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The High-Tech Strategy for Germany

Research for Civil Security

Cooperation between Germany and Israel in civil security research



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Foreword

It is a known fact that natural disasters, terrorism, organised crime and major accidents do not stop at national borders. It is only appropriate, therefore, not to discuss issues relative to ensuring public security at the national level alone, but rather to strive for a European and international exchange of ideas. Israel, the USA and France are important partners for Germany in this regard.

Israel and Germany already share a 50-year-old tradition of scientific cooperation built on trust, which has contributed significantly to mutual understanding. Particularly in security research, collaboration with a partner such as Israel, which has many years of experience in dealing with public security risks, can provide important support. Often shared responses to challenges are also the most successful ones.

In order to provide the German-Israeli collaborative research projects a framework also in civil security research, the Federal Ministry of Education and Research (BMBF), together with the Israeli Ministry of Science and Technology (MOST) and the Israeli Ministry of Industry, Trade and Labour (MOITAL), published the announcement of funding for cooperation within the context of the "Research for Civil Security" programme and called for the submission of project proposals at the end of 2008.

The BMBF now funds a diverse spectrum of German-Israeli research projects ranging from the protection of critical infrastructures to disaster management and crisis management. These projects thus form an important foundation for the further development of international markets for security solutions and for future collaboration in research. Productive exchange in these German-Israeli projects makes an indispensable contribution to further raising the security standards in the two countries for the benefit of the citizens.



A handwritten signature in black ink that reads "Helge Braun". The signature is written in a cursive, flowing style.

Dr. Helge Braun
Parliamentary State Secretary



Automatic Cargo Container Inspection System (ACCIS)

Improved detection of dangerous goods in cargo

The ability to detect dangerous materials in cargo, such as explosives or nuclear material, is becoming increasingly important. Innovative detection methods that enable the fully automatic identification of dangerous substances offer an opportunity to accelerate control processes and to work with greater security at the same high throughput rates.

The aim of the ACCIS collaborative project is to assemble a demonstration system for the automatic detection of explosives and radioactive material for medium-sized cargo (e.g. air cargo containers). Within the framework of this project, the basic components for an innovative inspection system will be investigated and tested on a laboratory scale. The project will provide findings on the performance of such a system relative to its detection limits and its ability to differentiate goods from dangerous substances.

To this end, an innovative screening method will be researched and tested. The method is based on a combination of high-resolution neutron resonance and gamma radiography. This process combination offers two basic advantages: the evaluation can be carried out automatically, and a wide variety of substances can be safely and reliably detected, including plastic explosives, for example.

In addition, the possible use of such technologies at airports and border crossings will also be investigated. Here, work will focus mainly on the analysis of legal conditions and on the acceptance of the method.

The collaborative project will contribute substantially to the future development of rapid, fully automatic inspection systems that can reliably detect explosives and radioactive materials in cargo. This will not only increase the security of aircraft and other means of transport, but can also eliminate the need for time-consuming manual inspections.

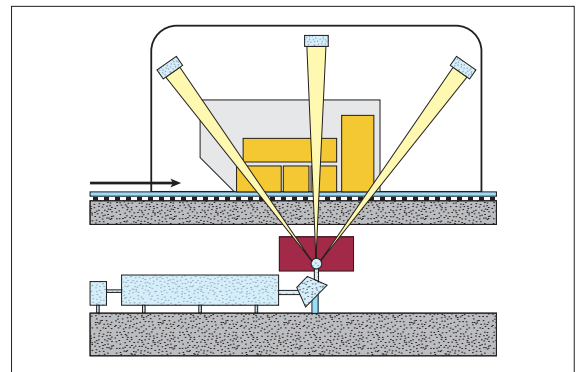


Diagram of an inspection system for cargo containers
(source: PTB Braunschweig)

Project title

Automatic Cargo Container Inspection System (ACCIS)

