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## Open technologies: Python, an open source language for the Mhaster datalogger



Mhaster is proving to be the top-of-the-line among dataloggers: it is interoperable, open and programmable, and can perform any custom external command.

Specifically, the user is free to implement new customized features on the station that can either complement its normal functioning or replace the standard functioning if the customer so wishes, in case s/he wants to personally define how to manage the processes of acquisition and communication. Just to give a couple of examples demonstrating the possibility of going beyond the standard configurations, the user is free to programme applications that allow her/him to acquire custom sensors or to send data via FTP with third-party proprietary formats.

These additional processes, as well as in C and Shell scripts, can be written in Python, too: an extremely intuitive programming language, which involves the presence of an interpreter analysing and executing the source code written in simple text files.

The main advantage of this system is that, once a source

message is written, it can be interpreted and executed on most operating systems (GNU/Linux, Microsoft Windows, Mac), simply by having at your disposal the correct version of the interpreter.

Python is a **free software**: the download of the interpreter for your platform, as well as the use of Python in your own applications, is completely free; it can also be freely modified and redistributed according to the rules of a fully open-source license.

This language, which is widespread all over the world and essential for companies such as Google and YouTube, has also become part of CAE technology as it allows us to quickly develop even the most complex applications in any context.

The relevance of this language is also proved by the fact that, from the Academic Year 2017/18, the Bocconi University provides a Python programming course to all students of the first-cycle degree programmes. "Coding is the new English", as Rector Gianmario Verona has always emphasized. ■

TORNA ALL'INDICE

## Radio: the new IOT standard protocols go beyond the limits of Modbus



During extreme meteorological events, data availability is essential. Several episodes, even recent ones, have shown how dedicated radio networks are the most reliable technology during emergency situations.

This is why CAE has significantly invested in a new extremely advanced radio, which implements open and standard protocols. This is an innovative digital radio modem that can be used both as a terminal unit and as a repeater.

The RCS2 radio uses the UHF band and is equipped with an Ethernet and serial interface. Particularly, the use of the serial interface allows a high saving in terms of consumption, guaranteeing a safe and long-lasting use of the radio even with a solar panel power supply and buffer batteries. This is a typical case in which the company is able to assert its long-term experience in the sector, where it is necessary to know how to combine reliability,

openness and speed, as well as energy saving.

The new radio carries the CoAP (Constrained Application Protocol) service; unlike other protocols such as the Modbus, created in 1979, the RCS2 radio is able to manage millions of knots and to transport any sort of data (JSON, XML, binary, etc...), including image files like the .jpg format, with no need of customization. The CoAp is specifically designed for machine-to-machine (M2M) systems and it is particularly suitable for monitoring and alerting systems, as it allows to optimize consumption and performance.

From today on, it will finally be possible to create truly open monitoring and alert radio networks, which are ready to include on the market any datalogger that implements the standard protocol. ■

TORNA ALL'INDICE

## Dams: emergency plans, alert and public safety systems. The case of Zhinvali in Georgia



Under the mandate of “Georgian Water and Power” (GWP), the Joint Venture Hydrodiagnostics LLC/CAE S.p.A./Field S.r.l. has been assigned a project for the provision of a monitoring and alert system for the Zhinvali dam in Georgia.

The dam belongs to “Georgian Water and Power” (GWP), a leading company in the Georgian and Southern Caucasus water supply markets, which is also involved in providing wastewater services and generating electricity from hydroelectric plants.

The dam is located along the Aragvi River, about 60 km north of the capital Tbilisi (see Figure 1). In the first phase, an engineering company conducted a study to evaluate and estimate the progression (maximum depth and flood wave speed) and the maximum flood wave capacity in the event that one of the following

risk scenarios occurs: the most catastrophic one, following the breaking of the dam, and a more realistic one, corresponding to an important release of water due to the possible breaking or opening of the gates in a controlled manner.

In the second phase, based on the possible wave propagation scenarios, the risk areas in the region under the responsibility of Georgian Water and Power LTD were identified along the 15 kilometres downstream of the dam. On the basis of these risk areas and after several field inspections, it was therefore possible to establish and configure the Early Warning System for the Zhinvali dam. The aim of this system is to protect the population in the risk areas, which extend up to the northern area of Tbilisi, the Georgian capital, where over 1 million people live.



The system allows to:

- **Perform an early diagnosis of the conditions that can affect the correct functioning of the dam, contributing to its breaking.** The system continuously monitors the parameters that best describe the safety level of the dam and, if necessary, it allows corrective actions to be taken in advance. The boundary conditions that most contribute to the occurrence of such extreme events are mainly:
  - *the conditions of the body of the dam*
  - *the water level of the lake*
  - *the flood downstream of the dam*
  - *turbidity of the drainage measures*
- **Activate the evacuation notification system.** In case of emergency, when one or more thresholds are exceeded, the system either activates its acoustic devices (a total of 5 stations with sirens) which are connected via radio, or sends messages (voice or text) to the monitoring operators and to the potentially threatened population. Moreover, the network has a mobile instant messaging service that can send text messages even in a pre-warning stage.

