Culture 2000 programme, Net-Connect: Connecting European Culture through New Technology, grant holder 2006-2009
6. EU FP6-STREP, IMPROVE: Improving Display and Rendering Technology for Virtual Environments, grant holder 2004-2007
7. EU FP6-Craft , AMI-SME: Analysis of Marketing Information for Small- and Medium sized Enterprises, grant holder 2004-2007
8. Autonomous Province of Trent, MoSeS: Modeling Semantic Shapes, grant holder 2004-2006
9. Autonomous Province of Trent, SpaceDesign Pro: Ubiquitous Shape Design, grant holder 2004-2006
10. Autonomous Province of Trent, InSIDE: Intelligent Styling system for Industrial Design, grant holder 2004-2006
11. Autonomous Province of Trent, SIMI-Pro: Semantic Information Management system for Innovative Product design, grant holder 2004-2006
12. Chairman of the Eurographics Italian Chapter Conference, Trento 2007
13. Chairman of the group WG2 “System prototype definition ”at the workshop “ECOTER” Development of a prototype system for sharing information related to acts of terrorism to the environment, 2005
14. Scientific Committee member of the: Conference Eurographics Italian Chapter, 2007- Conference Contexts and Ontologies: Theory, Practice and Applications, 2006. Conference Eurographics Italian Chapter, 2006, IEEE International Conference on Image Processing, 2005, AICA 2005, Conference "Matematica, Arte e Industria Arte e Industria, Cetraro, 2005,
15. Member of European Association for Computer Graphics. EuroGraphics, since 2004
16. Member of Italian Charter of Engineers, since 1997