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Newsletter #6

# The future of XR promoting Immersive Communication

Advanced media applications enabling immersive communication are becoming ubiquitous in our lives, and there is a global trend to adopt virtual solutions to support day-to-day business operations, social events, and general lifestyle. As it all narrows down to quality of experience (QoE), different immersive service categories including Real-time Holographic Applications, Immersive Virtual Training and Mixed Reality Interactive Applications, the huge technological challenge is to satisfy the very high requirements not only for the network itself but also from an architectural perspective. In order to tackle this challenge, Horizon 2020 project CHARITY will design an intelligent and autonomous framework spanning across the edge/cloud continuum of the network can facilitate the deployment and orchestration needs of such services.

NEW PAPERS RELEASED

Consistent strong efforts have been made by CHARITY project partners on publishing research papers through open access platforms. The CHARITY website has a section where papers produced by project partners are available for download. Below we highlight some of the most recent ones. Papers & Conferences section of the CHARITY project website.

Secure Network Slicing in B5G

CHARITY partner ICT-FI have recently published a paper "AI-based Autonomic & Scalable SecurityManagement Architecture for Secure Network Slicing in B5G" in IEEE Transactions on Network and Service Management. Below, is a brief summary of the publication.
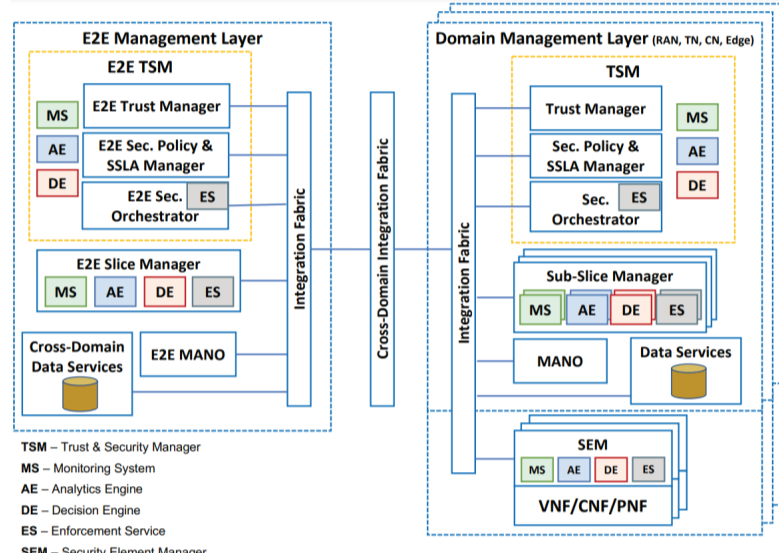
There is a need for fully automated and smart security management vital in 5G and beyond networks while meeting their stringent performance requirements. In this paper, authors introduce a novel autonomic and cognitive security management framework that empowers fine-grained zero-touch security management through different levels (i.e., network functions, sub-slice, and slice) and different administrative and technological domains. They showcase the compliance of the proposed framework with the ongoing standards (e.g., ZSM, 3GPP, and NFV) and demonstrate its feasibility by advocating for potential open-source solutions to implement its functional blocks in a cloud-native service-based environment.

Link: AI-based Autonomic & Scalable SecurityManagement Architecture for Secure Network Slicing in B5G.

Workshop on Flexible Resource and Application Management on the Edge

CHARITY project partner National Research Council of Italy (ISTI-CNR) chaired the 2nd Workshop on Flexible Resource and Application Management on the Edge. This online workshop was co-located with ACM HPDC 2022 (31st International Symposium on High-Performance Parallel and Distributed Computing, which took place in Minneapolis, Minnesota, United States.

The project partners from HAROKOPIO UNIVERSITY presented two papers about the work performed under CHARITY.

Paper 1: **"Towards a Distributed Storage Framework for Edge Computing Infrastructures":** this paper analyses the work performed in the field of Storage as Edge computing moves data and computation closer to the client enabling latency- and bandwidth-sensitive applications, that would not be feasible using cloud and remote processing alone. Authors, propose a lightweight hybrid distributed edge/cloud storage framework which aims to improve the Quality of Experience (QoE) of the end-users by migrating data close to them, thus reducing data transfers delays and network utilization.

