TrustID

TRUSTID Multiplier Event at the University of Patras
Project Overview

31st of May 2023

Dr. Marios Belk

Cognitive UX GmbH

Co-funded by the
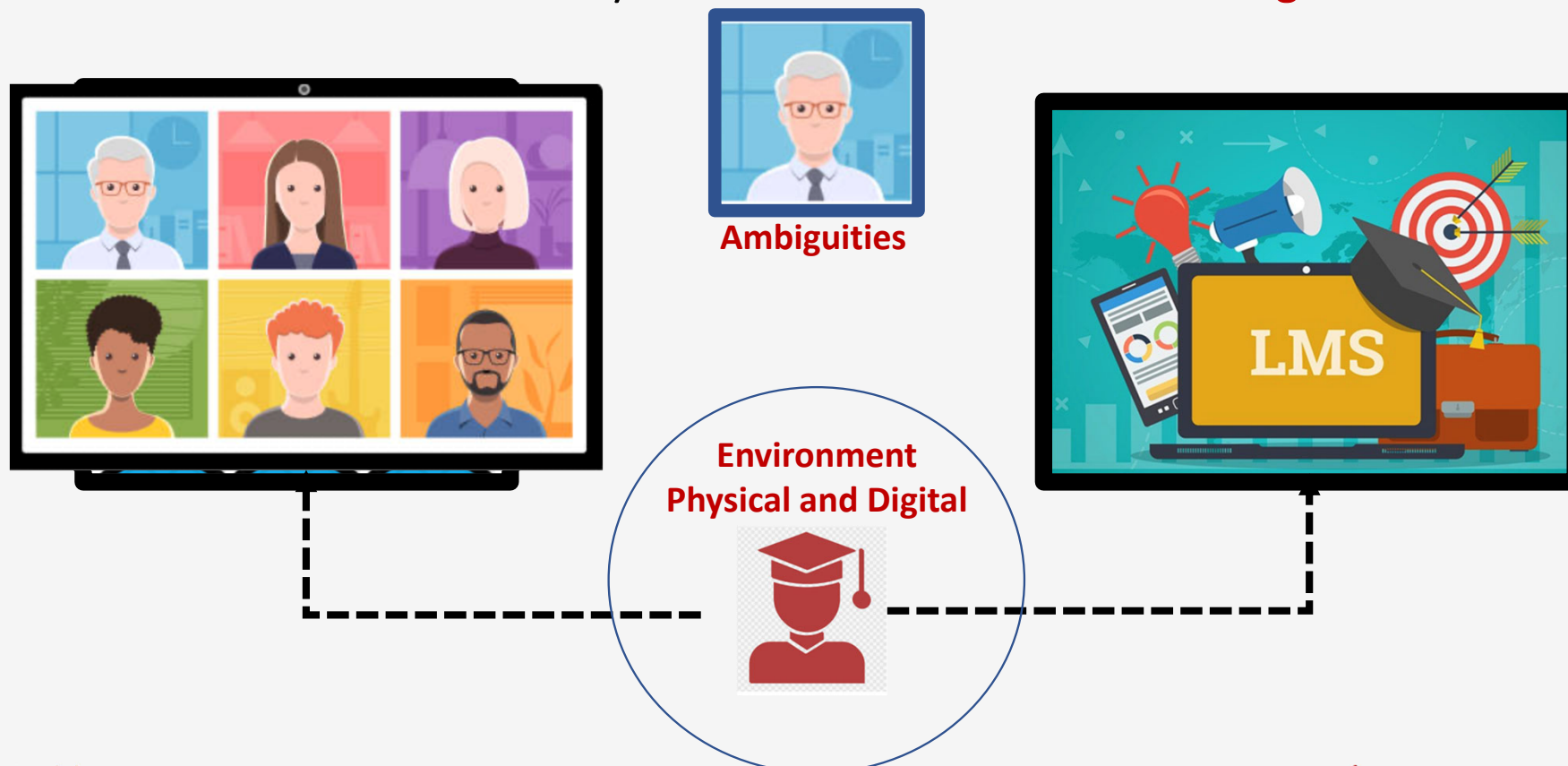Erasmus+ Programme
of the European Union

