



**CERTH**

CENTRE FOR  
RESEARCH & TECHNOLOGY  
HELLAS

November-December 2017

```
return b; } $("#User_logged").bind("DOMAttrModified textInput input change keypress paste  
= liczenie(); function("ALL: " + a.words + " UNIQUE: " + a.unique); $("#inp-stats-all  
$("#inp-stats-unique").html(liczenie().unique); }); function curr_input_unique() { } f  
var a = $("#use").val(); if (0 == a.length) { return ""; } for (var a = repl  
replace(/ +(?= )/g, ""), a = a.split(" "), b = [], c = 0; c < a.length; c++) { 0 == use  
[c]); } return b; } function liczenie() { for (var a = $("#User_logged").val(), a =  
a = a.replace(/ +(?= )/g, ""), a = a.split(" "), b = [], c = 0; c < a.length; c++) { 0  
push(a[c]); } c = {}; c.words = a.length; c.unique = b.length - 1; return c; }  
for (var b = [], c = 0; c < a.length; c++) { 0 == use_array(a[c], b) && b.push(a[c]);  
function count_array_gen() { var a = 0, b = $("#User_logged").val(), b = b.replace(/(\r  
replaceAll(" ", " ", b), b = b.replace(/ +(?= )/g, ""); inp_array = b.split(" ");  
for (var b = [], a = [], c = [], a = 0; a < inp_array.length; a++) { 0 == use_array(i  
inp_array[a]), b.push({word:inp_array[a], use_class:0}), b[b.length - 1].use_class = use_  
inp_array)); } a = b; input_words = a.length; a.sort(dynamicSort("use_class"));  
indexOf_keyword(a, " "); -1 < b && a.splice(b, 1); b = indexOf_keyword(a, void 0);  
b = indexOf_keyword(a, ""); -1 < b && a.splice(b, 1); return a; } function replaceA  
&& c++; } return c; } function czy_juz_array(a, b) { for (var c = 0, c = 0; c < b.l  
) { } return 0; } function indexOf_keyword(a, b) { for (var c = -1, d = 0; d < a.le  
rd == b) { c = d; break; } } return c; } function dynamicSort(a) {  
& (b = -1, a = a.substr(1)); return function(c, d) { return(c[a] < d[a] ? -1 : c[a  
} function occurrences(a, b, c) { a += ""; b += ""; if (0 >= b.length) { return  
= 0, f = 0; for (c = c ? 1 : b.length; ;) { if (f = a.indexOf(b, f), 0 <= f) {  
break; } } return d; }; $("#go-button").click(function() { va  
mit_val").a()), a = Math.min(a, 200), a = Math.min(a, parseInt(h().unique)); limit_va  
a()); limit_val = a; $("#limit_val").a(a); update_slider(); function(limit_val)  
); var b = k(); h(); var c = l(), a = " ", d = parseInt($("#limit_val").a()), f =  
ider_shuffle_number").e()); function("LIMIT_total:" + d); function("rand:" + f);  
eck rand\u00f3\u00f3rand: " + f + "tops: " + d)); var n = [], d = d - f, e; if (0 <  
0: a < c.length: a++) { e = m(b, c[g]), -1 < e && b.splice(e, 1); } for (g
```

## RESEARCH-TECHNOLOGY - INNOVATION FOR SUSTAINABLE GROWTH

In case of a **cyber attack** who would you call?