Paper 2: **"An Automated Pipeline for Advanced Fault Tolerance in Edge Computing Infrastructures":** aims to introduce a number of mechanisms that are able to leverage the benefits that are provided by the multi-step format in a more refined manner. Having access to information regarding multiple future instances allows us to design automated resource orchestration strategies that cater to the specific characteristics of each type of computational node that is part of the Edge Infrastructure.

Link: https://www.charity-project.eu/en/news/2nd-workshop-on-flexible-resource-and-application-management-on-the-edge.

XR Conference - ISCTE-IUL in Lisbon

João Rodrigues from Dotesfera presented their ongoing work on CHARITY and Cyango, the application behind the VR Tour creator use case at 7th International XR Conference - ISCTE-IUL in Lisbon held from 27th to 29th April. This International XR Conference is an annual immersive tech event of the International Association of Immersive Technology Innovation (IAITI) and it aims to bring industry and academia together in order to discuss, present and show case latest trends in the immersive technology arena.

Link: https://charity-project.eu/en/news/7th-international-xr-conference-iscte-iul-cyango-presentation-and-what-we-are-doing-with-charity.

Second workshop on the future of XR: Current ecosystem and upcoming opportunities

Fermin Calvo presented the highlights of the CHARITY project during the "2nd Workshop on the future of XR: Current ecosystem and upcoming opportunities" organized by ARETE & iv4xr. He emphasized on the importance of Edge Computing as a means to solve challenges of bandwidth utilization between data centres and sensors. Some of the results from the project were presented

and many more interesting findings are in the way.

Link: https://charity-project.eu/en/news/second-workshop-on-the-future-of-xr-current-ecosystem-and-upcoming-opportunities.

2022 EuCNC & 6G Summit Participation
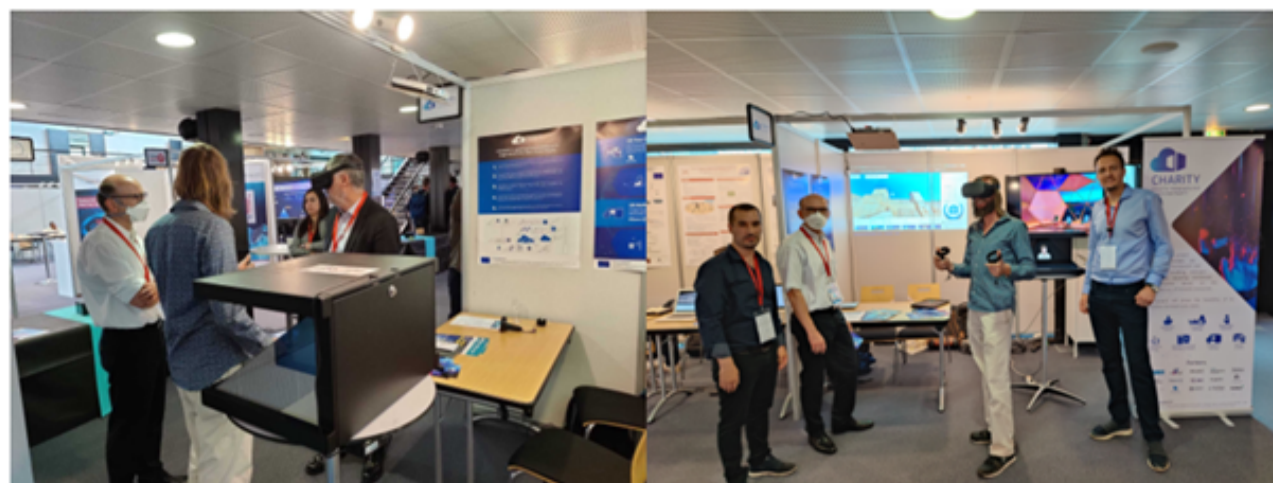
EuCNC & 6G Summit 2022 builds on putting together successful conferences in the area of telecommunications, and the CHARITY project took this opportunity to showcase its progress with a demonstration. This event brought together cutting-edge research and world-renown industries and businesses, globally attracting delegates from more than 40 countries all over the world, to present and discuss the latest results, and an exhibition with more than 70 exhibitors, for demonstrating the technology developed in the area, namely within research projects from EU R&I programs.