Covid-19 outbreak: Problem and Challenges in HEI's

- Before the Covid-19 outbreak many HEI's followed a blended learning educational model

Ambiguities

Environment Physical and Digital

LMS

- Challenges
  - Establish appropriate procedures for continuously and seamlessly identifying non-permitted activities from students, such as prohibited communication and collaboration among students, and impersonation cases
  - Provide insights to instructors in order to take informed decisions for their classes and attendees
  - Provide alternative integration capabilities and modes of TRUSTID in order to better adapt to specific requirements of each HEI

Design, develop and evaluate a multi-tier continuous student identification framework, bootstrapped to HEIs' needs, that will consist of state-of-the-art intelligent image, voice and interaction data processing while preserving their privacy

Core Objectives

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- **Literature review** on current practices and procedures related to student identity management of EU HEIs and **triangulate findings** with stakeholders' studies at the participating HEIs

- **Design and develop an integrated framework** for student identity management

- Validate the solution through a **User-Centered Design (UCD) methodology**; two formative studies are planned, during the software development process; and one summative study is planned, after the final release of the software

- Create a **repository** that will support **knowledge building**

- **Dissemination and exploitation** activities – *research papers, workshops, seminars, LTTAs, etc.*

Intellectual Outputs

- **Intellectual Output 1:** Analysis & validation of the TRUSTID framework for HEIs' continuous student identity management *(Conceptual)*

- **Intellectual Output 2:** Implementation of an open-source software toolkit *(Operational)*

- **Intellectual Output 3:** Evaluation and validation reports in the context of three case-studies at different HEIs *(Lessons Learned and Guidelines)*

- **Intellectual Output 4:** Knowledge building online community and repository *(Sustainability)*

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Key Achievements and Milestones reached

IO1 - Needs Analysis and Design of the Theoretical Framework for Continuous Student Identity Management *Output:* Publications, Other, Dataset

Objectives

- Conduct a needs analysis of students, teachers and academic policy makers related to continuous student identity management

- Define security metrics and policies for continuous student identity management

- Set the specifications of the framework by considering privacy aspects within diverse online learning scenarios

- Design a multi-dimensional user model for continuously identifying end-users based on a variety of inputs (voice, image, user interaction)

- Triangulate and combine findings from the literature and real-world case studies in three different HEIs

Tasks

- **Task 1.1:** Needs Analysis on Identity Management in HEIs

- **Task 1.2:** Needs Verification at HEIs

- **Task 1.3:** Specification of the Framework

Intellectual Output 1 – Achievements and Outputs

- **Needs analysis** on how HEI stakeholders perceive the credibility of critical academic activities during Covid-19 and identify threat scenarios and malicious activities during critical online academic activities
  - 31 participants from three European HEIs

- **Needs verification analysis** in order to verify the outcome and prioritize the identified threat scenarios in terms of importance and severity
  - 11 participants from three European HEIs

- **Requirements and countermeasure features** for addressing the identified threat scenarios

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Intellectual Output 1 – Achievements and Outputs

