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TrustID 

Learning Teaching Training Activity (LTTA)

Intellectual Output 2 - Design and Implementation of Open-source Privacy-preserving Toolkit and Application Programming Interfaces

Marios Belk, Cognitive UX GmbH



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ΠΑΤΡΩΝ
UNIVERSITY OF PATRAS



University
of Cyprus



INSTITUTO DE SISTEMAS E ROBÓTICA
UNIVERSIDADE DE COIMBRA

cognitiveux

Agenda

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Intellectual Output 2

- Overview
- Main Achievements
- Implemented Technologies

Intellectual Output 2 (IO2)

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- **Design and Implementation of Open-source Privacy-preserving Toolkit and Application Programming Interfaces**
- *Lead:* Cognitive UX GmbH
- *Participating Partners:*
 - University of Patras
 - University of Cyprus
 - University of Coimbra ISR
- *Output type:* Services / structures – E-learning platform
- *Media:* Software, Service, Publications

IO2 - Tasks and Task Leaders

- Task 2.1: Architecture Design
 - **Lead: Cognitive UX GmbH**
 - *Participating:* University of Patras, University of Cyprus, University of Coimbra
- Task 2.2: Privacy-preserving Biometrics
 - **Lead: University of Cyprus**
 - *Participating:* University of Patras, University of Coimbra, Cognitive UX GmbH
- Task 2.3: Development of Voice-, Image- and Interaction-based Algorithms
 - **Lead: Cognitive UX GmbH**
 - *Participating:* University of Patras, University of Cyprus, University of Coimbra
- Task 2.4: Integration and Verification Testing
 - **Lead: Cognitive UX GmbH**
 - *Participating:* University of Patras, University of Cyprus, University of Coimbra

Summary of Outcomes (1/2)

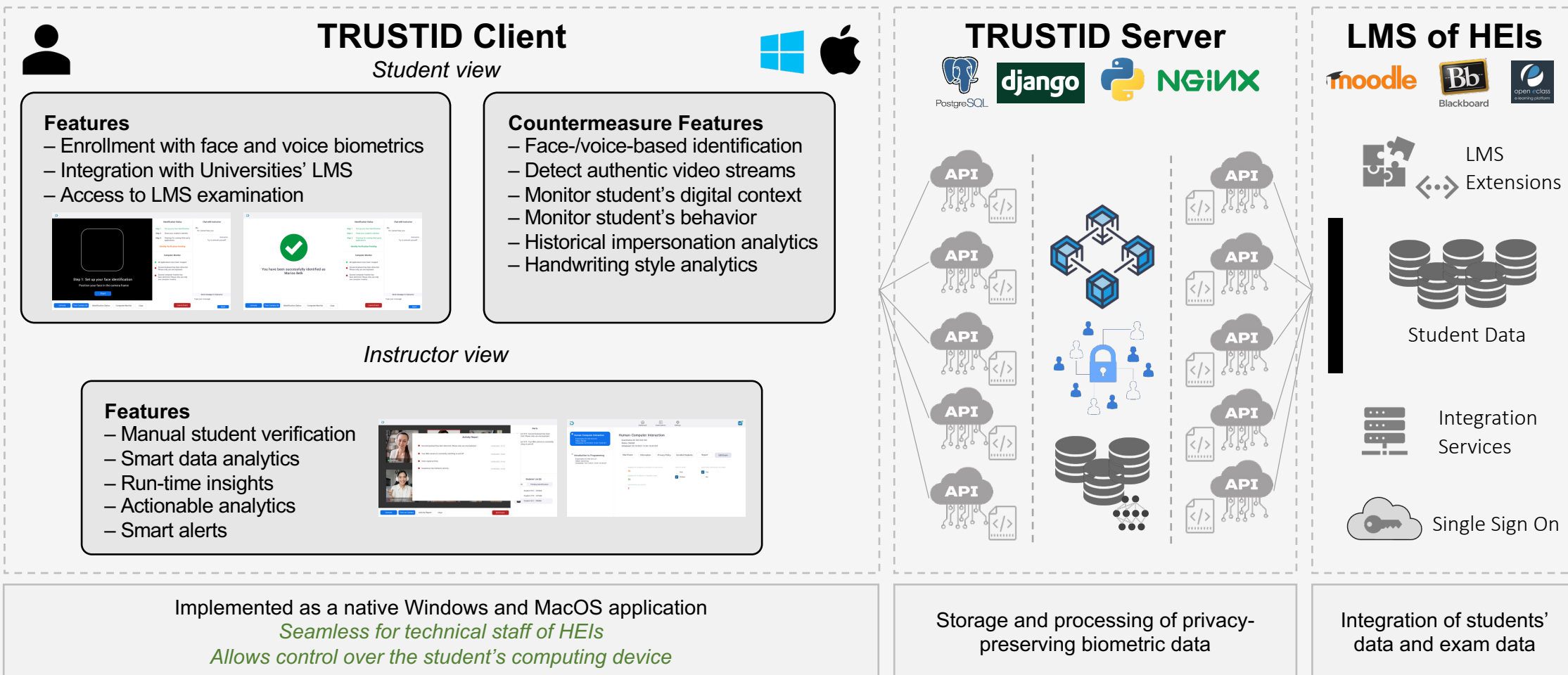
- Designed and developed the final version of the TRUSTID platform and associated tools and mechanisms for continuous student identification
- **Enhanced native client software applications** (implemented as both native Windows and MacOS applications), enabling students and instructors to interact with the implemented mechanisms of TRUSTID
- **Enhanced back-end system**, which consists of an **Application Programming Interface**, which exposes a series of system end-points of TRUSTID
- Major update to the **architecture for privacy-preservation**
- **Integrated all the technologies** under interoperable platform

