



DIAMINE

Project reference: IST-2000-25237

Funded under: FP5-IST

Detection and Imaging of Antipersonnel Landmine by Neutron Backscattering

From 2001-01-01 **to** 2003-12-31

Project details

Total cost:

EUR 2 798 770

EU contribution:

EUR 1 700 000

Coordinated in:

Italy

Topic(s):

2000-1.4.2 - Data Fusion and Smart Sensor Technologies for Humanitarian Demining

Funding scheme:

CSC - Cost-sharing contracts

Objective

The project proposes to build and in-field test a novel smart system for totally plastic Antipersonnel Landmine detection based on the neutron backscattering technique. The system will have minimum hazard, very simple human interface, and capability of imaging APM. The integration of this system with a modified Metal Detector will be studied, and a final prototype with the two sensor heads will be prepared and tested.

Objectives:

The objective of DIAMINE is to develop a prototype of hand-held landmine detector using the neutron back-scattering technique. A low-activity source (^{252}Cf , about 105 fast neutron/second) will irradiate the soil. The yield of low-energy back-scattered neutrons depends on the quantity of hydrogen in the irradiated volume. The presence of land-mine causes a localised strong increase of the yield. The comparison of the instantaneous count-rate with other parameters acquired on-line (source- soil distance and previous yield values due only to soil moisture) will be used to automatically detect the presence of a localised anomaly, giving a simple message to the operator. In some conditions, the hits distribution of the detector will provide an "image" of the hidden object to lower the false alarm rate. Validation tests in laboratory and in-field are planned. The coupling with a Metal Detector will be studied. The use of such detector in vehicle mounted system will be also explored.

Work description:

The DIAMINE project is supposed to run without gaps, in a unique phase, in recognition of the urgent need to make new tools available to Humanitarian De-mining operators. Monte Carlo simulations of the detector response to neutron back scattering will be performed from a specimen of soil containing a landmine to define detailed performances of the system. At the same time, the large area (40 x 40 cm²), position sensitive thermal neutron detector will be developed. Such detector has to work very close to the fast neutron source (^{252}Cf or Am-Be radioactive sources emitting 105 neutrons/second) and therefore has to be insensitive to the direct radiation from the source, including the gamma-rays. Furthermore the detectors have to be light mass and mechanically robust to be employed in field. They have to be radiation resistant and should not require special care in handling and have to be serviced on site. The neutron detector will be integrated with suitable front-end electronics ad hoc prepared in a specific work package. Simultaneously, computing and Man-Machine interface will be developed using data from simulations and special Metal Detector (MD) heads will be studied to allow the integration with the neutron backscattering system (NBS). Finally, prototypes of hand-held systems will be prepared, including MD, NBS heads and ancillary sensors to determine the detector-soil distance and the scan speed. Information from such sensors will be used to correct on-line the NBS response. The developed hand-held systems will be tested in laboratory as well as in field conditions with real mines. The final tests will be performed at the indoor Rudier Boscovic facility in Zagreb as well as in a test field by a Balkan

Mine Action Centre in Croatia. The use of the developed sensors in vehicle mounted systems will be also exploited

Milestones:

At 06 months: cross validation of MC calculations;
at 09 months: report in end-user requirements and design suggestion;
at 12 months: go-nogo selection of the NBT detector;
at 16 months: report on soil characterization, and decision on integration between NBT and MD;
at 18 months: go-nogo delivery of the NBT detectors;
at 24 months: delivery of software and MMI, adapted Metal Detector, and report on vehicle-mounted system;
at 27 months: delivery of NBT detector prototypes;
at 30 months: delivery of the first hand-held prototype;
at 33 months: delivery of the hand-held prototype, and start of final outdoor tests;
at 36 months: end of technical activities;
at 38 months: delivery of Edited Final Report.

Coordinator

LABEN S.P.A. - A FINMECCANICA COMPANY
STRADA PADANA SUPERIORE (STRADA STATALE 11) N? 290
20090 VIMODRONE (MILANO)
Italy

Italy

Administrative contact: Marzio CHIANELLA
Tel.: +39-02-25075291
Fax: +39-02-2505515
[E-mail](#)

Participants

COSTRUZIONI APPARECCHIATURE ELETTRONICHE NUCLEARI C.A.E.N. - SOCIETA' PER AZIONI
VIA VETRAIA 11
55049 VIAREGGIO
Italy

Italy

Administrative contact: Giovanni FRANCHI
Tel.: +39-05-84388398
Fax: +39-05-84388959
[E-mail](#)

EUROPEAN COMMISSION - JOINT RESEARCH CENTRE
RUE DE LA LOI 200
1049 BRUXELLES
Belgium

Belgium

Administrative contact: Francesco CORVI
Tel.: +32-14-571535
Fax: +32-14-591980
[E-mail](#)

ISTITUTO NAZIONALE DI FISICA NUCLEARE (INFN)
VIA ENRICO FERMI 40
00044 FRASCATI ROMA
Italy

Italy

Administrative contact: Giuseppe VIESTI
Tel.: +39-0498277124
Fax: +39-0498277124
[E-mail](#)

NEURICAM S.P.A.
VIA SANTA MARIA MADDALENA 12
38100 TRENTO
Italy

Italy

Administrative contact: Alessandro ZORAT
Tel.: +39-04-61882146
Fax: +39-04-61260617
[E-mail](#)

PLEIN & BAUS GMBH
MUELLERSBAUM 20
51399 BURSCHEID
Germany

Germany

Administrative contact: Andreas KOESTER
Tel.: +49-21-746780
Fax: +49-21-7467855
[E-mail](#)

SLOVAK ACADEMY OF SCIENCES - INSTITUTE OF PHYSICS
DUBRAVSKA CESTA 9
842 28 BRATISLAVA
Slovakia

Slovakia

Administrative contact: Stanislav HLAVAC
Tel.: +42-17-59410535
Fax: +42-17-54776085
[E-mail](#)

VALLON GMBH
IM GRUND 3
72800 ENINGEN
Germany

Germany

Administrative contact: Armin MERZ
Tel.: +49-71-21985534
Fax: +49-71-2183643
[E-mail](#)

Subjects

[Environmental Protection - Information Processing and Information Systems - Safety](#)

Last updated on 2005-06-13

Retrieved on 2015-12-22

Permalink: http://cordis.europa.eu/project/rcn/54366_en.html

© European Union, 2015