NEWS

Second Special Session on Cybersecurity in Healthcare and Medicine (CyHeMe) held in Bol at Brač Island as part of IEEE SpliTech 2024

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The 2024 IEEE 9th International Mediterranean Conference on Smart and Sustainable Technologies (IEEE SpliTech 2024) was held from June 25th to 28th, 2025, in Split and Bol at Brač Island, Croatia. The key issues that IEEE SpliTech tackles are related to "the global population problems that could be solved by smart and sustainable engineering solutions. The main population problems are related to the energy security, food security, waste issue and sustainability aspect. Digitalization and smart approaches are allowing huge potentials to enable the key advancements in the previously mentioned fields. To ensure previous, the close collaboration between all engineering professions is key ones" (1). The IEEE SpliTech 2024 has covered the topics of Smart City/Environment, Energy and Engineering Modelling and eHealth. Prior to the start of the main conference, the program began on June 25th with the IoT Day, "a full-day event with free lessons, tutorials and exhibition space divided into three parts: practical special sessions, lectures by diverse companies and Career Speed Dating. Each session has combined the academic concepts with practical exercises in a hands-on approach that allowed attendees to test the theoretical knowledge acquired. Attendees also realized their own prototypes to take home as their personal hands-on experience. Finally, indications on the future development in each field have been explored" (2). The next, 10th anniversary edition of SpliTech will take place in Split and Bol from June 16th to 20th, 2025.

One of six accepted IEEE SpliTech 2024 special sessions was the Second International Special session on Cybersecurity in Healthcare and Medicine (CyHeMe), for which the proposal has been drafted by the Working Group on Information Security and Cybersecurity within the Croatian Society for Medical Informatics (Croatian acronym: HDMI). The special session co-organizers were: Hrvoje Belani, Directorate for e-Health, Ministry of Health, Zagreb, Croatia; Krešimir Šolić, Department of Medical Statistics and Informatics; Josip Juraj Strossmayer University of Osijek, School of Medicine, Osijek, Croatia; Kristina Fišter, Andrija Štampar School of Public Health, University of Zagreb, School of Medicine, Zagreb, Croatia; Ana Madevska-Bogdanova, Faculty of Computer Science and Engineering, Saints Cyril and Methodius University, Skopje, Republic of North Macedonia; Toni Perković, Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture, University of Split, Split, Croatia; Tatjana Lončar-Turukalo, Faculty of Technical Sciences, University of Novi Sad, Novi Sad, Serbia.

After the first CyHeMe edition held last year in the special session format (3), the second CyHeMe special session aimed to foster discussions related to information security and cybersecurity resulting from the need to build secure, reliable and robust systems and services that not only support healthcare and medicine, but also foster well-being, encourage patients and the population in general to live according to healthy lifestyle recommendations, and address the specific safety needs of an aging population. This multidisciplinary special session aimed to bring together practitioners and researchers from relevant disciplines. Among other objectives, CyHeMe aimed to: 1) develop approaches that support

multiple perspectives of information security and cybersecurity in healthcare and medicine; 2) develop or refine methods for achieving and raising cybersecurity of systems and services that promote well-being or health; and 3) identify open research and industry challenges, as well as validation objectives for proposed solutions. Considering this year's cyberattacks on Croatian institutions and companies, including the largest university hospital centre (4), the special session theme proved very timely, as e-health cybersecurity and medical information security show to be of growing importance to healthcare and medicine domains.

CyHeMe call for papers has been announced at the conference website (5) as well as distributed via social networks and relevant mailing lists, and to academic and interest groups organizers have identified. After the submission process conducted through the EDAS Conference and Journal Management System (6), six full papers (up to 6 pages in IEEE double-column format) have been revised and accepted to be presented at the special session, after the single blind reviews conducted by at least three reviewers for each paper. The initial CyHeMe program committee had 20 members, and paid special attention to geographical distribution, expertise, seniority, and gender balance. All three Croatian co-organizers are active members of the HDMI Working Group on Information Security and Cybersecurity, as well as the program committee member Mira Hercigonja-Szekeres, University of Hrvatsko Zagorje, Krapina, Croatia.

The special session program has consisted of six 15-minutes presentations. There have been up to 15 participants at the special session in total, coming from various countries: Germany, Italy, Croatia, Slovenia, Finland, Serbia, etc. The special session agenda on June 27th, 2024, from 9:00 until 10:30, has been chaired by Hrvoje Belani from the Ministry of Health, Zagreb, Croatia, and the University of Split, Split, Croatia, and organized as follows:

- "A Survey on Advanced Security and Ensured User Privacy for Distributed Systems" (7),
- "Secrets in Motion: Privacy-Preserving Video Classification with Built-In Access Control" (8),
- "Taxonomy and Statistics of Cyber and Physical Vulnerabilities in Medical Device" (9),
- "Static and Dynamic Fingerprint of RFID devices" (10),
- "Enhancing Privacy of Clinical Decision Support Systems with Federated Learning" (11),
- "The European Union Cybersecurity Legislation for the Health Sector: A Croatian Experience Report" (12).

The special session view, as well as the view at the main conference opening, is shown in Figure 1.