Duration

06.2010 – 05.2013

Project partners

- The Federal Institute of Physics and Metrology (PTB), Braunschweig
- The Federal Institute for Materials Research (BAM), Berlin
- Berlin Technical University
- RoentDek GmbH, Kelkheim
- RI Research Instruments, Bergisch-Gladbach
- Partners:
 - Soreq NRC, Yavne (IL)
 - Weizmann Institute of Science, Rehovot (IL)
 - Israel Police Bomb Disposal Division, Jerusalem (IL) (associated)

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Internet-based tool for the evaluation of hospitals' level of preparedness for biological emergencies (BEPE)

Better preparation for biological emergencies

Today, due to international travel, rare but extremely dangerous pathogens can spread much faster than ever before. An additional potential threat occurs when such infectious agents are released by accident or even as a result of intentional application (bioterrorism). That is why hospitals should be as well prepared as possible for the diagnosis and treatment of pathogens of this type. The BEPE project will analyse the state of preparedness of hospitals relative both to individual patients with highly infectious diseases and to potential bio-terrorist emergencies in Germany and Israel.

It takes more than diagnostic capabilities alone to effectively treat patients stricken with highly infectious diseases and prevent the further spread of those diseases: personnel also have to be adequately trained in the proper handling of personal protective equipment and isolation stations have to be equipped accordingly. To this end, surveys will be conducted in both countries. Major synergies are anticipated from the cooperation between the German and Israeli partners here. Germany has experience, above all, with the care of individual patients suffering from highly infectious diseases such as SARS and Lassa fever. Israel, on the other hand, has experience in handling large numbers of affected people.

The BEPE project will create a comprehensive and reliable Internet-based software tool which can be used to assess how well individual healthcare facilities and the associated healthcare personnel are prepared for a potential outbreak of contagious diseases. The tool will also indicate how the facility's state of preparedness can be improved. The software supports quality management in the hospitals by raising the awareness and the level of knowledge of the personnel in the respective clinics relative to extremely dangerous pathogens.

The aim is to significantly reduce the time between admission of the patients, diagnosis of the suspected condition and the required isolation of the afflicted persons. This is a basic prerequisite for preventing further infections and slowing the spread of highly infectious diseases. This collaborative project will make a major contribution toward improving

the preparation of healthcare institutions for biological emergencies. Moreover, highly infectious diseases inspire fear and anxiety and can lead to widespread panic in the general population, thereby severely impairing public life. A better prepared healthcare system can also counteract these consequences.



The transport of patients with highly infectious diseases demands special knowledge (source: City of Frankfurt am Main, Public Health Department)

Project title

Internet-based tool for the evaluation of hospitals' level of preparedness for biological emergencies (BEPE)

Duration

04.2010 – 03.2013

Project partners

- City of Frankfurt am Main
- University Hospital, Frankfurt am Main
- Robert Koch Institute, Berlin
- CSO GmbH, Pforzheim
- Partners:
 - Ministry of Health, Tel Aviv (IL)
 - Ben Gurion University of the Negev, Beer-Sheva (IL)

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Fibre optic microsensors for the detection of explosive materials under real-time conditions (ChipSenSiTek)

Improved sensors for explosive materials detection

Today's state-of-the-art sensors require ten or more seconds for the sampling, sample processing and analysis of potentially dangerous substances. Moreover, most sensor systems are limited to the detection of only a few explosive materials and are often insensitive to liquid explosives. The development of special sensors could enable the rapid, non-contact identification and classification of explosives and explosive materials, especially in the inspection of baggage and people at airports, for example.

The aim of the project is to carry out research on a novel, miniaturised sensor principle. The concept employs specially coated sensors that permit the selective and highly sensitive detection of explosives and explosive materials. These sensors are suitable for installation in an airlock-style chamber fitted with a ventilation system that can entrain substances into the air stream, such as clothing-borne contaminants. In this way, they will be conveyed to the sensors, which then identify the danger. This eliminates the previous need for sampling and sample preparation and significantly reduces the time and effort required.

In the field of security technology, the use of miniaturised systems based on special sensors opens up completely new possibilities for the real-time analysis of dangerous substances. Thanks to the ease with which it can be integrated, examples of the newly developed system will be implemented and tested under realistic conditions in two applications: a personnel airlock and a robot-controlled baggage inspection system. Along with the inspection of people and baggage, the system is also suitable for industrial process control and food monitoring. Use in the form of a hand-held detection unit is possible for routine inspection of vehicles, for example.



