

## ● WORK EXPERIENCE

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20 APR 2021 – 20 SEP 2021 Genoa, Italy

**RESEARCH SUPPORT** UNIVERSITY OF GENOA

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Research support activities concerning the installation of soil water content sensors for the analysis and monitoring of landslide areas.

Activities:

- Installation of environmental monitoring networks for soil moisture measurement
- Sampling and geotechnical soil characterisation
- Calibration of capacitive sensors
- Data management and remote control of monitoring equipment

**Business or Sector** Professional, scientific and technical activities |

**Department** Department of Civil, Chemical and Environmental Engineering |

**Address** Via Montallegro 1, Genoa (GE), Italy

24 MAY 2021 – 24 JUN 2021 Genoa, Italy

**RESEARCH SUPPORT** UNIVERSITY OF GENOA

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Research support in the configuration and commissioning of a video surveillance system of the monitoring sensors installed in the Vallone della Bendola within the framework of the INTERREG V-A France - Italy ALCOTRA 2014-2020 CONCERT-EAUX project.

**Business or Sector** Professional, scientific and technical activities |

**Department** Department of Civil, Chemical and Environmental Engineering |

**Address** Via Montallegro 1, Genoa (GE), Italy

23 JUL 2020 – 23 DEC 2020 Genoa, Italy

**RESEARCH SUPPORT** UNIVERSITY OF GENOA

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Support to the completion of the installation of landslide sensors in the framework of the INTERREG V-A France - Italy ALCOTRA 2014-2020 project AD-VITAM (Analysis of Vulnerability of Mediterranean Alpine Territories to Natural Risks).

Activities:

- Calibration of sensors for soil moisture measurement and laboratory configuration of the instrumentation.
- Field installation of soil water content monitoring networks
- Laboratory analysis for geotechnical soil characterisation
- Data management and remote control of monitoring instrumentation

**Business or Sector** Professional, scientific and technical activities |

**Department** Department of Civil, Chemical and Environmental Engineering |

**Address** Via Montallegro 1, Genoa (GE), Italy

25 MAY 2020 – 30 JUN 2020 Genoa, Italy

**OCCASIONAL COLLABORATOR** GTER S.R.L. INNOVAZIONE IN GEOMATICA, GNSS E GIS  
(INNOVATION IN GEOMATICS, GNSS AND GIS)

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Installation of GNSS permanent stations for monitoring the water vapour content in the atmosphere within the framework of the INTERREG V-A France - Italy ALCOTRA 2014-2020 CONCERT-EAUX project.

Activities:

- Support to the activity of planning and realization of the installation on the territory of antennas for GNSS total stations for environmental monitoring.
- Support to the transport and assembly of the field instrumentation (acquisition units, GNSS antennas, power supply batteries and solar panels)

**Business or Sector** Professional, scientific and technical activities |

**Address** Via Jacopo Ruffini 9/1A, Genoa (GE), Italy

3 JUN 2019 – 2 JUN 2020 Genoa, Italy

**RESEARCH FELLOW** UNIVERSITY OF GENOA

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Activities:

- Research for the programme entitled "Low-cost soil moisture sensor networks for landslide monitoring", Scientific Disciplinary Area ICAR/07 GEOTECHNICS
- Analysis, configuration and calibration of sensors for soil moisture measurement
- Field installation of soil water content monitoring networks
- Soil sampling, from construction of samplers to collection of material in the field
- Laboratory analysis for geotechnical soil characterisation
- Data management and remote control of the monitoring instrumentation

The activities listed above were carried out within the framework of the AD- VITAM project (Analysis of the Vulnerability of Mediterranean Alpine Territories to Natural Risks) whose main aim is to increase the resilience of territories characterised by landslides.

**Business or Sector** Professional, scientific and technical activities |

**Department** Department of Civil, Chemical and Environmental Engineering |

**Address** Via Montallegro 1, Genoa (GE), Italy

**Link** <http://www.advit.am/it/>

## ● EDUCATION AND TRAINING

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1 JAN 2022 – CURRENT

**PHD STUDENT** University of Genoa

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Main topic: Surface Soil Moisture (SSM) estimate through the integrated use of low-cost monitoring networks and remote sensing technologies (multi/iper-spectral optical images, microwaves images).

PhD program released according to Piano Nazionale di Ripresa e Resilienza (PNRR) (D.M. 1061/2021) and in collaboration with Gter srl Innovazione in Geomatica, GNSS e GIS.