Specifications of the TRUSTID framework

- Refined the framework throughout the project

- Specifications for the face, voice and interaction identification mechanism

- Specifications for LMS integrations of TRUSTID at UPAT, UCY, UC sites

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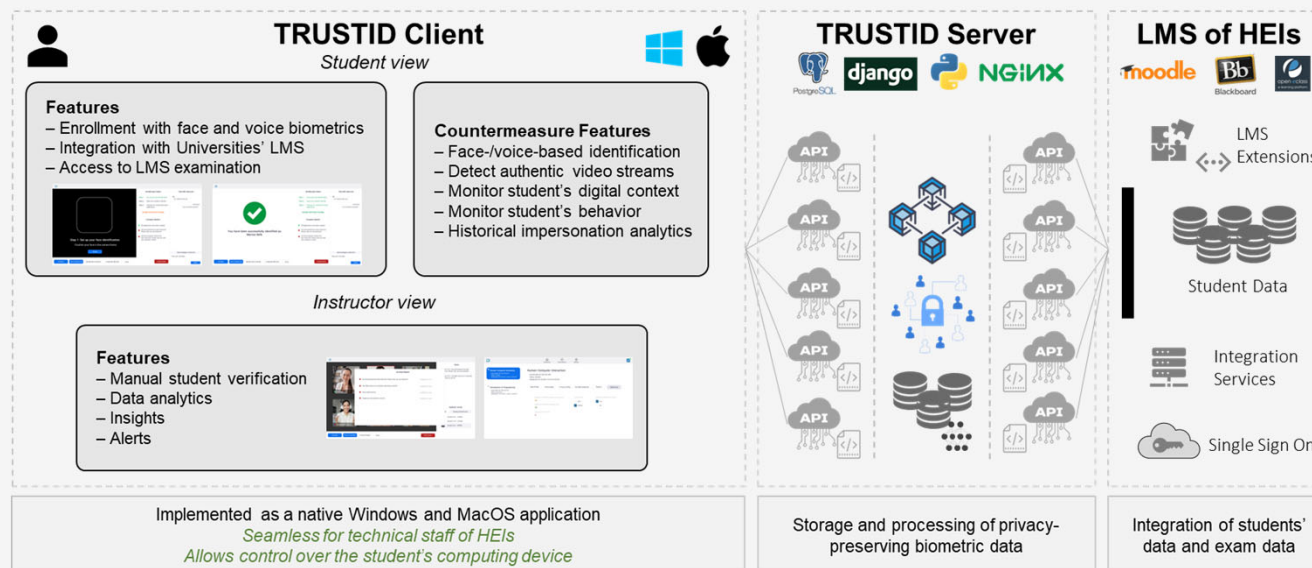
Intellectual Output 1 – Achievements and Outputs

Privacy-preserving architecture for continuous student identity management

- Designed the privacy-preserving architecture

- Implemented the privacy-preserving smartphone wallet

- Defined the flow between client and server applications of TRUSTID towards achieving privacy-preservation of users' biometric data
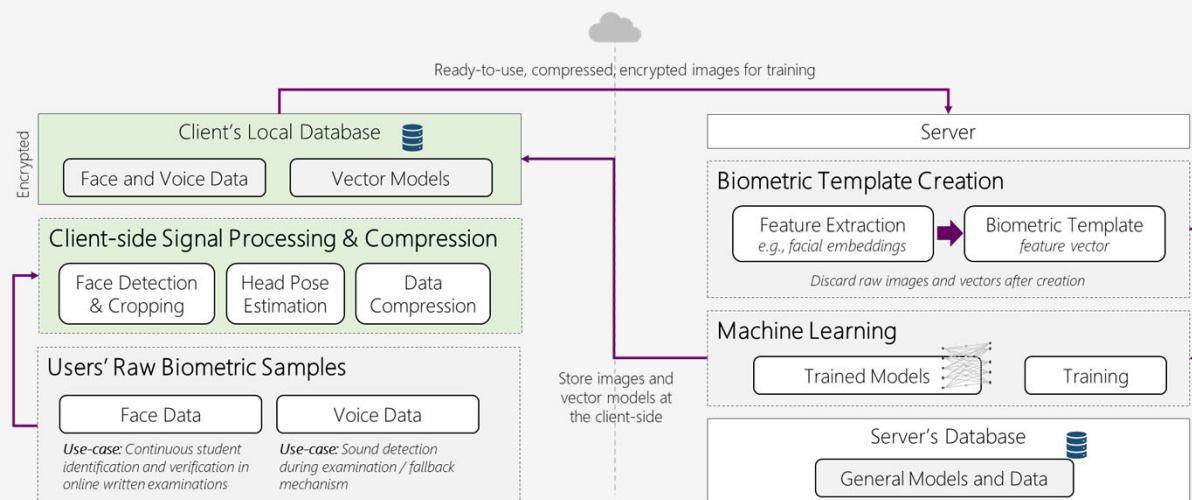
Intellectual Output 2 – Objectives and Tasks