A security by design hybrid approach will be developed in order to minimize the exposure of small and medium sized businesses to cyber security risks and threats

# Newsletter CERTH in English

## Opinions—Dr. Anagnostis Argiriou

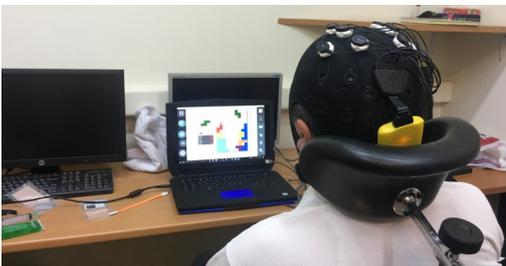


In this column, researchers from CERTH express their opinion regarding the research environment in Greece, make suggestions, express ideas and raise concerns about critical research issues in the country. In this issue, Dr. Anagnostis Argiriou, Senior Researcher and Deputy Director at the Institute of Applied Biosciences (INAB/CERTH), is the one who is providing valuable food for thought

Below, some of the most important points of his utterances:

- Focused, long term research strategy is needed for Greece
- Research Entities should be more opened to International Cooperations
- Continuous monitoring and evaluation of the Greek research ecosystem in order to unlock its potential
- Greece produces well in scientific publications but very low in innovative products. Actions through a coordinated strategy to close the gap, are needed
- Multidisciplinarity is one of the boosters of Innovation and must be promoted among laboratories and institutions

## Operating the computer using your eyes and mind



Loss of the voluntary muscular control while preserving cognitive functions is a common symptom of neuromuscular diseases leading to a variety of functional deficits, including the ability to operate conventional interfaces like mouse, keyboard, or touch-screens. As a result, the affected individuals are marginalized and unable to keep up with the rest of the society in a digitized world. The MAMEM project develops novel interfaces that can be controlled through eye-movement and mental commands, using eye-tracking and EEG devices.

More specifically, we have implemented the GazeTheWeb-Browser, a custom-made browser that substitutes basic browser functionalities (selection, scrolling, zooming, typing, link navigation, history and favourites) with interaction elements that can be operated through eye-gaze and EEG signals. Moreover, it enables dynamic modification on the way a web-page content is displayed to the user, augmenting it to be operated through the eyes.

In addition, one of the most impressive outcomes of MAMEM is the ability to play the widely-known Tetris game using your eyes and mind. In one of our recent meetings, we had the opportunity to invite Nikos (one of our research participants) to become the beta tester of our hands-free Tetris. It was the first time that we had the opportunity to have the game played in a realistic environment by an individual with neuro-muscular disorders. Nikos went through a short process of training so as to learn how to rotate the tetriminos with his thought (SMR Training), as well as how to shift them with his gaze (Eye-tracking calibration). Nikos was rather excited to play the game, staying for more than an hour in front of the screen having in total, five complete Tetris games. Even though a novice player in this type of Tetris, he was also rather effective in playing the game with the clearance of five rows being his maximum score. Not bad for a novice player!

# Protecting SME's from cyberattacks



Small and medium-sized enterprises (SMEs) have important private information, digital assets and their client's data just like the Multinational Companies. However, they are typically poorly prepared to defend themselves. It is significant that 60% of targeted attacks in 2015 were aimed at small businesses, while more than 430 million new unique pieces of malware have been discovered, with consequences ranging from minor impact on operational efficiency to detrimental effects on the profitability and/or on the supplier – customer – partner relationship. Clearly, cyber threats comprise a major risk for European businesses and as a rule, their vulnerability increases as their size falls. Given that SMEs are part of a worldwide chain, in which they are suppliers for other companies, their protection from cyberattacks is essential. This is where the opportunity lies and where the FORTIKA concept provides a solution as it aims to minimize the exposure of small and

medium sized businesses to cyber security risks and threats. Moreover it aims to help them successfully respond to cyber security incidents, while relieving them from all unnecessary and costly efforts of identifying, acquiring and using the appropriate cyber security solutions.

To fulfil its vision the project adopts a security by design hybrid approach that adequately integrates hardware and software with business needs and behavioral patterns at individual and organizational level. Ultimately, FORTIKA proposes a resilient overall cyber security solution that can be easily tailored and adjusted to the versatile and dynamically changing needs of small businesses. To this end, the project ambitiously aims to make systematic and extensive use of the existing service and product portfolio of security solution providers across Europe.

