Mariano Crimaldi

Eng. Ph.D.

mariano.crimaldi@unina.it

+393495072614

scopus.com/authid/detail.uri?authorId=57191481522

researchgate.net/profile/Mariano-Crimaldi

linkedin.com/in/mcrimaldi/

https://mcrimaldi.github.io/

Education

Ph.D in Sustainable Agricultural and Forestry Systems and Food Security,
University of Naples Federico II
02/2022

Master Degree in Environmental Engineering,
University of Naples Federico II
2012

Bachelor degree in Environmental Engineering,
University of Naples Federico II
2009

Publications

List of pubblications
https://scholar.google.it/citations?user=Ofzq0M4AAAAJ&hl=it

Languages

English ●●●●○
Cambridge Assessment English B2

Certificates

UAV Pilot — *A1 - A2 - A3*
Open category

Scientific Experience

Scientific-Technical Officer,
Department of Agricultural Sciences - University of Naples Federico II
12/2024 – present

- **Laboratory management:** supervision of the operation and maintenance of scientific instruments.
- **Experimentation and analysis:** collaboration with researchers in designing and conducting experiments, as well as performing chemical, physical, or biological analyses on agricultural samples.
- **Research project development:** support in preparing funding proposals (national and European), and in planning and implementing research projects.
- **Application of advanced technologies:** promotion of innovative technologies such as precision agriculture, IoT sensors, drones, robotics, and big data to enhance agricultural productivity and sustainability.
- **Industry collaboration:** fostering dialogue between the university department and agricultural companies to facilitate the transfer of innovations from the laboratory to the field.
- **Prototyping and testing:** development or supervision of prototypes of new agricultural technologies to ensure their effectiveness and safety.
- **Practical training:** assisting students in laboratory and field activities, introducing them to the use of advanced instrumentation.
- **Preparation of educational materials:** collaboration with faculty to develop manuals, technical guides, and teaching materials related to agricultural technologies.
- **Workshop organization:** planning and coordinating seminars, refresher courses, and workshops on new agricultural technologies for students, researchers, and industry professionals.
- **Publications and communication:** contributing to the drafting of scientific articles, outreach materials, and technical reports, as well as managing the department's digital communication channels (social media, website).
- **Event organization:** promoting science outreach initiatives, such as open days, conferences, and agricultural fairs.

Post-Doc Researcher,
AGRITECH - National Research Center for Technology in Agriculture
03/2023 – 12/2024

Development of robotic solutions for the automation of precision farming and agriculture solutions, integrated fleets of land-air autonomous systems through artificial intelligence systems, collaborative robots, and 5G networks.

Scientific Collaborations:

- **XXXIX PhD National Course in AI for Agrifood and Environment**
  - **Use and applications of artificial intelligence (AI) in agriculture** - Seminar lecturer for students of the national PhD course in AI for Agrifood and Environment.
- **Istituto Superiore F. Morano, Caivano (NA)**
  - **Agriculture 4.0** - Teaching assignment as an external expert for the PNRR-funded project "*STEM with english*".
- **Dr. Fulvio Maffucci**
  - **Stazione Zoologica Anton Dohrn** - Photogrammetric surveys of the nesting coastal habitat of *caretta caretta* and proposals for advanced management of the beaches affected by the phenomenon.
- **Dr. Alessia Sannino**
  - **Physics Department** - Development, installation and study of on the use of atmospheric LiDAR to assess the forest microclimate and its interaction with the atmospheric composition.

Post-Doc Researcher,
Department of Agricultural Sciences - University of Naples Federico II
02/2022 – 03/2023
Earth Observation Technologies for Irrigation in Mediterranean Environments - Estimation of productivity of irrigated crops through techniques of assimilation and/or input-forcing in agro-hydrological models (e.g. *AQUACROP*); derivation of irrigated productivity maps in the project study areas located in Lebanon, Jordan, Spain and Italy.

Scientific Collaborations:
- **Prof. Guido D'Urso**
  - ***Agricultural, Forestry and Biosystems Engineering Lab*** *- Analysis of remote sensing data in GIS environment, development and programming of data input-forcing techniques.*
- **Prof. Giovanni Battista Chirico**
  - ***Ecohydraulics Lab*** *- Development, study and installation of sensors on riparian vegetation for bulk drag calculation, validation of data using multispectral images acquired via UAV. 3D scanning and reconstruction of riparian plants to study the interaction with water flow.*
- **Prof. Nunzio Romano**
  - ***C.I.R.AM.*** *- Hyperspectral, multispectral and thermal soil surveys using drones. Near-surface soil moisture measurements with TDR, capacitive probes, and spectroscopic analysis.*
- **Prof. Mario Palladino**
  - ***Hydrology Lab*** *- Development and implementation of sensors network for monitoring water-soil interactions. Design of integrated systems for monitoring and managing domestic micro-greenhouses.*
- **Prof.ssa Simona Vingiani**
  - ***CRISP - Soil Science Lab*** *- Design and implementation of hardware components of a DSS for the remote management of the irrigation of a vineyard, through the integration of soil sensors in a local network, using the IoT philosophy.*