IO2 - Design and Implementation of Open-source Privacy-preserving Toolkit and Application Programming Interfaces *Output:* Software, Services, Publications

Objectives

- Implement the algorithms for continuous user identification based on a mixed model of voice, face and user interaction analytics

- Preserve the privacy of utilized user biometric data

- Design and develop an open-source Identity-as-a-Service solution, which will allow administrators in HEIs to easily integrate continuous user identification components in their online learning platforms

- Design and develop an interactive dashboard for service integration and analytics

Tasks

- **Task 2.1:** Architecture Design

- **Task 2.2:** Privacy-preserving Biometrics

- **Task 2.3:** Development of Voice-, Image- and Interaction-based Algorithms

- **Task 2.4:** Integration and Verification Testing

Development of native client applications

- Windows application

- MacOS application
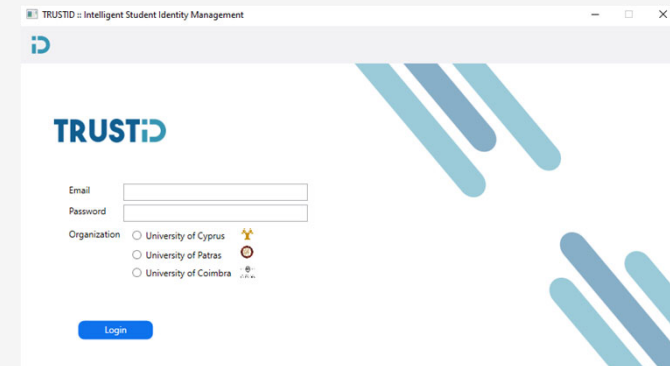
Development of intelligent user identification mechanisms

- Face-based identification

- Voice-based identification

- Interaction-based identification

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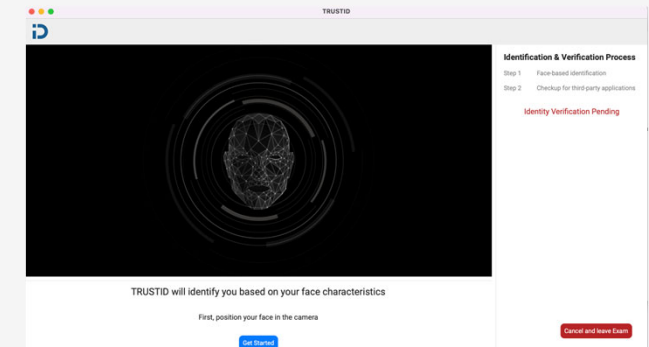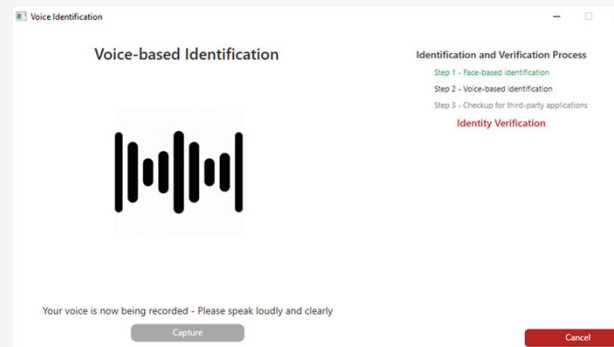
Intellectual Output 2 – Achievements and Outputs

- Implementation of a **privacy-preserving architecture** and **smartphone wallet**

- **Prototype** designs and implementations

- Development and integration of new features in the **native Windows and MacOS applications**

