TEACHING NEWSLETTER

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TEACHING is an EU-funded project that designs a computing platform and the associated software toolkit supporting the development and deployment of autonomous, adaptive, and dependable CPSoS applications, allowing them to exploit sustainable human feedback to drive, optimize and personalize the provisioning of their services.

This issue provides a grasp of the main project developments during January 2023 - March 2023. It also provides facts on the results achieved, as well as links to the latest dissemination activities.

During the reference project period, TEACHING partners have improved and implemented main technical action items, particularly, on the modules of the TEACHING AI toolkit, with the aim of adapting and refining their applicability to the application contexts given by the use cases, in which they will be validated in the final stages of the project.

Furthermore, within the activities of work package 3, TEACHING project has included a knowledge transfer of functional safety topics at TU Graz University lectures in March, as well as the delivery of a 2-day cybersecurity engineering course with the SoQrates community. This is also considering as a leverage clue in the dissemination activities of the project. WP2 has been successfully finished in the previous period, and some effort from the participating partners has been devoted to support the exploitation of the platform tools developed so far, within the relevant tasks.

Regarding dissemination and exploitation strategy, TEACHING has applied in the Horizon Result Booster services, aiming to improve its exploitation strategy and deliver a thorough market analysis by the end of the project. Moreover, TEACHING is continuously contributing to the activities of the HRB services, in which we have applied as project group. Particularly, NextGenCPSoS is a cluster of seven EU funded projects (CPSoSaware, SMART4ALL, ADEPTNESS, ADMORPH, HiPEAC, DIH4CPS, TEACHING), which aims at developing new technologies and approaches for cyber-physical systems of systems. TEACHING has taken the first step towards, forming a Project Group (PG) based on commonalities between their work in this research field.

TEACHING HIGHLIGHTS M37 – M40

WHAT HAS BEEN DONE?

WP1 effort was directed towards designing and implementing demonstrators of the TEACHING artefacts with the intention to validate the main project hypotheses. This work included the definition of the use case scenarios, and the experimental protocol, as well as the integration of various components using the TEACHING platform. The result of this work included the preparation of two Human-in-the-loop AI-enhanced experiments based on simulated, yet realistic data. One experiment involved a fully autonomous driving experience and the use of the ML/DL models that learn to automatically shift driving modes based on the passengers' stress profiles. The second experiment involved a flight operated by a flight management system and the classification of anomalies happening in auxiliary, yet co-located to the FMS systems and their mitigation.

WP2 being officially over with the previous period, some effort from the participating partners has been devoted to supporting the exploitation of the platform tools developed so far within WP2 tasks, thus contributing to the experimental activities as well as completing the overall WP2 validation via the project use cases. The TEACHING platform developed by this WP includes tools for exploiting accelerated devices like GPUs and FPGAs for AI and stream processing, mechanisms for efficient and scalable networking, distributed federated learning and service orchestration. These allow to implement federated learning schemes as well as more generic distributed computation and communication patterns that tie together a multitude of Cyber-Physical Systems into an organized CPSoS. The platform tools are now used by both the flight management experiment and the experiment on autonomous driving with used.

The activities of Workpackage 3 of the TEACHING project has included a knowledge transfer of functional safety topics at TU Graz lectures in March as well as the delivery of a two day cybersecurity engineering course with the SoQrates community. TUGs PENNE automotive E/E architecture framework for testing cybersecurity attacks has been tested with partners AVL and AIT in online workshops. Additionally, a master thesis on AI-based lane detection demonstration and handover strategies has been showcased by a shared master student of Uni Pisa and TUG. Supported by AIT dissemination actions at the DECSOS workshop have been fixed and started. Additional scientific publication activities at the EuroSPI related to WP3 outcomes have been initiated. Also talking and interacting with a visiting high school class at TUG on topics of autonomous vehicles and AI-based systems brought TUG researcher the opportunity to abstract and demystify some of TEACHING project outcomes.

WP4

The work in WP4 during the reporting period was conducted by focusing efforts on the remaining active tasks, namely T4.2 (AI for human monitoring), T4.3 (AI models for human-centric personalization) and T4.4 (Dependable AI models). In this context, the work in the work package included both technological and scientific contributions.