Finally the introduction of a software-defined smart ecosystem in “FORTIKA Marketplace”, will provide the feature of a light mode solution, which will offer virtualized security services (with minimum downloading requirements). From their perspective, users (i.e. SMEs) may utilize a variety of services and share profiling information with the service providers in return for tailored security services aligned with their actual needs. The FORTIKA marketplace will also function as a single point of access for the profiling information for each SME. FORTIKA Cyber-security framework will be evaluated through five major types of SMEs and will be supported from 2 local SME/ICT clusters and 1 EU alliance.

**Note:** In June of 2017, project coordinator, Information Technologies Institute, hosted the kick-off meeting of the FORTIKA project in the premises of the Centre for Research and Technology Hellas in Thessaloniki, Greece. The FORTIKA Consortium consists of 16 complementary partners from 9 different European Countries. The project is going to last 3 years.



Spot View



Horizon 2020  
European Union Funding  
for Research & Innovation



## Sustainable Processes and Optimized Technologies for Industrially Efficient Water Usage

Industrial water consumption worldwide comprises ~22% of the total water consumption, whereas for the European Union industrial consumption is ~12%. Moreover, the industrial sector significantly contributes to polluting liquid effluents, considering that only 60% of such industrial effluents (estimated on the basis of data from eight EU countries) are treated before release to the environment.

The SPOTVIEW project aims to develop and demonstrate innovative, sustainable and efficient technology components and processes, leading to **optimized use of natural resources**, especially **water**, in three industrial sectors (**Dairy, Pulp and Paper, Steel**), that contribute ~44% of industrial water usage in EU. This resource optimization (including water, energy, raw materials and additives) is a key issue for maintaining production competitiveness and sustainability. A total of 14 existing and new technologies will be assessed during the project, including solid/liquid separation, ultrafiltration, deionization, biological treatment, disinfection and chemical heat pump. Up to 7 selected technologies demonstrators are planned in real industrial environment. The implemented processes and technologies will be evaluated in terms of environmental impact and benefits, generated by achieving the SPOTVIEW targets; i.e. reduction by 20% to 90% of water and energy usage, wastewater discharges and chemicals.

SPOTVIEW (*Sustainable Processes and Optimized Technologies for Industrially Efficient Water usage*) is a H2020-SPIRE project (under contract No. 723577). The SPOTVIEW consortium, comprising 15 members, covers the whole value chain, from technology development, assessment, supply and industrial applications in each targeted sector. The gains for the three industrial sectors, expected to be generated through the recovery of by-products and wasted energy, chemicals and additives savings, represent annually 1.53b€ for Europe.

The **Laboratory of Natural Resource and Renewable Energies (NRRE)** of CPERI/CERTH, in collaboration with the dairy industrial partner MEVGAL participate in this major Horizon 2020 project. Greek partners will deal with the valorisation of dairy industry effluents and water recycling.

## Co-creating smart and sustainable cities in Europe: new Smart Cities flagship project announced



Urban environments are accelerating their transformation towards cleaner, friendlier places able to respect and use resources more efficiently. Across Europe, cities are blending social innovation, engineering and ICT excellence and smart technologies to help reach these goals.

IRIS is proud to be identified at the forefront of this effort and announce itself as the latest addition to the **European Commission Smart Cities and Communities (SCC)** Lighthouse projects, under the European Union's Horizon 2020 research and innovation program.

IRIS is a 5-year project launched in October 2017, which will be a collaboration of 43 partners from 9 countries of diverse disciplines – from enterprises and municipalities to research centers and universities – with planned demonstration of Smart Cities solutions in 3 Lighthouse Cities and replication in other 4 Follower cities across Europe and with a total of 18 million € contribution funding.