- Mechanisms for **LMS integration**

- **Application Programming Interface**, end-points for service integration

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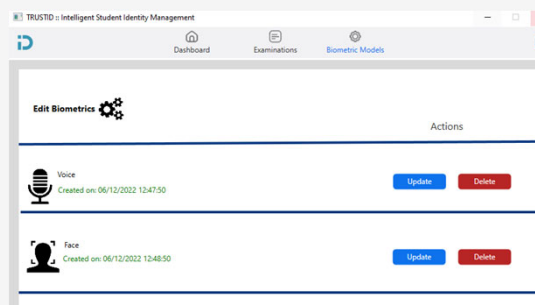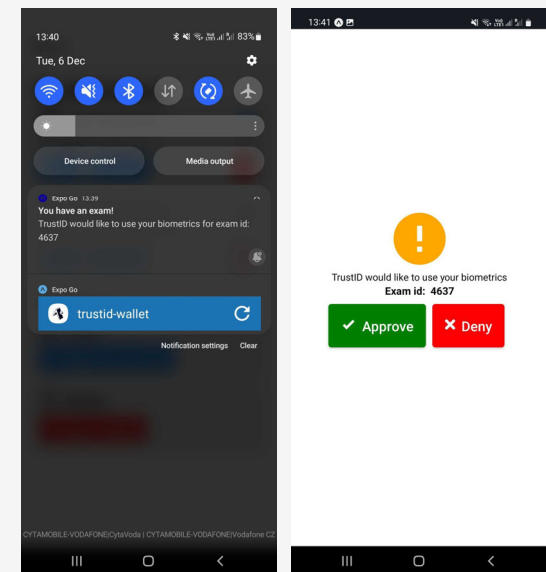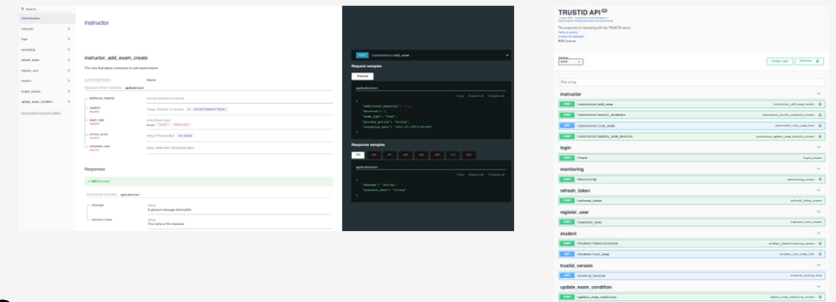
Intellectual Output 3 – Objectives and Tasks

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IO3 - Evaluation Reports regarding Efficiency, Effectiveness and User Acceptance of TRUSTID in Three Case Studies at Higher Education Institutions across Europe *Output:* Dataset, Publications

Objectives

- Organize and execute standalone studies and pilot trials

- Assess the effectiveness and accuracy of the intelligent biometric methods

- Evaluate the overall effect of the project on usability and security

- Produce evaluation reports

- Define personas including the characteristics of the most representative end-users

- Define different evaluation scenarios of TRUSTID

Tasks

- **Task 3.1:** Design of Experimental Evaluation Methodology

- **Task 3.2:** Formative Evaluation Report

- **Task 3.3:** Summative Evaluation Report

Intellectual Output 3 – Achievements and Outputs

Formative, conducted at early stages of the project, which aim at validating initial prototypes of the platform and get initial user feedback on likeability, perceived usability and security

Summative, conducted during the last months of the project to evaluate the effectiveness and feasibility of the proposed approach

We conducted the studies aiming to evaluate:

- i) the resilience of TRUSTID to impersonation and collaboration/communication attacks during an online examination by evaluating the implemented face- and voice-based identification mechanism;

- ii) usability and user experience of end-users based on their interactions with the TRUSTID system; and

- iii) perceived security and privacy of users towards the TRUSTID system

- In PoC2, the System Usability Score was calculated to be 78, which is a high score (Any score above 68 is considered above average)