Instead of the special session keynote, there was a separate workshop on the related topic held later the same day from 15:00 until 16:30, the "Workshop on e-Health Applications in Practice", organized by Assoc. Prof. Petar Šolić, PhD from FESB, University of Split, Croatia, and Ivan Tanasijević, PhD, from Institute for Artificial Intelligence Research and Development of Serbia. The workshop topic description was the following: "E-health in its modern transformation often uses artificial intelligence algorithms, the creation of which in a functional form requires the use of high-performance computing. At this workshop, the current AI-based informatisation plans for KBC Split will be presented. Opportunities for cooperation will be discussed and examples of good practice will be shared, along with a presentation of the national infrastructure that can be used for data processing. For the purposes of the workshop, non-technical language will be used, with the aim of discussing common ideas and concretizing them through future projects."

Figure 1. The 2nd CyHeMe special session (on the left) and IEEE SpliTech 2024 opening session (on the right) (photo credit: Hrvoje Belani)

This second CyHeMe special session has taken place on-site, with all the authors presented their research live. The special session has been executed as a multidisciplinary, 1,5 hours long special session and attracted practitioners and researchers across disciplines: information security and cybersecurity, medicine, health sciences, software engineering, computer sciences, art, digital health, digital forensics, criminalistics, public security. Participants from government, public, academic and civil sectors have investigated challenges and exchanged knowledge to ensure the convergence of current and future cybersecurity efforts in health and medicine. This special session has examined some of the critical factors that enhance information security and cybersecurity of systems and services that promote health and well-being through not only technical, but also organizational and user-driven mechanisms.

Figure 2. Two CyHeMe special session full paper presenters: Hrvoje Belani, MSc EE from Zagreb, Croatia (on the left) and Assoc. Prof. Kristina Drusany Starič, MD, PhD, from the University Medical Center Ljubljana, Slovenia (on the right) (photo credit: Hrvoje Belani)

The co-organizers have rated the second CyHeMe edition a success, with 60% paper acceptance rate and authors of six accepted papers coming from seven European countries: Germany, Finland, Spain, Italy, The Northern Macedonia, Slovenia, and Croatia. The special session topics have been a great fit for SpliTech 2024 tagline “Go for future”. The special session organizers would like to thank SpliTech 2024

to the organizing, technical program and steering committees for their commitment, assistance and collaboration in making this special session a reality. The hotel venue, the conference organization and running smoothly have represented a very pleasant working environment for the special session organizers and participants.

Figure 3. Workshop on e-Health applications in practice, led by prof. P. Šolić, PhD, from FESB, Split and I. Tanasijević, PhD, from the Institute for AI R&D of Serbia (on the left) and two CyHeMe paper presenters in front of the SpliTech sign (on the right) (photo credit: Hrvoje Belani)

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Appendix A: 2nd CyHeMe Call for Papers

CALL FOR PAPERS

Cybersecurity is essential to be approached by-design when developing digital solutions in general, and as healthcare is being even more targeted by perpetrators, it is of crucial importance to have it as a constituent part of product development roadmap. Security vulnerabilities, threats and risks exist in digital solutions using various technologies, from web and mobile to Internet of Things (IoT) and Artificial Intelligence (AI), and they should be managed in order to establish proper protection and maintain resilience. One of the weakest links – humans should gain cybersecurity awareness and enterprises should create and cherish cybersecurity culture, as well as information security hygiene.

In this Special Session, we will foster discussion related to information security and cybersecurity resulting from the need to build secure, reliable and robust systems and services that not only support healthcare and medicine, but also foster well-being, encourage patients and the population in general to live according to healthy lifestyle recommendations, and address the specific safety needs of an aging population. This multidisciplinary session will bring together practitioners and researchers from relevant disciplines. Among other objectives, CyHeMe aims to: i) develop approaches that support multiple perspectives of information security and cybersecurity in healthcare and medicine; ii) develop or refine methods for achieving and raising cybersecurity of systems and services that promote well-being or health; and iii) identify open research and industry challenges, as well as validation objectives for proposed solutions.

Accepted, and presented papers will be published in the conference proceedings and submitted to IEEE Xplore as well as other Abstracting and Indexing (A&I) databases.

We cordially invite authors who wish to present original papers or reviews of the following topics:
- Access control, authorization and trust in healthcare systems
- Cybersecurity threat models in healthcare and medicine
- Formal and informal modelling of security-related policies and requirements for e-health
- Protecting medical devices and well-being apps from cyberharm
- Clinical information security and the evolution of security-related guidelines, policies, and regulations in medicine
- Cybersecurity strategies, regulations and standards in e-health and m-health
- Vulnerability assessment and management of users, infrastructure, systems and devices, processes and operations, and policies for healthcare and medicine
- Addressing threat landscape and the evolving ransomware issue in healthcare systems
- Security requirements verification: monitoring, documenting, and auditing in healthcare and medicine
- Users' safety and privacy in secure usage of health-related systems
- Cloud, artificial intelligence or blockchain cybersecurity for healthcare services and medicine-related industries
- Remote monitoring devices, biosensors, Internet of Medical Things (IoMT), health analytics and big data
- Secure, safe, reliable and trustworthy health-related data management
- Cybersecurity and resilience for smart hospitals, and medical and life-science facilities
- Security-related processes innovation and transformation
- Securing e-Health Records and medical data exchange
- Data mining and machine learning for e-health cybersecurity


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