Ph.D. Student,
Department of Agricultural Sciences - University of Naples Federico II
11/2018 – 02/2022
Immersive Visualization for Smart Farming applications. Study of "*Functional-structural plant modelling*" for agricultural applications. The main goal of the study is to create a bi-directional integration between biological model and immersive technology such as virtual and augmented reality in order to have a realistic simulation of plant growth, capable to adapt to input factors such as light, presence of nutrients and water concentration. Development and research of UAVs systems for precision agriculture applications including real-time plant diseases recognition using AI, Neural Networks and Deep Learning. Development of novel spraying system for UAVs. Python image analysis applications, GIS applications of remote sensing images. UAV use for plant disease remote sensing.

Scientific Collaborations:
- **Prof. Francesco Giannino**
  - ***Laboratory of Applied Ecology and System Dynamics -*** *Development of a biological-mathematical model of tree growth and programming in a 3D environment of the model.*
- **Prof. Fabrizio Sarghini**
  - ***DroneLAB*** *- Precision agriculture UAVs sensors and platforms development, applications and data production/analysis; Development and creation of sensors for implementation on tractors of a control unit to prevent vehicle rollover. 3D Printing design and manufacturing of experimental prototypes.*
  - ***CoffeeLAB -*** *Food analysis sensors design, development, data collection and elaboration.*
- **Prof. Oliver Deussen**
  - ***Visual Computing Lab,*** *University of Kostanz (DE) - 3D rendering and programming of plants.*

- **Prof. Albino Maggio; Dott. Valerio Cirillo**
  - ***Agronomy and Crop Sciences Lab*** *- Development and application of deep-learning algorithms for in-field and real-time weed recognition. Aerial surveys of multispectral images for the study of crop-weed interactions.*
- **Prof. Antonio Saracino; Dott. Luigi Saulino; Prof. Giuliano Bonanomi**
  - ***Forest Ecology and Silviculture Lab*** *- UAVs aerial forestal surveys, hemispheric image analysis, study and development of sensors for forest monitoring.*

Research Grant,
Department of Agricultural Sciences - University of Naples Federico II
05/2014 – 11/2018

Study of advanced techniques for hemp (*Cannabis Sativa* L.) utilization in food industry. Experimental cultivation mechanical harvesting optimization. Study of biomass plantation automatic harvesting (*Cannabis Sativa* L., *Punica Granatum* L.). Mechanical hemp seed oil extraction optimization. Study to evaluate the effects of an automatic milking system (AMS) on milk yield and composition of buffalo (Mediterranean-type Bubalus bubalis) cows. Energetic optimization of one and two phases mechanical harvesting. Biomass characterization for EU project "*PON Enerbiochem*". Calorimetric studies of biomas using a Mahler's bomb. Bio-fuel production from SRF/SRC woody biomass (*Arundo Donax* L., *Populus Nigra* L.; *Populus x Euroamericana* L., *Fraxinus Angustifolia* L., *Robinia Pseudoacacia* L., *Eucalyptus Occidentalis* L., *Salix Alba* L.); Mechanical tobacco seed oil extraction optimization.

Scientific Colaborations:
- **Prof. Salvatore Faugno**
  - ***Agricultural Mechanics and Biomass Lab*** *- Setting up and management of the laboratory for biomass analysis. Development of sensors for the evaluation of the calorific value of biomasses and their main characteristics (moisture, ash content, particle size).*
- **Prof.ssa Stefania Pindozzi; Prof.ssa Elena Cervelli**
  - ***Rural Building and Agro-Forestry Landscape Lab*** *- Study, development and installation of sensors for barns and animal husbandry, photogrammetric and topographic surveys, analysis of acquired data. Sensor development for field and spatial scale surveys, photo-interpretation, remote sensing, orthophotos with drone support. Computation and interpretation of environmental indices. Data acquisition, analysis and processing in GIS environment. Development of spatial analysis processes. Creation of a virtual environment as decision support platform in land use management and planning processes.*
- **Prof.ssa Felicia Masucci; Prof. Antonio Di Francia; Dott.ssa Maura Sannino**
  - **Livestock and Animal Production Lab** *- Deployment of sensors for animal welfare tracking in automatic milking systems (AMS). Study of calf behavior in relation to the introduction of automatic feeding systems.*

Intern, *University of Washington*
03/2011 – 09/2011 | Seattle, WA, USA

Study about localization of corrosion potential and metal release in galvanically affected zone in drinking water with extensive experiments related to the elucidation of effects of galvanic coupling on the distribution of galvanic potential. Design of novel flow-through cells to monitor corrosion in drinking water based on corrosion potential changes. Extensive experiments related to the elucidation of effects of galvanic coupling on the distribution of galvanic potential. Measurements of metal release using ICP-MS.

