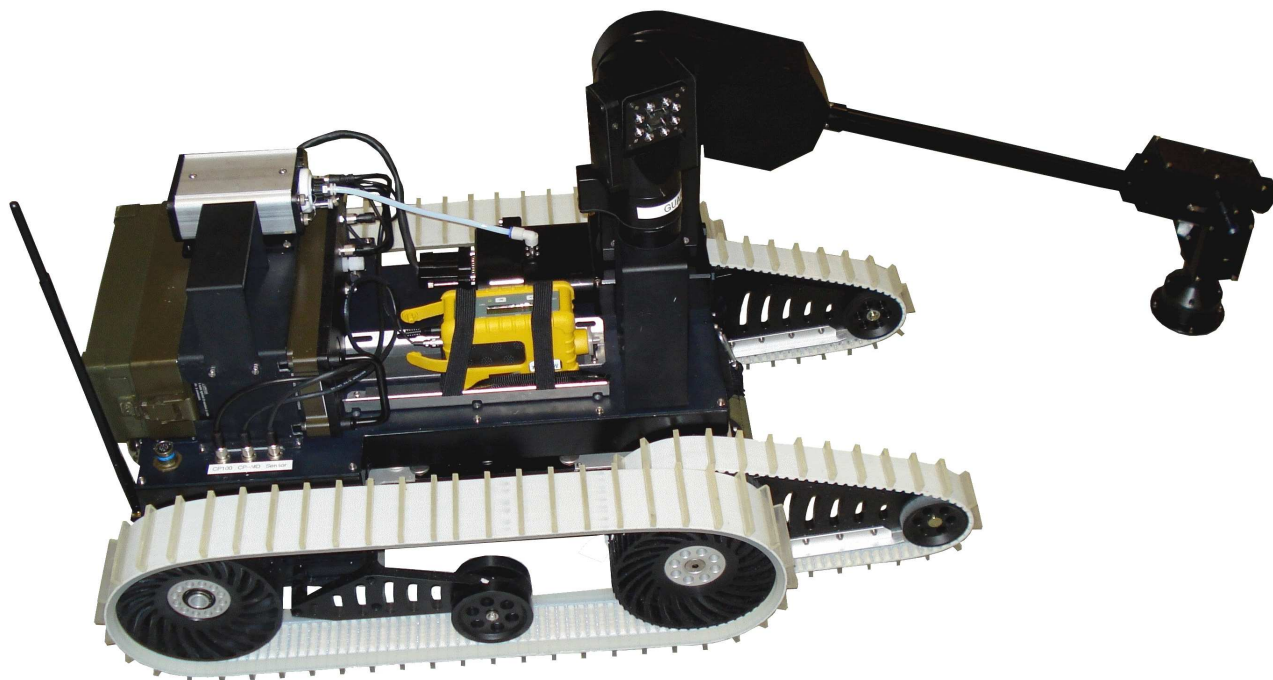


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GUARDED

Publishable Executive Summary

Generic Urban Area Robotized Detection of CBRNE Devices

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LA DIRECTION DE LA DÉFENSE
ET DE LA SÉCURITÉ CIVILES

1 Introduction

This document summarises the activities and results of the project GUARDED carried out by the consortium ECA, DDSC, ENVIRONICS, IONICON and IPS.

This project was managed and funded in the frame of the EDA R&T Joint Investment Programme on Force Protection A-0120-RT-GC by the Contributing Members:

Austria, Belgium, Cyprus, Czech Republic, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, the Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden

2 Acronyms

CBRNE: Chemical, Biological, Radiological, Nuclear and Explosive

COTS: Commercially available Off-The-Shelf

EOD: Explosive Ordnance Disposal

GPR: Ground Penetrating Radar

PTR-MS: Proton Transfer Reaction Mass Spectrometry

3 Objectives

The aim of this project is to demonstrate the feasibility of a remote controlled mobile platform equipped with CBRNE sensors to gather and disseminate information on a suspected hazard or confirmed contaminated area.

This will be achieved by integrating a mission tailored suite of CBRNE sensors and specific embedded tools, as collector of sample for example, with a remote controlled mobile platform controlled by an operator outside of the hazardous area.

4 Project organization

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5 Project Results

The COTS sensors trial campaign at the beginning of the project led us to the following conclusions:

- The determination of a suspected chemical or explosive agent (specific molecule) gives generally good results. Nevertheless, the false alarms and error rates are so high that it is very difficult, even impossible, to effectively identify unknown or not explicitly searched agents in real operational conditions.