A personnel airlock in which the new sensors could be integrated (source: KABA Gallenschütz GmbH)

Project title

Fibre optic microsensors for the detection of explosive materials under real-time conditions (ChipSenSiTek)

Duration

01.10.2007 – 30.09.2010

Project partners

- Clausthal Technical University, Laser Applications Centre (LAC), Goslar
- Diehl BGT Defence GmbH, Überlingen
- KABA Gallenschütz GmbH, Bühl
- Ingenieurbüro Wanner GmbH (IBW), Potsdam
- CryLaS GmbH, Berlin
- Flug- und Industriesicherheits Service- und Beratungs- GmbH (FIS), Kelsterbach
- Partners:
 - Weizmann Institute of Science, Rehovot (IL)
 - Ben Gurion, University of the Negev, Beer-Sheva (IL)

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Electromagnetic protection of transport infrastructures (EMSIN)

Improved electromagnetic protection of transport infrastructures

Critical infrastructures such as airports depend on the unimpaired operability of their communications technologies and IT networks. Even malfunctions or failures in individual elements can cause the entire network to go out of service. For airports, the consequences can be preventive suspension of flight operations or, in the worst case, catastrophic accidents. Complete shielding of communication and IT systems against electromagnetic interference represents a difficult challenge. The reason for this is that electronic installations can be influenced by specific electromagnetic fields which can be applied intentionally. Moreover, such interference fields can be applied from some distance and are no longer detectable once they have been shut off, which makes localisation much more difficult. Sources that generate sufficiently strong electromagnetic fields are relatively easy to purchase or build, which means intentionally generated electromagnetic radiation represents a potential criminal or terrorist risk. The early detection, analysis and localisation of electromagnetic interference fields therefore represent a major challenge.

The aim of the EMSIN collaborative research project is to improve the technical and organisational protection against electromagnetic disturbances in critical traffic infrastructures. As part of the project, an electronic test network will be created. Its designers will address the end user requirements and use models based on the electronic infrastructures of German and Israeli airports.

Along with timely detection, the project will develop recommendations for immediate actions in response to the effects of electromagnetic interference fields. It will also generate strategies and approaches for risk assessment and the avoidance of potential dangers. The protection concepts to be developed will integrate both the technical and the organisational requirements of the process flows to the greatest possible extent. The results will take the form of innovative sensor systems and be implemented via services designed to enhance the security of infrastructures.



Early recognition of electromagnetic disturbances increases the security of the travellers (source: ©iStockphoto.com/mevans)

These technical contributions will be accompanied by studies of the organisational structures, legal framework and societal acceptance of the approaches. Subsequently, together with the industrial partners involved, the overall concept will be further developed and implemented in a marketable form.

Project title

Electromagnetic protection of transport infrastructures (EMSIN)

Duration

04.2010 – 03.2013

Project partners

- Thales Defence Deutschland GmbH, Pforzheim
- Research Institute of Protective Technologies and NBC Protection (WIS), Munster
- FIS Flughafen- und Industriesicherheit Service- und Beratungs-GmbH, Kelsterbach
- Gottfried Wilhelm Leibniz University, Hannover
- Hannover University of Technology
- Flughafen Paderborn-Lippstadt GmbH, Paderborn (associated)
- Partners:
 - Netline Communications Technologies Ltd., Tel Aviv (IL)
 - Ben Gurion Airport, Tel Aviv (IL) (associated)

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System trust and crisis management: An interactive expert exchange system for strengthening societal resilience (ESR)

Improved resilience of the population in crisis situations

A well-prepared, strong society will be in a position to reduce both the direct consequences and also the long-term consequences of a major disaster, and to manage crises much more rapidly. Crisis resilience (the ability of the general population to withstand crisis situations) is the term used to describe how societies deal with dangers and emergencies. This strength and the capacity to handle catastrophes can only be improved through good cooperation between all actors and communication in the society.