Summary of Outcomes (2/2)

- Major improvement of the face identification enrollment mechanism (vs. Web-based enrollment) enabling end-users to enroll in the TRUSTID system through recording of face-based images that are used for training the face-based identification models
- Mechanism for LMS integration (e.g., Moodle authentication), examination management, synchronization)
- Updated machine learning-based algorithms and mechanisms for face-based identification
- Integrated a new machine learning-based algorithms and mechanisms for voice-based identification and interaction-based identification
- Implemented a privacy-preserving wallet smartphone application

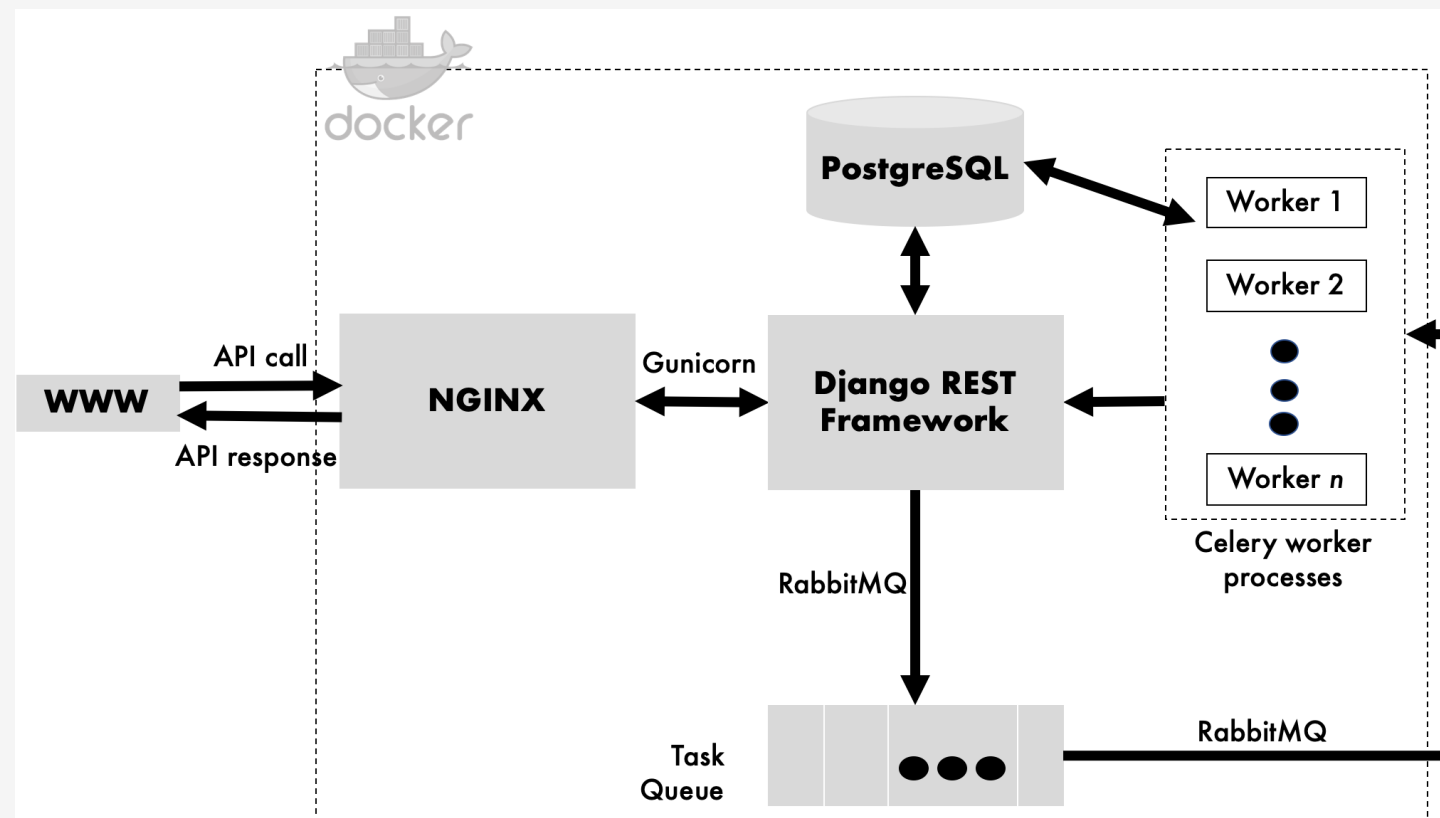
TRUSTID High-level Framework

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Architectural Design and Technology Stack

- Server-side **web API**
- **Django** REST Framework
- **NGINX** (Web server, Reverse proxy, Load balancer)
- **Gunicorn** (Application server that implements the Web Server Gateway Interface)
- **Celery** (Asynchronous task queue based on distributed message passing)
- **RabbitMQ** (Message broker)
- **PostgreSQL**
- **Docker**



Client Application


Windows and MacOS

Integrated Login

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TRUSTID :: Intelligent Student Identity Management






TRUSTID

Email

Password

Organization

- University of Cyprus 
- University of Patras 
- University of Coimbra 

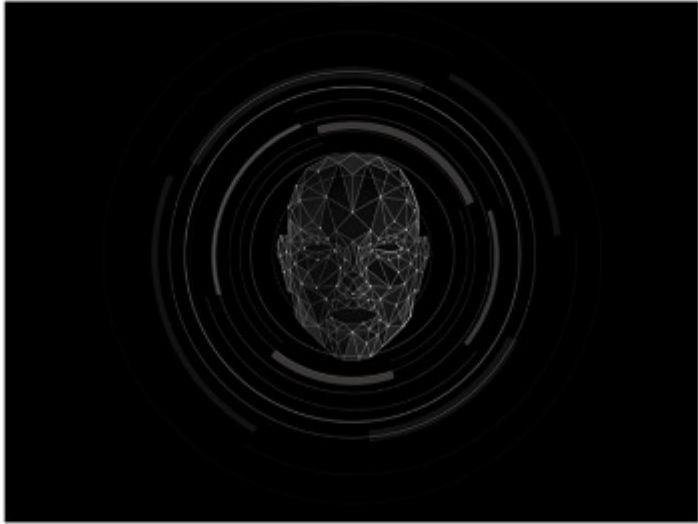
Register Face Biometrics

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Face Enrollment

Register Face Biometrics



TRUSTID needs your consent to collect your face data
Please select I consent to continue