**Address** Via Balbi 5, Genoa (GE), Italy |

**Field of study** Security, Risk and Vulnerability - Risk and Resilience Engineering for the Natural, Industrialized and Built Environments

**Link** <https://rubrica.unige.it/personale/UkJCWlps>

23 SEP 2019 – CURRENT

**ENGINEER** Ordine degli Ingegneri di Genova - Order of Engineers of Genoa

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**Address** Piazza della Vittoria 11-10, Genoa (GE), Italy | **Field of study** Civil and Environmental Engineering

29 MAR 2019

**MASTER'S DEGREE IN CIVIL AND ENVIRONMENTAL ENGINEERING (CLASS LM-35 - CLASS OF MASTER'S DEGREES IN ENGINEERING FOR THE ENVIRONMENT AND THE TERRITORY)** University of Genoa

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**Address** Via Balbi 5, Genoa (GE), Italy | **Final grade** 106/110 | **Level in EQF** EQF level 7 |

**Thesis** Low-cost soil moisture sensor networks for landslide monitoring.

24 JUL 2015

**DOCTOR OF ENVIRONMENTAL ENGINEERING (CLASS L-7 - DEGREE IN CIVIL AND ENVIRONMENTAL ENGINEERING)** University of Genoa

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**Address** Via Balbi 5, Genoa (GE), Italy | **Final grade** 99/110 | **Level in EQF** EQF level 6 |

**Thesis** The management of forest fires and hydrogeological instability in Liguria.

3 JUL 2010

**HIGH SCHOOL DIPLOMA** Istituto Paritario Don Bosco

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**Address** Via San Giovanni Bosco 14, Genoa (GE), Italy | **Final grade** 86/100 | **Level in EQF** EQF level 4

## ● LANGUAGE SKILLS

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Mother tongue(s): **ITALIAN**

Other language(s):

	UNDERSTANDING		SPEAKING		WRITING
	Listening	Reading	Spoken production	Spoken interaction	
<b>ENGLISH</b>	B2	B2	B2	B2	B2
<b>FRENCH</b>	A2	A2	A2	A2	A2

*Levels: A1 and A2: Basic user; B1 and B2: Independent user; C1 and C2: Proficient user*

## ● DIGITAL SKILLS

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Microsoft office(WordExcel Powerpoint Outlook) | PLAXIS | MATLAB&Simulink | Z+F Laser Control | Slide | Basic AutoCad | SAP | SSAP 2010 (Slope Stability Analysis Program) | GRASS GIS | QGIS | Metashape | CloudCompare

## ● ADDITIONAL INFORMATION

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### PUBLICATIONS

[\*\*LANDSLIDE SUSCEPTIBILITY ASSESSMENT: SOIL MOISTURE MONITORING DATA PROCESSED BY AN AUTOMATIC PROCEDURE IN GIS FOR 3D DESCRIPTION OF THE SOIL SHEAR STRENGTH\*\*](#)

– 2022

The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences, Volume XLVIII-4/W1-2022

Slope stability is strongly influenced by soil hydraulic conditions. Considering rain-triggered shallow landslides, the stability can be markedly influenced by the propagation of the saturation front inside the unsaturated zone. Soil shear strength varies in the vadose zone depending on the type of soil and the variations of soil moisture. Monitoring of the unsaturated zone can be done by measuring volumetric water content using low-cost instrumentation, such as capacitive sensors that are easy to manage and provide data in near-real time. For a proper soil moisture assessment a laboratory soil-specific calibration of the sensors is recommended. Knowing the soil water content, the suction parameter can be estimated by a Water Retention Curve (WRC), and consequently the soil shear strength in unsaturated conditions is evaluated. Several models are already proposed for shallow landslide susceptibility evaluation, also in FOSS GIS environment. However, these models do not usually consider the

soil shear strength in unsaturated conditions, even if it is crucial, especially in the case of shallow landslides. A procedure that allows the estimate of the soil shear strength starting from soil moisture monitoring data (from sensor networks or satellite-derived map) is here presented. Moreover, preliminary results relative to a case study (i.e. the landslide of Ceriana-Mainardo in Italy) are shown. The proposed procedure could be integrated into existing models for landslide susceptibility assessment and also for the emergency management.

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Stefania Viaggio, Alessandro Iacopino, Rossella Bovolenta, Bianca Federici

**MONITORAGGIO DEL CONTENUTO D'ACQUA E VALUTAZIONE AUTOMATICA IN GIS DELLA RESISTENZA DEL SUOLO IN CONDIZIONI DI PARZIALE SATURAZIONE PER L'ANALISI DI STABILITÀ DEI VERSANTI.**

– 2022

Incontro Annuale dei Ricercatori di Geotecnica 2022 – IARG2022 Caserta, 7-8-9 settembre 2022

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Stefania Viaggio, Alessandro Iacopino, Bianca Federici, Rossella Bovolenta

**Monitoraggio delle frane mediante una rete di sensori: la misura del contenuto d'acqua del terreno (Landslide monitoring using a sensor network: measuring soil water content)**

Proc. of XXVII National Geotechnical Conference, July 13-15, 2022, Reggio Calabria, Italy

Within the ALCOTRA AD-VITAM project, the University of Genoa has been engaged in the development of a system, named LAMP, for the analysis and prediction of landslides triggered by rainfall. LAMP is based on a physically based model, which integrates hydrological and geotechnical modeling. Temperature and soil water content sensors are used to power the model, as well as rainfall data observed by rain gauges or weather radar. GNSS receivers are placed at the ground plane for additional control. The final products of the model are maps of landslide susceptibility in the occurrence of measured or expected pre-cipitation. With particular reference to soil water content measurements, the present work describes the installation phases of the monitoring network, the reliability analysis of the instruments and the operations related to the calibration of the sensors.