The aim of this project is twofold: to characterise the strength of the German and Israeli societies, and to achieve an exchange among experts from all groups of actors involved. The networking of experts and the mutual exchange of experience will be implemented by means of an expert system. The experts will contribute their perspectives and experience in dealing with security issues.

In order to investigate and evaluate crisis resilience, studies will be carried out in Germany and Israel. The differences between the two countries will be subjected to comparative analyses and dependencies will be identified. The goal is to learn from the experience of the two countries, and to undertake suitable activities to strengthen their capacities to withstand crises. In order to achieve the broadest possible exchange among the groups of actors, workshops will first be carried out with the end users. In a subsequent stage of the project an expert system will be developed which will enable an effective exchange of information between the groups of actors and the experts.

The objectives of the project are to generate a viable concept for the information platform and to carry out fundamental work in resilience research. Accordingly, data security will be a major focus.



German-Israeli information exchange via a joint crisis management system (Source: Fraunhofer IITB)

Project title

System trust and crisis management: An interactive expert exchange system for strengthening societal resilience (ESR) – phase 1

Duration

03.2010 – 02.2011

Project partners

- nexus Institut für Kooperationsmanagement und interdisziplinäre Forschung GmbH, Berlin
- Partners:
 - Interdisciplinary Center for Technology Analysis and Forecasting (ICTAF), University of Tel Aviv (IL)

Collaboration coordinator

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Intelligent safeguarding localization system for the rescuing of people trapped or buried under rubble (I-LOV)

Better localisation of people buried under rubble

Images of damage events in which people have been trapped or buried under rubble serve as constant reminders of the vulnerability of the places where we live and work. To conduct rapid rescue operations, emergency forces all over the world need timely information concerning the exact position of people trapped or buried under rubble, about the risk of the collapse of debris, and about standardized intervention procedures as well as information on the state of the victims' health.

The project focuses on key aspects and challenges in terms of social conditions, emergency medicine, intervention psychology, law and technology required for the targeted and timely rescue of people who have been trapped or buried under rubble. It aims to ensure the safety of rescue forces and victims at all times during natural or man-made catastrophes. Above all, the emphasis is on innovative localisation processes designed to improve the ability to locate buried and injured people. Therefore, a portable information system is to be developed.

At the conclusion of all research work, demonstration units will be developed that will be tested in field trials under realistic intervention conditions. These field trials will be used to gather findings on practical functionality, localisation precision and operational tactics, in order to improve the suitability of the system for use in disaster areas. Among other things, the technologies to be developed will help collect information at accident sites and optimise the flow of communication and information while at the same time lowering the cost of interventions.



After an earthquake: The search for people buried under the rubble (source: The Federal Agency for Technical Relief, THW)

Further informations:

www.i-lov.org

Project title

Intelligent safeguarding localization system for the rescuing of people trapped or buried under rubble (I-LOV)

Duration

01.06.2008 – 31.05.2011

Project partners

- Albert Ludwig University, Freiburg
– Institute for Public Law (IOR)
– IMTEK, Chair for Electrical Measurement and Test Methods
- BOS GmbH & Co KG, Berlin
- Bundesanstalt Technisches Hilfswerk [Federal Agency for Technical Relief], Bonn
- carat robotic innovation GmbH, Dortmund
- Dortmunder Initiative zur rechnerintegrierten Fertigung (RIF) e.V.
- Cologne University of Technology, Institute for Plant and Process Engineering and Institute for Emergency Medicine
- Friedrich Alexander University of Erlangen-Nuremberg, Chair for Technical Electronics, Erlangen
- Hövener & Trapp Evison GmbH, Dortmund
- JT-elektronik GmbH, Lindau am Bodensee
- Ruhr University Bochum, Chair for Machine Elements and Construction Studies
- Symeo GmbH, Neubiberg
- Karlsruhe University, Institute for Technology and Management in Construction Operations
- Paderborn University, C.I.K.
- Partners:
 - Albert Ziegler GmbH & Co KG, Giengen
 - German Federal Criminal Police Office, Wiesbaden
 - ROTEM Ind. Ltd., – Sharvit Division, Beer-Sheva (IL)
 - National Emergency Management Agency of the State of Israel (NEMA), Tel Aviv (IL)
 - Soreq Nuclear Research Center, Yavne (IL)

Collaboration coordinator

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Infrared laser-based fibre optic sensor system for drinking water monitoring (IRLSENS)

A better monitoring system for clean drinking water

The supply of potable water is one of the areas of everyday life in which extremely high quality is particularly important. In Germany, the Drinking Water Ordinance regulates the high demands on drinking water quality in the form of limit values for contaminants.