- User identification accuracy of 100% during enrollment and 78% during continuous monitoring

Intellectual Output 4 – Objectives and Tasks

IO4 - Knowledge Repository containing Training Webinars, Guides of Best Practices, Integration Guidelines, Training Materials and Forum Discussions on how to Adopt and Deploy Continuous Student Identity Management Solutions in HEIs *Output:* Internet, Broadcast, Event, Publications, Video

Objectives

- Develop and conduct training webinars, which will serve as a training, evaluation and dissemination tool of the project

- Produce best practices on how to adopt continuous student identification in online learning systems

- Design integration guidelines on how technical administrators may integrate the solution into their existing learning management environments and systems

Tasks

- **Task 4.1:** Training Webinars

- **Task 4.2:** Best Practice Guides

- **Task 4.3:** System Integration Guidelines (through an Application Programming Interface)

Intellectual Output 4 – Achievements and Outputs

- Deployment of Final Knowledge Repository
  - https://trustid-project.eu/kr.php

- Deployment of Final TRUSTID Community Forum
  - https://trustid-project.eu/community.php

- TRUSTID GitHub Open-source Code Repository
  - https://github.com/cognitiveux/trustid

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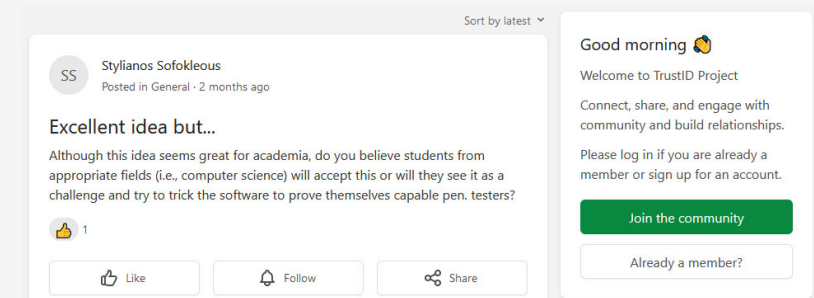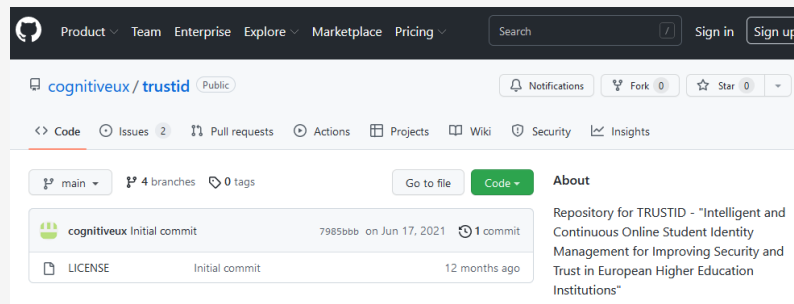
Webinars

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- All events available at the TRUSTID YouTube channel
  - https://www.youtube.com/@trustidproject4535

TRUSTID Project Webinar at the University of Cyprus

Online Student Identification with Face Recognition

TRUSTID Webinar - Beyond Passwords: Biometric...

TRUSTID Webinar - Strong Authentication Best Practic...

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Publications

Christos A. Fidas, Marios Belk, Argyris Constantinides, David Portugal, Pedro Martins, Anna Maria Pietron, Andreas Pitsillides, and Nikolaos Avouris. 2023. **Ensuring Academic Integrity and Trust in Online Learning Environments: A Longitudinal Study of an AI-centered Proctoring System in Tertiary Educational Institutions**. *Education Sciences* (2023). (to appear)

José N. Faria, David Portugal, Pedro Martins, Marios Belk, Argyris Constantinides, Andreas Pitsillides, and Christos A. Fidas. 2023. **Image-based Face Verification for Student Identity Management — the TRUSTID Case Study**. In *UMAP '23 Adjunct: Adjunct Proceedings of the 31st ACM Conference on User Modeling, Adaptation and Personalization* (UMAP '23 Adjunct), June 26–29, 2023, Limassol, Cyprus. ACM, New York, NY, USA, 6 pages. https://doi.org/10.1145/3563359.3597397 (to appear)