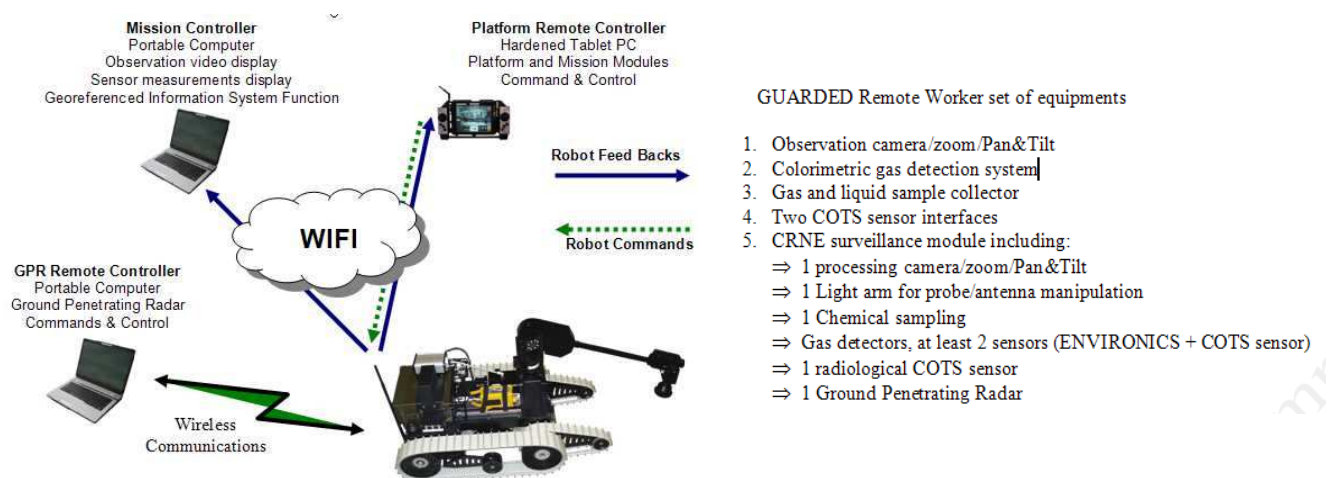
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- It is quite impossible, at least with current technologies and taking into account the operational constraints, to detect something without external contamination (leak of liquid, external gas or powder traces). So, the system must be designed for allowing the operators to open suspicious devices or to create accesses inside examined parcels.
- There are no major problems for the detection and the measurements of radiation. Nevertheless, care is to be taken if contamination measurement is needed. In this case, it will be necessary to provide a remote controlled device able to assume the contact between the probe and the object to be controlled.
- According to the biological hazard there is currently no convincing solution to do a real time analysis on the site.

According to these above conclusions the GUARDED Remote Worker demonstrator system is able to:

- Simultaneously integrate several equipments on a modular and easily reconfigurable platform focused on CBRNE detection and identification.
- Collect and gather data coming from several sensors.
- Offer an “easy to use” man/machine interface providing an unambiguous risk level indication.
- Use as many sensors, coming from several providers, as possible.
- Provide sampling capacities.
- Provide sensors handling capacities allowing a complete and easy all around inspection even inside of the suspicious device (at least 5 degrees of freedom).
- Be transported in existing military vehicles and easily integrated in current first responders equipments.

The GUARDED Remote Worker is part of a CBRNE robotic intervention system concept. This concept, coming from military, fire-fighter and EOD specifications is based on the use of a range of multisided platforms (at least three types : small, medium and large) able to carry a set of sensors and/or tools through standardized interfaces (mechanic, electric and software).



The project demonstration was completed by the development and the evaluation of an embedded PTR-MS demonstrator.



The PTR-MS prototype is a fully functioning device that has been tested extensively under laboratory conditions (and partly under "real life" conditions) under the supervision and control of experts in PTR-MS technology. All tasks have been fulfilled with great success; nevertheless as the status of the instrument at the moment is "demonstrator", a trained person is required for successful operation, especially if any problems or malfunctions occur.

EnviroNics Oy has been able to demonstrate the existence of a chemical detector mounted on a robot platform with the video produced. The understanding of integration bottle necks between the robot and chemical detection was increased and this has already had impact on the product design and this experience will influence future product design. Capability of soil and liquid sampling methods for chemical detectors should be developed. This would improve the usability of the combination. Also, chemical detection with simple configurable sensor approach should be considered as an option to increase the sensor coverage.

The trial results demonstrated that the GPR sensor integrated into the GUARDED platform can be successfully used for detection and imaging of unknown hidden objects. We also showed that the GPR sensor can successfully discriminate between different types of objects. The accuracy of the detection can further be improved by using a larger platform, which would allow using a more powerful robotic arm. Such a larger robotic arm could carry a larger antenna array which could provide images with a better overall resolution. The results could be further improved by integrating complementary sensors such as PTR-MS that, used in conjunction with the GPR, would allow a better recognition of dangerous objects with a smaller false alarm rate.

The evaluations done showed that the GUARDED Remote Worker system increases the capacities of existing sensors by allowing for more precise and effective operations near, around or inside suspicious objects while staying outside the hazardous area. In the same way we validated the ability of the system to realise an approach of the dangerous area allowing a better identification of the site status and thus having a more precise knowledge of the real risks in order to inform the crisis management team and allowing it to define more effective, well adapted and safer rescue organisation. Moreover, the demonstrator structure, due to its modular architecture, allows future developments and extensions.

6 Conclusions

The GUARDED Remote Worker system can be considered as the backbone for the development of a complete range of Automatic Assistance Systems for CBRNE interventions and can be seen as one of the components of a larger specialised unit task force where it will be used as reconnaissance system and remote controlled tool support.

Nevertheless, it is currently only a demonstrator with the associated known limitations of a demonstrator. So, it will be of a great interest and highly added value bringing if European military organisations could use the system and then provide valuable input in order to transform the prototype to a market ready solution.

As developed under the EDA R&T Joint Investment Programme on Force Protection A-0120-RT-GC, this system can be used by the contributing members that could borrow it as defined in this programme.