Conventional measurement systems today are already able to detect an extremely wide variety of contaminants and their sources in a relatively short time, and enable operators to issue a warning to the users of the affected drinking water network. One example of this is when fertilizers leach into the groundwater as a result of heavy rainfall, which can cause local values to exceed limits. In such cases, the operator resorts to preventive measures and under certain circumstances consumers are advised to use mineral water. The introduction of poisonous substances, especially fertilizers and pesticides, into the drinking water can occur not only as a result of accidents or natural catastrophes, however: such contamination could also be conceivably caused by criminal or terrorist activities.

The aim of the IRLSENS project, therefore, is to develop a measurement system that is capable, in particular, of detecting pesticides (e.g. DDT) and other chlorinated hydrocarbons (e.g. chloroform) in a matter of seconds, thereby warning the operators of the supply network even faster so they can initiate the relevant measures. The new measurement system combines innovations in the area of laser- and fibre-based infrared analysis into a new, high-performance technology. The advantages of this system will lie in the speed of the analysis, in its specialisation for a specific group of substances, and in its compatibility for automation, which will make maintenance easier. As the measurement systems will sometimes be installed in inaccessible points within the drinking water network, automation is of particular importance. The project will use drinking water contamination scenarios to select suitable installation locations. To carry out test measurements under realistic conditions, a demonstration unit will be assembled and installed in a water works. This demonstration unit will also include the associated software components for the analysis and storage of the data.

The technological part of the project will be accompanied by research into the social scientific aspects, especially relative to efficient risk communication and the legal framework.



Potable water of extremely high quality is essential for our life (source: ©[Splash]/iStockphoto/Thinkstock)

Project title

Infrared laser-based fibre optic sensor system for drinking water monitoring (IRLSENS)

Duration

05.2010 – 04.2013

Project partners

- Fraunhofer IAF (Institute for Applied Solid State Physics), Freiburg
- Fraunhofer IPM (Institute for Physical Measurement Techniques), Freiburg
- Bruker Optik, Ettlingen
- DVGW Technology Centre Water (TZW), Karlsruhe
- Zweckverband Wasserversorgung Kleine Kinzig (WKK), a water supply association, Alpirsbach-Reinerzau
- Freiburg University with the Centre for Security and Society
- Partners:
 - Tel Aviv University (IL)

Collaboration coordinator

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Detection of hidden threats through real-time 3D imaging (LiveDetect3D)

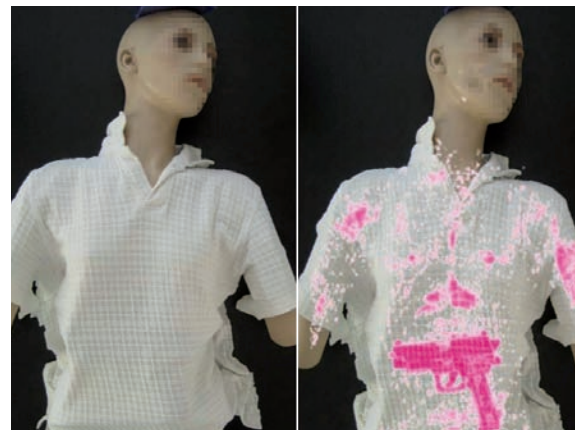
Improved access control through personnel scanners

Access control of personnel entering critical infrastructures such as airports and train stations is of major importance for safe travel. The booths and portal-type security checks already used in some airports are one possible approach, but there remains a medium-term need and potential for further improvement of such personnel control systems.