Argyris Constantinides, José Faria, Taoufik Sousak, Pedro Martins, David Portugal, Marios Belk, Andreas Pitsillides, and Christos A. Fidas. 2023. **TRUSTID: Intelligent and Continuous Online Student Identity Management in Higher Education.** In *UMAP '23 Adjunct: Adjunct Proceedings of the 31st ACM Conference on User Modeling, Adaptation and Personalization* (UMAP '23 Adjunct), June 26–29, 2023, Limassol, Cyprus. ACM, New York, NY, USA, 4 pages. https://doi.org/10.1145/3563359.3597410 (to appear)

Argyris Constantinides, Christodoulos Constantinides, Marios Belk, Christos A. Fidas, and Andreas Pitsillides. 2021. **Applying Benford's Law as an Efficient and Low-cost Solution for Verifying the Authenticity of Users' Video Streams in Learning Management Systems**. In *IEEE/WIC/ACM International Conference on Web Intelligence and Intelligent Agent Technology* (WI-IAT '21). Association for Computing Machinery, New York, NY, USA, 563–569.

Christos A. Fidas, Marios Belk, David Portugal, and Andreas Pitsillides. 2021. **Privacy-preserving Biometric-driven Data for Student Identity Management: Challenges and Approaches.** In *Adjunct Proceedings of the 29th ACM Conference on User Modeling, Adaptation and Personalization*. Association for Computing Machinery, New York, NY, USA, 368–370.

Learning Teaching Training Activities (LTTA)

- Short Staff Training on how to Adopt and Deploy Continuous Student Identification in Online Learning Systems
  - *Host:* University of Cyprus
  - *Event Date:* Three-Day Event on 25-27 April 2023
- Three-day event featuring speeches, presentation, hands-on tutorial and practical training
- The training aimed to bring together instructors, system and IT administrators, trainers and academic councils from the participating partners' countries to familiarize with the TRUSTID project and with the continuous student identification solution
- Target audience:
  - Academic councils, curriculum developers and/or policy makers
  - Instructors
  - System administrators

Learning Teaching Training Activities (LTTA)

Multiplier Events in Greece, Germany, Portugal, Cyprus

- On 16, 17, 22, 29 and 31 May 2023, Cognitive UX GmbH, ISR-University of Coimbra and University of Cyprus, University of Patras hosted multiplier events in Germany, Portugal, Cyprus and Greece

- The events gave the chance to participants to learn more about the TRUSTID project, its main outcomes and interact with the implemented open-source software technology

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Germany Event

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- On the 16th and 17th of May 2023, Cognitive UX GmbH hosted the Info and Tech Day in Germany

- The event was held at the University of Mannheim

- Featuring walk-in hands-on interaction demonstrations with the TRUSTID open-source technology

- Presentations on the main outcomes of the project

- Tutorials on how to access and use the TRUSTID open-source technology.
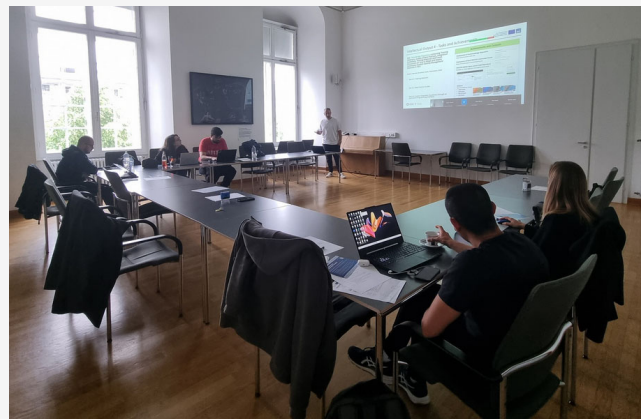
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