

GAMON Platform

Global Measurement Platform for Nuclear Safety and Security



CAEN SyS

Systems & Spectroscopy Division



Enhancing Nuclear Safety and Security



The Challenge

Increased sensitivity to nuclear safety and security issues has prompted public entities and private institutions to maximize their ability to quickly assess risks and to intervene in the event of an accident or incident. Rapid intervention and response are achieved through nuclear measurements via airborne, ground, and underwater systems that can be effortlessly deployed, remotely controlled, and easily maintained.

Current systems often consist of detectors and monitoring devices, never designed to work together. The result is a quantity data arriving from incompatible devices and detectors that need to be integrated and analyzed. This process wastes valuable time that could otherwise be spent on response and mitigation.

A network of cohesive, well-integrated and easy deployable detection systems combined with real-time fusion and analysis of critical data is essential to facilitate and enhance decision-making process during these critical times, improving the quality of the management plan.

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*International Qualified Radioprotection
and Nuclear Measurements Expert*

GAMON Platform & Benefits

The Solution

The GAMON Platform is a unique and innovative system, capable of empowering authorities and institutions with the ability to respond to a wide range of operational activities and complex radiological situations in a single, simple, reliable solution. It allows the operator to supervise all GAMON systems implemented in the field via a simple yet powerful web interface. The GAMON Platform is built upon a foundation of smart systems designed to be interconnected into a network of sensors. The GAMON Platform combines a cloud database application for visualization and analysis from all GAMON systems for autonomous and real-time measurements.

The GAMON Geo-Referenced web application allows operators and administrators to easily visualize network status and dataflow in real time. Additionally, by leveraging integrated data-fusion algorithms, operators can easily manage ongoing in-field procedures and reduce emergency intervention time.

The GAMON Platform relies on intelligent, cutting-edge, digital MCA electronics to perform data analysis and execute source identification algorithms. System network and integration options include GPS, WiFi, Bluetooth, and Long-Range (LoRa) wireless communication protocols as well as wired communication via USB and Ethernet. All data are automatically stored to a secure database via web (TCP/IP) protocol. The data can be read from this database via the GAMON web application included with the system.





The Benefits

The GAMON Platform can be tailored to specific customer needs, offering critical advantages and capabilities such as rapid deployment, multi-station network development and increased personnel safety and security, in compliance with international standards. These benefits are achieved by having easy, fast, secure, and reliable access to all real time measurements. Its intuitive graphical interface allows the user to fully monitor and control the detector system, guaranteeing rapid and well-founded decision making for a prompt response to emergencies.



Data Access

Local database with historical data stored on device non-volatile memory



Georeferenced System

Georeferenced information for dose rate heat map



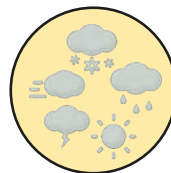
Fast Deployment

Easy configuration of the network for security purposes



Smart Communication

Redundant interfaces and failover configuration capability



Harsh Weather Tolerant

Extended operational temperature range and enhanced spectrum stabilization



Multi-system Network

Data fusion of heterogeneous systems in the network



TOTAL BENEFITS

Multisystem Integration

Enhanced ALARA

Prompt Deployment and Connection

Cost Saving

GAMON Platform Functionalities

WEB INTERFACE

Web interface software requires no installation. Simply open a tab in your favorite browser and connect to the probe IP

MAPPING FUNCTIONALITY

The Mapping Functionality is enabled thanks to the included GPS antenna. It allows to:

- real-time tracking of mobile systems
- immediate visualization of the distribution of contamination through the georeferenced dosimetric heat map
- depicting system status and critical radiological information and alerting the operator in case of alarm

The total H*(10) dose heat map is obtained from the data fusion of every GAMON System deployed in the network.

Every report includes the GPS coordinates for offline data analysis.



REAL-TIME DATA VISUALIZATION:

Scintillator count rate (ICR) and GM dose rate instantaneous values are shown in real-time for live monitoring

PROBE INFORMATION

Last calibration date, PMT voltage, detector type...

Internal probe temperature data is integrated into the spectrum stabilization algorithm

ENVIRONMENTAL INFO

An optional rain sensor detects rainfall and supports correlation analysis between weather conditions and measured data.

The included GPS antenna adds Latitude and Longitude coordinates to the dataset, thus enabling mapping functionalities and geo-referenced data fusion analysis

AUTOMATIC SPECTRUM STABILIZATION

A state-of-the-art stabilization algorithm maintains spectra stabilization in all the weathers conditions. This feature corrects for temperature dependence in the PMT's response. This algorithm has been extensively evaluated, tested, and optimized in both outdoor environments and in environmental chambers, from -40° to +60° C, with fast transient (up to 10%/hour)

LIVE SPECTRUM VISUALIZATION

Isotope Identification and very fast Spectrum Anomaly detection

HISTORICAL DATA TREND

Supports visualization of immediate Scintillator count rate (ICR) and GM dose rate trends.

Data are shown on separated waterfall plots to enable radionuclide contamination analysis within an up-to-the-minute time window

Automatic statistic analysis tool

The Automatic Statistic Analysis Tool allows the user to perform customized searches of reports stored in the internal database by selecting the start and the end date, status and type.

It shows the trend of:

- H*(10) dose for each identified isotope
- Average scintillator count rate (ICR)
- Average GM dose rate
- Rain (optional)

A pie chart shows the percentage of normal, warning, alert and critical reports over the period selected by the user's queries.