In particular, we worked on the modules of the TEACHING AI toolkit with the aim of adapting and refining their applicability to the application contexts given by the use cases in which they will be validated in the final stages of the project. This covered both automotive and avionics applications, including the various pre-processing, training and inference phases for the stress detection, driving personalization and anomaly detection modules. From a technical point of view, the porting of the software to the iMX8 platform was also improved. Also, in relation to the automotive application case, the design and development phases of the methodologies related to dependable AI systems have been advanced, with a specific focus on the analysis and adaptation of the use case to cover usage level C, based on the standards of ISO/IEC JTC1 SC42 WG03, Trustworthiness, TR 5469 "Functional safety and AI systems" and ISO TC22 SC32 WG13 "Automated Driving Systems" (TS 5083, post-deployment phase).

The different phases of the work carried out in WP4 in recent months have been described in scientific papers, which are currently in preparation, or already submitted to scientific journals and in events organized at international conferences.

Use Cases

WP5 is culminating its integration activities with live pilots for both domains, avionics and automotive. Both pilots rely on the TEACHING platform and its dedicated toolkit.

The avionics pilot is further improving the ability to detect anomalies in the running systems and deliver appropriate recommendations to a human in the loop in a specially adapted manner that is easily digestible for human usage. The decision-making is going through final improvements through aggregated learning across a fleet of devices.

The automotive pilot is being finalised in terms of its ability to integrate personalised human models in the TEACHING platform. The platform is in turn integrated into the driving simulator controls, which offers an opportunity to test the (subjective and objective) human response to realistic safety-critical driving scenarios.

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TEACHING Dissemination and Communication

Within the reference period, the TEACHING partners continue to effectively disseminate the project results by participating in online events, creating further networking opportunities, and continuously raising awareness. One of the main scopes of the TEACHING partners is to contribute and support communication activities of the project, in order to achieve all the dissemination goals. TEACHING partners have expanded the project visibility via submitting the 6th

TEACHING broadcast, a live interview session of Georg Macher (Graz University of Technology). In this broadcast, Autonomous Driving & AI at the edge and their importance in Artificial Intelligent Systems were discussed. In addition, Georg talked about the TEACHING's current efforts, already achieved results and the impact that the project will have on the autonomous driving systems generally. In addition, website and social media analytics are continuing to be used to monitor website visibility and audience engagement throughout the project's duration. Moreover, the TEACHING project, within the aforementioned period, has participated continuously in the activities which are involved in the Horizon Results Booster. After the submission of the D1.1 "Portfolio of Research and Innovation Project Results" which all the partners of the Project Group "NextGenCPSoS" have delivered, TEACHING has proceeded with the requested contribution of the Step 3 from Module B. This was focused on the "Capacity building" in order to facilitate best practices amongst dissemination staff, referring to strategic planning and ensuring a lasting legacy with improved dissemination practices. On the other hand, TEACHING in the first quarter of 2023, has applied as a single project in the HRB services. Contribution from TEACHING partners was quite precious and crucial, as we aimed to review the key exploitable results of TEACHING, by clarifying existing exploitation paths, and identifying all relevant stakeholders in the exploitation value chain.
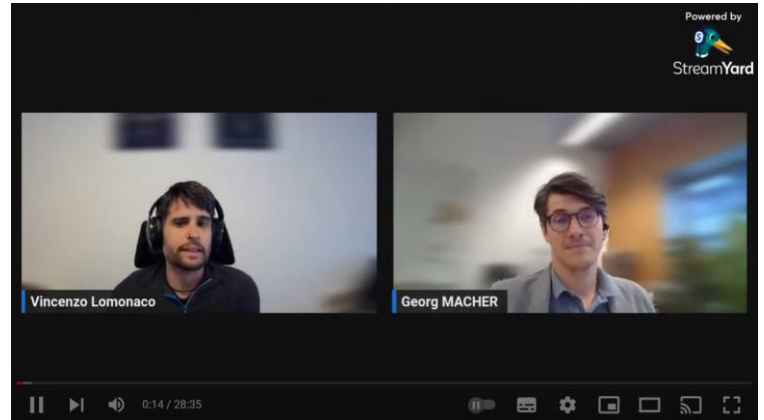
TEACHING Publications

The TEACHING project also had an active performance via journal and conference paper publication, by presenting the research work carried out in the frame of the project. Most of TEACHING released articles are located in ZENODO and OpenAIRE.

TEACHING Consortium

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