Scientific Collaborations:
- **Prof. Gregory Korshin**
  - ***Environmental Engineering Lab*** *- Development of sensors and techniques for galvanic corrosion measurement. Patent proposal for developed sensor technology.*

Scientific Skills and Expertise

Scientific Metrics

- **31 *Documents***
- **428 *Citations*** by **337 *documents***
- **12 *h-index***

Lab Equipment and Measuring Instruments Expertise

- GIS Analysis
- Satellite Imagery Analysis
- Thermal Cameras
- Hyperspectral Cameras
- Multispectral Cameras
- TDR Soil Moisture Probes
- Capacitive Soil Probes
- Spectroscope
- Plant Strain Sensor
- Structured Light 3D Scanner
- Numerical Flow Computation
- Acoustic Doppler Velocimeter
- IoT hardware
- On-Field Weather Sensors
- Simile FSPM modeling
- UAVs design and operations
- IMU, RTK and vibration sensors
- 3D design and printing
- Gas-chromatography
- High Performance Liquid Chromatography (HPLC)
- Mass Spectrometry (MS)
- Colorimeter
- Particle Analyzer
- Deep-Learning dataset acquisition
- Deep-Learning algorithm development (TensorFlow, Keras, PyTorch)
- Digital hemispherical photography for estimating forest canopy properties (CAN-EYE)
- HHV and LHV measurement with Mahler's bomb
- Biomass proximate and ultimate analysis (chip size, volatile matter, ashes, moisture, fixed carbon, carbon, hydrogen, nitrogen and sulfur)
- Temperature, humidity an environmental sensors for barn behaviour in Automatic Milking Systems (AMS)
- Inductively Coupled Plasma-Mass Spectrometry (ICP-MS)
- Voltammetry

Data Analysis and Scientific Software Experience

- **GIS environment:** *QGIS, ArcGis, GRASS*
- **Satellite images:** *ERA5 - CERRA - EO APIs*
- **Statistical Analysis** (*ANOVA, Correlation, Regression, k-Means, Machine-Learning techniques*): *STATA, XStat, Python packages, R language*
- **Structure from Motion (SFM) and Multispectral/Hyperspectral images:** *Metashape, Pix4DMapper, RealityCapture, ENVI, 3DF Zephyr*
- **3D scanning:** *Skanect, Meshroom, 3DF Zephyr*
- **IoT hardware:** M5Stack, *LattePanda, STM32, Arduino, Raspberry Pi*
- **Sensors hardware:** *ESP32, NodeMCU, single-board electronics*
- **Programming languages:** *Python, C#, R, LaTeX, Git, MatLab, LabVIEW*
- **3D modeling:** *Fusion360, CATIA, Unity, Blender, SolidWorks*
- **Deep-Learning frameworks:** *TensorFlow, RoboFlow, Keras, PyTorch, LabelBox, CVAT*
- ***Advanced Informatics:*** *ProxMox VE, Docker, Kubernetes, OpenShift*
- **3D printing:** OrcaSlicer, *CURA, PrusaSlicer, OctoPrint*
- **Literature and bibliography:** *LaTeX, Zotero, Notion*
- **Basic Informatics:** *Windows, Linux, Microsoft Office, OpenOffice*

Professional Experience

HSE Engineer, *Studio Amich*

07/2013 – 06/2014 | Giugliano in Campania (NA), Italy

Estimation of industrial activity risks. Assessment and drafting of the DVR (Documento Valutazione dei Rischi), management of operational safety plan. Expert advise on safety and security within a workplace. Advise, estimation and assessment of environmental, chemical and electromagnetic risk, internal and external noise, fire, vibrations, radiations. Trainer for compulsory corporate courses.

Technical Advisor, *Public Prosecutors Office of Lanciano (CH)*

02/2013 – 07/2013 | Lanciano (CH), Italy

Technical study about the state of the art of wastewater treatment plants in Lanciano (CH) area. Several technical reports and on-site chemical tests has been made to spotlight plants problem and management according to Italian and European environment laws.

Intern, *Passavant Impianti S.P.A.*

04/2009 – 09/2009 | Angri (SA), Italy

Study of Nitrification/De-Nitrification process in waste water treatment regarding waste water treatment plant in Angri (SA), Italy. Accurately surveyed Nitrification/Denitrification process.Performed chemical tests. Updated process plans. Drew up proposals for process alternatives and troubleshot plant problems.

Declaration

In riferimento alla legge 193/2003 autorizzo espressamente l'utilizzo dei miei dati personali e professionali riportati in questo curriculum.