Automatic calibration tool

Fast and easy Energy and FWHM calibrations may be performed via the web interface. Simply put a source near the probe and launch the calibration tool, which automatically recognizes the peaks in the spectrum and makes the calculation for the new energy and FWHM calibration curves.

Customizable isotope library

Compliant with environmental monitoring standards, three thresholds (warning, alarm, critical) can be set for each isotope. H*(10) dose for each identified isotope present in the library is automatically calculated in the report. Isotopes can be completely customized to the user's needs.

GAMON Control Software

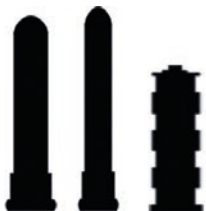
Web interfaced based software interated in the gamon system

Each GAMON system includes an internal CPU running a web server application called GAMON Control Software eliminating the need for a central data server. Radiological information is stored in an internal database as well as in the non-volatile memory, allowing autonomous data taking even in the event of connectivity loss. Spectra, acquisition reports, and data history can be displayed and downloaded through a common web browser. Access credentials (such as user, technician, administrator) can be defined, and the degree of access of these user levels can be customized.

Spectral analysis and statistical data treatment are performed according to ISO-11929. These identification routines rely on an extended isotope library which identifies the selected radionuclides in the stabilized spectrum.

► Highlights

- No central data server required
- User-friendly web interface with access to data reports and historical data
- Automatic and real time diagnostics
- Isotope-based alarms fully configurable
- Prompt alarms signaling based on spectrum acquisition and Geiger-Muller counting
- Secured data and system configuration with password-controlled access and customizable levels of privileges
- Full control of data acquisition and calibration ensuring system optimization



Static Environmental Network

Radiation measuring stations for environmental monitoring networks
GAMON S / GAMON D / GAMON Diver



Dynamic Monitoring Network

Mobile measuring units for first emergency response and homeland security
GAMON Mobile / GAMON Pack / GAMON Drone

EASY VISUALIZATION OF INSTANTANEOUS RATES AND ALARMS

REAL-TIME GAMMA RADIATION SPECTROMETRY



REAL-TIME UPDATING FLOW CHARTS

IDENTIFIED ISOTOPES FROM A LIBRARY OF MORE THAN 80 TYPES

GAMON Systems





GAMON S

Gamma radiation spectroscopy system for real-time radiation monitor

The GAMON S spectrometer series has been designed for outdoor and indoor real-time radiation monitoring, for early environmental warning and emergency response. It can operate in harsh weather conditions and is protected from rain and moisture.

The GAMON S can be deployed in a wide range of scenarios, as in permanent ring monitoring as well as in moving monitoring stations. Thanks to the integrated GPS the system position can be easily monitored real time.

The GAMON S spectrometer runs automatic isotope identification and isotope related dose rate evaluation. The real-time data processing and the defined isotope-based alarm allow GAMON-S to detect the presence of artificial nuclides in a short time window and more effectively compared to traditional dose rate meters.

The user can select the isotopes to be identified from the library and adjust the thresholds of the isotope related alarms. The spectrum stabilization is obtained with the identification of natural occurring radionuclides as the 40K.

The gamma detector is composed by an inorganic scintillation crystal which can be either NaI(Tl), CeBr3 or LaBr3(Ce). NaI(Tl) is preferable its high light yield and moderate cost, LaBr3(Ce) for its excellent energy resolution and CeBr3 for its good energy resolution and low internal radioactivity.





▶ Operative Application

- Ring monitor systems around nuclear facilities
- Nationwide environmental monitoring networks
- Area monitor system in nuclear research laboratories
- Portable, mobile measurement stations for emergency response

▶ Highlights

- Gamma radiation spectroscopy system based on scintillation detector and Geiger-Mueller counter
- Based on an active standalone MCA device for the digitization of outdoor gamma spectroscopy signals (patented)
- Onboard web interface for easy configuration of isotope-based alarms
- Internal database for summary reports and plots, easily generated by the embedded web interface
- Robust spectrum stabilization algorithms
- Big onboard data storage for long autonomous data taking
- Designed for operating outdoor in extreme weather conditions from -40 to +60 °C
- Robust case, designed to guarantee IP68, including the power and the communication connectors
- Suited for marine environmental survey thanks to the optional fiber glass external case
- Design for easy wall and pole mounting
- Wired and Wireless communication interfaces: USB 2.0, Ethernet, WiFi and 3G/4G LTE
- Implementing long range, low power wireless platform LoRa™
- Configurable list of communication interfaces for selecting primary and backup interfaces
- Quick and easy to install and commission thanks to onboard web graphical interface
- Autonomous delivery of email and SMS on alarm to a configurable list of recipients



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▶ Highlights

- Gamma dose rate monitoring system embedding two energy compensated Geiger–Mueller (GM) detectors
- Onboard web interface for easy configuration
- Wide measurement range from 10 nSv/h to 10 Sv/h with subtraction of intrinsic background
- Automatic switching between GM tubes based on the acquired count-level
- Moving average algorithm for instantaneous dose rate measurement
- Big onboard data storage for long autonomous data taking
- Designed for operating outdoor in extreme weather conditions from -40 to +60 °C
- Robust case, designed to guarantee IP68, including the power and the communication connectors
- Design for easy wall and pole mounting
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