The aim of the LiveDetect3D project is to use a combination of a terahertz imaging system and an optical 3D camera to make it possible to examine a person for dangerous articles – also from a distance – without generating detailed images of the body and possibly violating privacy rights. The technological research work will be accompanied by an ethical assessment and acceptability analysis, in order to define criteria for safeguarding the privacy of the person scanned right from the outset, and to exclude any solutions that could raise concerns about data privacy.

The imaging system is based on terahertz technology, which will be combined with an optical 3D imaging system. This innovative approach will result in rapid image reproduction in real time and high quality that will facilitate the detection of security-related materials and objects. Moreover, the image reconstructed by the terahertz technology will be superimposed with the optical 3D image in a way that clearly highlights any security-related materials and objects while preserving the clothing on the final image.

The aim of the project is to investigate and evaluate the performance and practicality of this technological solution in Israel and Germany by means of a functional demonstration unit.



Weapon hidden under clothing (source: SynView GmbH)

Project title

Detection of hidden threats through real-time 3D imaging (LiveDetect3D)

Duration

05.2010 – 07.2012

Project partners

- Hübner GmbH, Kassel
- Frankfurt University, Frankfurt am Main
- Siegen University
- SynView GmbH, Glashütten
- Tübingen University
- FIS GmbH, Kelsterbach
- SECURITAS GmbH, Berlin
- Partners:
 - Ben Gurion University of the Negev, Beer-Sheva (IL)
 - University of Tel Aviv, (IL)
 - Israel Prime Minister Office, Jerusalem (IL)
 - Samsung Semiconductors R&D center, Ramat Gan (IL)
 - NovaTrans, Herzelia (IL)

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Real-time Security Management System for Infrastructures on German and Israeli roads (RETISS)

Improved information systems for roads

Tunnels and bridges are key elements of particular importance in the road network. If infrastructures fail, the geography-related bottleneck effect that tunnels and bridges create can have far-reaching impacts and trigger cascade effects for road users and the economy. New challenges that road infrastructure operators must face today include serious accidents involving dangerous goods transports, for example, but also terrorist threats.

Both preventive measures and the proper and rapid response to an emergency require up-to-date information about the security situation of the structures at all times, e.g. traffic density, types of vehicles and loads, defective vehicles, and the number of persons located in a tunnel or on a bridge. The development of suitable data fusion and risk assessment tools which can be used to collect, compile and evaluate information in real time is of particular relevance here: data such as information about overheated vehicles, dangerous goods transports and persons who leave their vehicles, for example, or behave in an unusual manner.

In the RETISS project, new detection systems will be designed, installed and tested under practical conditions on a German and an Israeli structure. The current "security status" will be determined and displayed in real time in the tunnel command and control centre by means of the new information technology system to be researched within the framework of the project (Real-time Security Management System), so measures can be taken immediately in case of danger.

Highway operators in the two countries are integrated in the collaborative project as associated partners and end users. The work will be accompanied by legal studies relative to data collection and processing. The findings of the field test and the resulting requirements and possibilities of the management system developed will be discussed with relevant user groups. Based on the results of the project, the industrial partners involved will then work together to develop a complete marketable system. The findings will also be presented to the relevant advisory and standardisation committees.



Road tunnels provide direct connections and are indispensable for efficient road networks (source: BAST)

Project title

Real-time Security Management System for Infrastructures on German and Israeli roads (RETISS)

Duration

03.2010 – 02.2013

Project partners

- The Federal Highway Research Institute (BAST), Bergisch-Gladbach
- PTV Planung Transport Verkehr AG, Karlsruhe
- Strehle & Partner Ingenieure GbR, Dresden
- Free State of Thuringia, State Office for Construction and Traffic, Zella-Mehlis (associated)
- Partners:
 - Ness A.T. Ltd., Tel Aviv (IL)
 - Communication And Sensors (Com-N-Sense) Ltd., Kfar Monash (IL)
 - Maa' tz - The Israeli National Roads Company Ltd., Or Yehuda (IL) (associated)

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