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Alessandro Iacopino, Stefania Viaggio, Rossella Bovolenta

**[Field Measurements of Soil Water Content at Shallow Depths for Landslide Monitoring, Geosciences, 10\(10\): 409.](#)**

– 2020

Monitoring changes in soil saturation is important for slope stability analyses. Soil moisture capacitive sensors have recently been developed; their response time is extremely fast, they require little maintenance, and they are relatively inexpensive. The use of low-cost sensors in landslide areas can allow the monitoring of large territories, but appropriate calibration is required. Installation in the field and the setting up of the monitoring network also require attention. In the ALCOTRA AD-VITAM project, the University of Genoa is involved in the development of a system, called LAMP, for the monitoring, analysis and forecasting of slides triggered by rainfalls. Multiple installations (along vertical alignments) of WaterScout sensors are placed in the nodes of the monitoring network. They provide real-time water content profiles in the shallow layers (typically in the upper meter) of a slope. With particular reference to these measurements, the present paper describes the reliability analysis of the instruments, the operations related to the sensor calibration and the installation phases for the monitoring networks. Finally, some of the data coming from a node, belonging to one of the five monitoring networks, are reported.

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Rossella Bovolenta, Alessandro Iacopino, Roberto Passalacqua and Bianca Federici

**[Soil water contents and displacements monitoring, integrated into a Hydrological-Geotechnical Model for the evaluation of large-scale susceptibility to landslides triggered by rainfalls, EGU General Assembly 2020, Online, 4–8 May 2020, EGU2020-5014](#)**

– 2020

Most of the Italian territory is subject to landslides and therefore the possibility of using low-cost sensors for widespread monitoring networks is particularly attractive, provided that the sensors are characterized by satisfactory accuracy and precision, low cost and good compatibility with the acquisition systems. LAMP adopts a physically based model, which integrates the hydrological and geotechnical modeling. Temperature and soil moisture sensors are used to feed the model, in addition to rain data obtained by rain gauges or meteorological radars. Moreover, GNSS receivers are arranged on the ground level. The final products of the model are landslide susceptibility maps in case of measured or forecasted rainfalls. The first soil moisture values detected by the wireless sensor networks installed in two sites are encouraging. The analysis of a correlation between rainfall, soil moisture values and displacements will be performed.

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## **ORGANISATIONAL SKILLS**

### **Communication and organization with specialized companies and local authorities**

- Organization of collaboration activities with specialized companies for the installation in the field of supports to the environmental monitoring networks.
- Management of the authorization procedures by local public and private bodies to proceed to the works of installation.
- Capacity of comparison, and sometimes of negotiation, with the owners of the areas involved in the installation of the monitoring networks.

**Planning & Problem Solving** Ability to plan work activities in any context and predict the *worst case* based on which to ensure the quality of procedures and results.

## **COMMUNICATION AND INTERPERSONAL SKILLS**

**Team Working** Great aptitude for collaboration and teamwork management, developed in both educational and work settings, with the aim of obtaining effective solutions in an efficient and pragmatic way. Ability to value the contribution of individual team members and learn new concepts.

**Work Activity Reports** Strong aptitude for writing and editing reports and periodic records of work performed.

Creation of useful documents to maintain accurate and detailed records of work status.

## **TECHNICAL SKILLS**

### **Cartographic data management**

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Knowledge of cartographic data management in a GIS environment (Grass GIS, QGIS, ArcMap, Geomedia).

### **Geomatics**

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Knowledge on conducting geomatic land surveying with both traditional (total station and geometric leveling) and remote sensing (photogrammetry and laser scanner) techniques and data processing.

### **Geotechnical soil characterisation**

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Operational knowledge regarding soil sampling activities and geotechnical soil characterisation (grain size by sieving and sedimentation, water content, particle density, organic content, porosity, Atterberg limits).

### **Configuration and management of environmental monitoring networks**

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Experience in the field of monitoring sensors (soil moisture sensors) in relation to:

- assembly and commissioning of components
- installation and optimisation of monitoring networks
- remote data acquisition and interpretation
- sensor calibration

Experience in the ongoing management of environmental monitoring equipment:

- assessment of preventive measures to protect field-installed equipment
- planning and implementation of maintenance
- integrity checks

Problem-solving skills to manage critical issues and potential risk factors related to the instrumentation installation phases.

### **Hydrology**

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Knowledge of hydrology with special reference to the problems of the influence of precipitation on the variation of the water content of the soil.

### **Assembly and installation of surveillance systems**

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Experience in assembling surveillance cameras and analysing solutions for optimising remote data acquisition and management.

Area of development: surveillance of environmental monitoring systems.