CERTH has a significant role in the IRIS project consortium, since it participates with 3 different Institutes:

- **Information Technologies Institute (ITI)**, which is the Technical and Innovation Manager of the project, while also being the main responsible for the coordination of the proposal preparation and the successful submission of the IRIS proposal, along with the support of the
- **Chemical Process and Energy Resources Institute (CPERI)** for the definition of the Integrated Solutions repository to be exploited in close collaboration with the IRIS partners and the
- **Hellenic Institute of Transport (HIT)** for the integration and harmonization of the mobility solutions

It is also notable that one of the follower cities to participate in the IRIS Smart City concept is **Alexandroupolis** from Northern Greece.

### Concept and approach

IRIS is organized around 5 key challenges, referred as Transition Tracks, focusing on (i) Energy Positive Districts, (ii) Smart Energy Management, (iii) Smart e-Mobility, (iv) a digital integrated City Innovation Platform and (v) Citizen Engagement and Co-creation.

Within this scope, 16 IRIS integrated solutions will be implemented, demonstrated and ultimately replicated in different districts of the 3 lighthouse cities of **Utrecht (NL, Project Coordinator)**, **Gothenburg (SE)** and **Nice Côte d'Azur (FR)** and the 4 Follower Cities of **Vaasa (FI)**, **Alexandroupolis (GR)**, **Santa Cruz de Tenerife (ES)**, and **Focsani (RO)**. IRIS ambition is to unlock the intelligence of communities by co-creating elegant action in a sustainable Europe.

## New integrated tool for debunking fake news and verifying videos



The InVID project, which is coordinated by ITI/CERTH, has developed and released a new integrated tool for debunking fake news and verifying videos. The **InVID Verification Plugin** is an extension that can be easily installed in the web browser, and enables the user to perform a series of actions for examining if a video that is claimed to relate to a news item (e.g. a breaking news event) is authentic and trustworthy. These actions

include searching and presenting for the video a wealth of metadata that come from relevant channels (e.g. YouTube, Twitter), selecting video keyframes and performing reverse search in order to find any similar pre-existing content on the web, and magnifying selected details in the video frames with a digital magnifying glass functionality, among others.

The tool aims at supporting journalists, other media professionals and active users of the Web, in their continuous quest for verifying the authenticity and trustworthiness of the videos that they (re-)publish via their media institutions, the Web and social media channels. In this way, the InVID Verification Plugin and the InVID project as a whole help the aforementioned communities of users in fighting the swift and wide-spread distribution of fake news that rely or use, among others, video materials for reinforcing their claims.

The InVID Verification Plugin is already in use by more than 850 users worldwide, and its use is for free. You can find more information about the plugin, and links for installing and using it, at <http://www.invid-project.eu/verify>.

This tool was developed as part of the InVID project, [www.invid-project.eu](http://www.invid-project.eu), which has received funding from the Horizon 2020 program of the European Commission under grant agreement H2020-687786.

## Intelligent Transport Systems Observatory (ITS Observatory)

The first pan-European Observatory on Intelligent Transport Systems (ITS) has been set up within the framework of the ITS Observatory project. This new platform (<https://itsobservatory.info>) is a comprehensive on-line tool that provides easily accessible and comprehensive information on ITS. The main objectives of the Observatory are to bridge the fragmentation of knowledge across Europe, to enhance the proliferation of ITS, to create an effective and user-friendly decision-making tool that supports policy-making and to create a common EU library for projects, research and pilot applications of ITS.



The observatory consists of: 1) an ITS database of projects that have been completed or are in progress, 2) an ITS information registry, and 3) a user-friendly search tool for ITS.

The purpose of ITS Observatory is to bridge existing knowledge gaps in ITS by providing decision makers with a "smart" online platform with access to up-to-date and precise information on ITS implementation, as well as comprehensive information on the results of ITS implementation in order to assist actors in the development and implementation of similar future projects. Therefore, the ITS Observatory offers a reliable and user friendly decision-making tool, in the form of an ever-updated ITS library, and a tool for exchanging views through its on-line community forum.