CHARITY was present at booth number 32 with interesting posters and demonstrations. The booth covered some of the interesting use cases from the project like Holographic meeting, VR Tour creator, VR Medical training and Collaborative training. The booth was quite a success as it witnessed interesting exchange and engagement. This also sets the stage for future collaboration opportunities.

Link: https://charity-project.eu/en/news/2022-eucnc-6g-summit-participation.

Video on Augmented Reality Gaming Use Case explained by Zbyszek Ledwoń

In a short video, Zbyszek Ledwoń from Orbital Knight explains CHARITY's Augmented Reality Gaming Use Case.

Link: https://www.charity-project.eu/en/news/video-augmented-reality-gaming-use-case-explained-by-zbyszek-ledwon.

Eurescom Message - Summer 2022 - Cover theme "Extended Reality"

Next-generation immersive services including advanced AR, VR and Holography-based applications have been referred to as killer applications for Beyond-5G and 6G networks. They represent one of the most demanding class of services with very high requirements not only for the network itself but also from an architectural perspective and regarding quality of experience (QoE). Considering different immersive service categories, including Real-time Holographic Applications, Immersive Virtual Training and Mixed Reality Interactive Applications, the huge technological challenge is apparent. Eurescom published a magazine featuring the contributions from CHARITY project on 5G-enabled XR medical training 4.0, The future of augmented reality gaming and more.

Link: https://www.charity-project.eu/en/news/eurescom-message-summer-2022-extended-reality.

# News and highlights from other Horizon 2020 projects related to the work of CHARITY

iv4XR - Intelligent Verification / Validation for Extended Reality-Based Systems - is an H2020 European project focusing on the automated testing verification of extended reality (XR) systems through the use of autonomous and intelligent test agents. The project is in its last year and has already made important progress in formalizing the problems and contextualizing them along the challenges faced by industrial partners. Solutions are being prototyped and applied gradually to the use cases. For more information consult the project website.

Link: https://iv4xr-project.eu/.
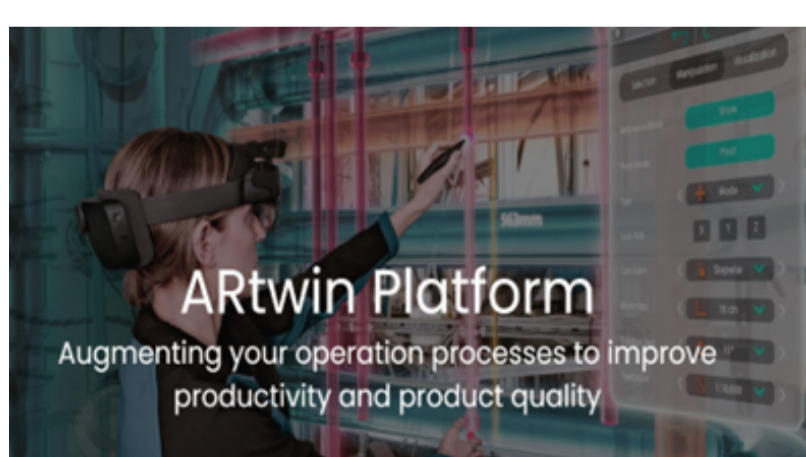
ARtwin is an EU Horizon 2020 project, aimed at improving productivity and product quality, by deploying an ARCloud platform for industry and construction. The ARtwin platform is an autonomous and transportable all-in-one 5G solution, enabling high-resolution AR experiences across different devices. The platform maintains in real-time the Digital Twin of a factory or BIM of the building and provides immersive visualisation to design offices, factory workers, field-level planners and construction managers.

Link: https://artwin-project.eu/.

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