This project, which is currently under construction, is an example of complementarity between structural works and early warning systems, and it has been designed in order to make any “dam emergency plan” more concrete and effective. ■

TORNA AL L'INDICE

## CAE as a sponsor of the Hydrology Days 2018



### Società Idrologica Italiana Italian Hydrological Society

The Hydrology Days of the Italian Hydrological Society will be held at the Faculty of Engineering of the “Sapienza” University of Rome and are organized by: the DICEA (Department of Civil, Constructional and Environmental Engineering) of the “Sapienza” University of Rome and the Order of Engineers of Rome, together with the University of “Roma Tre”, the University of Tuscia (Viterbo), the University of Perugia, the University for Foreigners of Perugia, the District Basin Authority of the Central Apennines, the National Civil Protection Department, the Superior Institute for Environmental Protection and Research, and the Italian Hydrotechnical Association - section of Central Italy.

According to an already consolidated approach, this edition, which takes place under the chairmanship of *Eng. Tommaso Moramarco*, will aim at strengthening the collaboration between the Hydrological Scientific Community, the Public Administration and professionals. The aim is to make clear and enhance the contribution of Hydrology to the different space and time scales for a correct

action of prevention, mitigation and management of the hydrological-hydraulic risk in a highly evolving context, in order to evaluate both the hydrological forcing and the response of the territory and the environment.

Particularly, three sessions are scheduled, whose titles are the following: monitoring and analysis of hydrological forcing; evaluation of the hydrological response; adaptation and mitigation measures. As a sponsor, CAE will present one of its proposals for the mitigation of flood risk in urban areas, particularly focusing on the monitoring and alerting system for the protection of drive underpasses, where quick accumulations of water can trigger seriously dangerous situations for the occupants of the vehicles in transit. Underpasses are among the most vulnerable infrastructures, and the proposed systems are suitable to promptly report a flooding situation and consequently forbid the transit by activating the appropriate signs.

The detailed programme of these meetings is now available [here](#). ■

TORNA AL L'INDICE

## Knowledge and experience at the service of customers: a week of in-company training



CAE is equipped with highly specialized professionals operating locally. At the time of recruitment, the staff is properly trained to be able to safely perform installations in extreme and logistically complex locations. Particularly, as they often find themselves working in high mountain contexts, they attend courses on how to behave in such environments and how to use Personal Protective Equipment in order to prevent the risk of falling from above when they temporarily work at height and with ropes. These locations are not always accessible by land, so it often happens that our technicians have to reach them by helicopter; this is why they attend training courses in order to learn how to behave in such situations, as well as the opportunities and risks related to the use of this vehicle. Moreover,

as they often work on offshore platforms, they also need to pass sea survival and rescue courses; as far as installations on road stretches, they must be able to regularly set up construction sites using the appropriate signs. In addition to the training courses on CAE technologies, as our staff works in a variety of different contexts, each one is trained in relation to his/her specific areas of intervention. However, this starting training is not enough to guarantee the high quality standards that distinguish us, as a specialized knowledge requires ongoing updates, insights and studies. This is why CAE periodically organizes training and learning programmes for its technicians, who are the true force operating in the field. On the second week of March, all our technicians gathered at our headquarters

premises, to attend a training session, that can be useful to introduce the latest technological innovations and improve our knowledge on specific topics. *"These courses have been designed to make the technicians more and more aware of the potentials of the tools they are going to use, as well as to clarify the modalities of intervention in certain contexts. It was an excellent opportunity to go into details of some of the offered solutions aiming at facilitating the daily work of our technicians,"* said Eng. Fabrizio Bertocchi, who participated in the courses organized by our Technical Department. *"I am sure the success of the courses comes from the involvement of those who are directly involved in identifying the topics to be discussed. More involvement means more motivation and better results",* underlines Eng. Luca Marangi, another trainer from the Technical Department.

Surely the experience gained over the years and in the various risk areas is also a central element in order to guarantee the high quality of our service, both in terms of installation and maintenance. This experience makes it possible to cope with any possible problems that may be difficult to foresee. This is why the meeting of our technicians is also a moment of sharing and allows a transfer of know-how from those who can define themselves specialists in a specific sector or in the use of specific technologies, to those who are less experienced. For this reason, in order to enhance involvement and alignment, some of the courses were held directly by our technicians.

*"It has been a very useful week that, among other things, has strengthened the feeling of belonging, as well as the awareness that we are not on our own just because we are isolated from a logistic point of view, but instead we are part of a larger project. An individual's mistake is enough to compromise the reputation of our company; our technicians' role is fundamental, so we must provide them with all the necessary tools to fulfil their duties."* That is what Francesco Pastorelli, senior technician and referent for field technician training, declared. ■



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