The ITS Observatory is an interactive tool whose success is based on its support from ITS stakeholders. More specifically, all the information that exists, and will be added in the future, comes directly from its registered users. For this reason, it is important to provide information on developments in ITS sector by the directly involved entities who can easily register at the observatory and record any information (information on ITS projects and products, events related to ITS, regulations on ITS, etc.) they consider should be published. The ITS Observatory is a project co-funded by the European Union's HORIZON 2020 program.

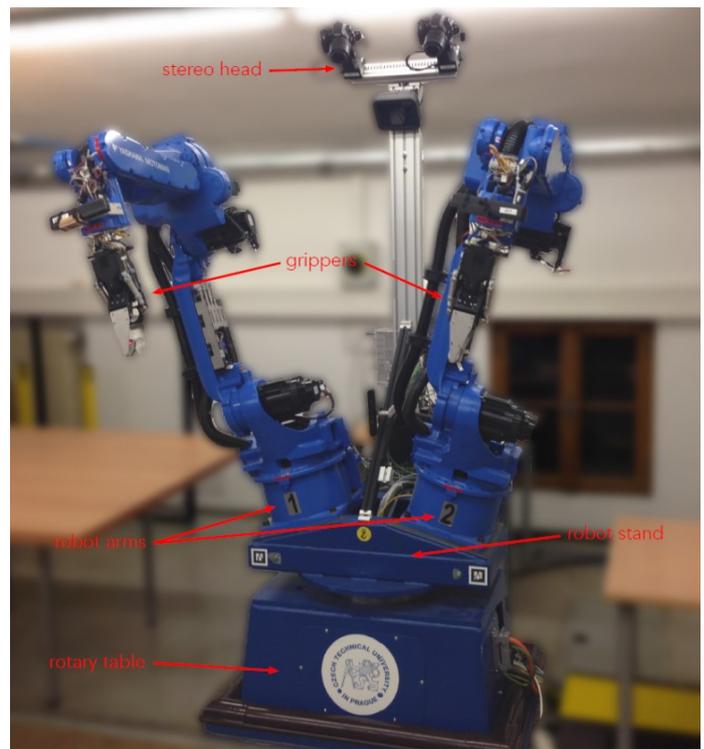
## RadioRoSo: Radioactive Waste Sorting by Robots

In the context of the EU cluster project ECHORD++ ([www.echord.eu](http://www.echord.eu)), CERTH/ITI coordinates a scientific experiment concerning the autonomous sorting of radioactive waste.

In whole Europe there are currently several old nuclear waste storage facilities, containing mixed complex materials with different levels of radioactivity. In addition there are several nuclear plants that are currently being decommissioned (e.g. in UK) or planned to be decommissioned in the near future (e.g. in Germany). Due to new stricter security requirements for storage facilities, waste material should be sorted according to compressibility and level of radiation and stored accordingly in new infrastructures. The sorting procedure is currently performed manually by means of master-slave robotic manipulators. The process is tedious, expensive and very slow also posing health hazards for the workers. Thus there is a high demand of achieving a degree of automation in this field which will have a significant impact on the cost of these mega-projects.

In this context the key objective of the RadioRoSo experiment is to automate the task of waste sorting using industrial robots and artificial intelligence. As a result the robotic system will be able to identify, grasp and sort a variety of waste materials of different dimensions and properties, including soft items such as garments or cables. In the first part of the experiment we have achieved fast and accurate sorting of highly radioactive springs from the debris of Magnox fuel element deconstruction, surpassing humans in both speed and accuracy. Currently we are working on sorting a heap of complex and previously unseen items of low activity. CERTH's role in the project is mainly the development of image understanding algorithms for object recognition and grasping from sensor data. SURO (Czech Radioactivity Commission) is contributing with radioactivity sensing, CVUT (Czech Technical University) does robotic manipulation and UniGe (University of Genova) is developing a special gripper suitable for the hostile environment.

