PRESS RELEASE

29th February 2024

The EASIER project, which has been granted €3 991 591,25 by the European Commission, completed its 3-year runtime on December 31, 2023. Leveraging the multidisciplinary expertise of its project partners and invaluable feedback provided by deaf communities, EASIER managed to achieve significant progress in enhancing the translation framework to reduce communication barriers. The final project review by the European Commission took place on February 29, 2024, formally ending the project.

EASIER was a Horizon 2020 project established with the aim to design, develop, and validate a multilingual machine translation system which would act as a framework for barrier-free communication among deaf and hearing individuals, as well as provide a platform to support sign language content creation. Between January 2021 and December 2023, 14 institutions from eight European countries worked together as core partners of the EASIER project.

The project concept was based on a unique combination of technological sign language resources and sign language linguistics expertise, allowing for exploitation of a robust data-driven sign language recognition engine, the incorporation of a signing avatar that integrates sign language grammar and prosody features to perform the most advanced synthetic signing currently available, as well as the state-of-the-art machine translation technology that consumes both annotated and unannotated data to deal with a wide range of use scenarios.

EASIER (Intelligent Automatic Sign Language Translation) project is funded by the EU's Horizon 2020 programme under Grant Agreement number 101016982.

Project results: What has been achieved?

In January 2021, the EASIER consortium embarked on a journey of enhancing communication between spoken and sign language users. In this pursuit, during the 36 months of the project, the EASIER project partners have meticulously and collaboratively developed and enhanced a diverse range of assets that will remain accessible to the academic and industrial stakeholders. These assets include:

- **Mobile application and the corresponding desktop platform** that serve as the central point for bridging linguistic gaps between spoken and sign languages, providing a user-centered interface and the architecture for seamless translation across several spoken and sign languages.
- **Multilingual translation models** that support high-quality translation in low-resource language settings. The project introduced and improved three fundamental translation directions: Sign-to-Spoken, Spoken-to-Sign, and Spoken-to-Spoken. These models formed the backbone of EASIER's translation capabilities, ensuring a comprehensive approach to language accessibility.
- **Advanced signing avatar technology** that provides superior visualization of sign languages. Paula, the project's signing avatar, has undergone significant enhancements during the project's life span, becoming the first avatar with advanced abilities to convey emotions. Additionally, language-specific strategies for mouthing have been integrated, enhancing the avatar's expressiveness. Notably, Paula can process elements of the EASIER notation, resulting in improved prosody and clearer affect within signed sentence animations.
- **Cutting-edge technology for affect extraction** encompassing voice, text, and video inputs. The incorporation of these innovative features enabled the recognition and portrayal of emotions, enhancing the depth of communication experiences: affect extraction from voice analyzes vocal characteristics to detect emotions; affect extraction from text processes written words to discern underlying sentiments; affect extraction from video captures facial expressions.
- **Sign language recognition models** that provide a bottom-up phonetic representation. EASIER employed cutting-edge 2D to 3D lifting technology, enhancing the recognition models. This advancement ensured a more accurate portrayal of gestures and expressions, contributing to clearer and more precise communication.
- **Multi-sign language lexical resource** with an interlingual index as the backbone – a machine-readable and semantics-based lexicon. The project added multiple European sign languages to the Open Multilingual Wordnet with the aim to establish connections between signs with shared meanings across languages.
- **Web applications that allow post-editing of machine translation output**, including NERstar, which includes automated processes during import, editing, and export to enforce limits and optimize subtitles and glosses; AZDV, which provides corrections as graphical diagrams interpretable by software, enabling avatar animations as replacements for erroneous portions of machine translation output; and SignTube, an editing tool for alignment between the subtitle file, time code, and sign language video.