Upon successful completion of the experiment the results will be directly exploitable on an existing large decommissioning project by industrial user Ansaldo NES in the UK.



For more information: Project web-page: <http://radiatoroso.ciirc.cvut.cz/>

# C-MOBILE (Accelerating C-ITS Mobility Innovation and deployment in Europe)



The C-Mobile project (Accelerating C-ITS Mobility Innovation and deployment in Europe), funded under the EU programme “Horizon 2020”, emphasizes on the advantages of the Cooperative Intelligent Transport Systems (C-ITS) which can improve road safety as well as traffic and energy efficiency in complex urban areas. The main objectives of the project are the development, wide-scale deployment and interoperability of sustainable C-ITS services. C-Mobile will demonstrate the pilot operation and performance of 20 C-ITS services in 8 European cities/regions: Thessaloniki, Barcelona, Vigo, Copenhagen, Bilbao, Bordeaux, Newcastle and North Brabant. The

C-Mobile consortium is comprised of 37 partners from 9 countries and the leading partner is the company IDIADA AUTOMOTIVE TECHNOLOGY SA. The pilot site of Thessaloniki is led by the Hellenic Institute of Transport (HIT) of the Centre for Research and Technology-Hellas (CERTH) in cooperation with 4 other partners: the Region of Central Macedonia and the private companies INFOTRIP S.A., Traffic Technique S.A. and TAXIWAY.

Information about the project is available in the official website: (<http://c-mobile-project.eu/>).



## Information about the TransAID project (Transition Areas for Infrastructure-Assisted Driving)

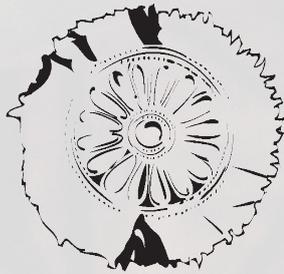
The kick-off meeting of the TransAID (Transition Areas for Infrastructure-Assisted Driving) project, which is part of the EU Framework Programme for Research and Innovation “H2020”, was held in Brussels on the 13<sup>th</sup> and 14<sup>th</sup> September 2017. TransAID focuses on the development of hierarchical traffic management schemes for mixed traffic (automated, cooperative and conventional vehicles) along transition areas of the road network where



automation level changes will be requested due to emergency and high complexity situations, and the absence of appropriate infrastructure equipment. Automation prototypes will be modelled and simulated in microscopic traffic simulation tools, so that the interactions between automated, cooperative and conventional vehicles can be investigated.

Accordingly traffic management schemes will be proposed to facilitate the cooperative maneuvering of the aforementioned vehicles. Real-world testing of the proposed management schemes will be conducted in actual test tracks, so that guidelines can be formulated for the equipment of the road infrastructure in the future in order to allow the smooth integration of automated vehicle in road traffic.





# ΕΚΕΤΑ

ΕΘΝΙΚΟ ΚΕΝΤΡΟ  
ΕΡΕΥΝΑΣ & ΤΕΧΝΟΛΟΓΙΚΗΣ  
ΑΝΑΠΤΥΞΗΣ

The Centre for Research and Technology-Hellas (CERTH) founded in 2000 is one of the leading research centres in Greece and listed among the TOP-20 E.U. institutions with the highest participation in competitive research grants.

Today CERTH includes the following five institutes with indicated major fields of research:

- **Chemical Process and Energy Resources Institute (CPERI)** Sustainable & Clean Energy, Environmental Technologies, Chemical & Biochemical Processes, New Functional Materials
- **Information Technologies Institute (ITI)** Informatics, Telematics and Telecommunication Technologies, Safety and Security
- **Hellenic Institute of Transport (HIT)** Smart Sustainable Mobility, Transport Safety
- **Institute of Applied Biosciences (INAB)** Agri-biotechnology, Health Translational Research, Informatics for big bio-data
- **Institute for Bio-economy and Agri-Technology (IBO)** Bio-economy, Agri-technology

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