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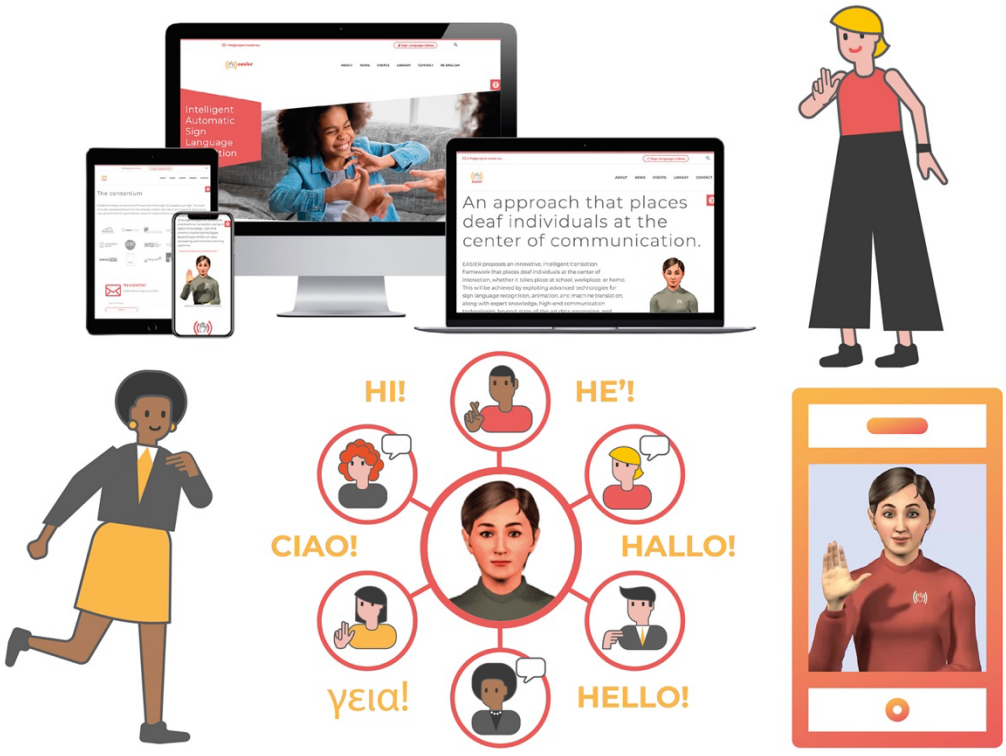
- **Best practices and harmonized guidelines** for generation and annotation of new sign language resources and training resources. EASIER has emphasized best practices for data generation, storage, and reuse and provided guidelines that play a pivotal role in ensuring the integrity and accessibility of sign language resources, fostering consistency and quality. Additionally, EASIER actively participated in several standardization development organizations, contributing to the establishment of industry standards in the field of accessible communication.

Last but not least, EASIER has greatly expanded the network of stakeholders to understand and align with user needs and preferences. One of the key aspects of the project was the end user involvement, achieved through active engagement and gathering end user feedback from sign language communities in France, Germany, Greece, the Netherlands, Switzerland, and the UK. This work was coordinated by the European Union of the Deaf which led the team responsible for providing the definition of evaluation metrics and the evaluation protocol, assessing user requirements, needs, and gaps, recruitment strategies of end user groups, as well as the performance of project evaluation studies. All together, EASIER engaged 152 deaf and hearing individuals across seven language communities in evaluation studies. Not only did this valuable community feedback significantly influenced the technology development process by shaping the design of the mobile application, avatar, and translation models, it also increased awareness and insights into these advanced technologies within deaf communities through their direct engagement.



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Sustainability and exploitation of project results

Recognizing that innovation is an iterative process, EASIER has placed strong emphasis on the strategic reuse of its outputs and continuous improvement. The tools, models, and resources have been meticulously designed to be adaptable and extensible, also to the languages that were not covered by the project. By encouraging the reuse of project outputs, the EASIER consortium has fostered a collaborative environment where researchers and developers can leverage the results and achievements of EASIER as building blocks for their future projects. This cyclical process of reuse and improvement propelled sustained progress, creating a ripple effect of innovation within the accessible communication landscape. Through these collaborative efforts, EASIER has ensured that its contributions will serve as enduring resources, fostering a legacy of inclusivity and accessibility.

As summarized by Dr. Giacomo Inches, the EASIER Project Coordinator, "*EASIER achieved a major milestone in the field of sign language analysis, processing, and translation by consciously involving deaf communities in all stages of the project delivery: from design through evaluation to technical development. During the three years of the project, we utilized and benefited from all the major innovative technologies available to date, like LLMs and affect transferred to the avatar, while also creating a vibrant ecosystem where computer scientists and linguistics closely collaborated to take mutual benefit from the advancement in the respective fields, such as the introduction and incorporation of sign languages into Wordnet and the generation of sign language starting from human editable and readable graphics. The high innovative potential of the project has been sustained by 41 papers published across several venues and domains, as well as the attention of a wide group of stakeholders and the general public demonstrated through 36K page views of the EASIER website and over 600 active followers across the EASIER social media channels. We are confident that the legacy of the EASIER project can be further exploited in future initiatives supported by the EC and national funding bodies*."

Work beyond the project lifespan: Where can you meet the EASIER project partners and learn more about the project results?

As co-organizers of the *11th Workshop on the Representation and Processing of Sign Languages: Evaluation of Sign Language Resources* organized in the framework of the next LREC-COLING 2024 Conference, which will take place in Turin, Italy, on May 20-25, 2024, the EASIER project partners will present the results of EASIER to the large audience composed of researchers, industry representatives, and funding agencies.

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Visit **project-easier.eu** website for more info.

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