I consent

Cancel Enrollment

Biometrics Process

- Step 1 - Consent
- Step 2 - Face Biometrics

Biometrics Ready


Register Voice Biometrics

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Voice Enrollment

Register Voice Biometrics



TRUSTID needs your consent to collect your voice data
Please select I consent to continue

I consent

Cancel Enrollment

Biometrics Process

- Step 1 - Consent
- Step 2 - Voice Biometrics

Biometrics Ready

Control and Manage Biometrics

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TRUSTID :: Intelligent Student Identity Management

Dashboard Examinations **Biometric Models** AC

Edit Biometrics

Actions

 Voice Created on: 06/12/2022 12:47:50	Update	Delete
 Face Created on: 06/12/2022 12:48:50	Update	Delete


Continuous Face Identification

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Face Identification

Face-based Identification



TRUSTID will identify you based on your face characteristics
First, position your face in the camera frame

[Get Started](#)

[Cancel](#)

Identification and Verification Process

- Step 1 - Face-based identification
- Step 2 - Voice-based identification
- Step 3 - Checkup for third-party applications

Identity Verification


Continuous Voice Identification

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Voice Identification

Voice-based Identification



Identification and Verification Process

- Step 1 - Face-based identification
- Step 2 - Voice-based identification
- Step 3 - Checkup for third-party applications

Identity Verification

Your voice is now being recorded - Please speak loudly and clearly

Capture

Cancel

Digital Written Examination Scenario

Written Examination

Multiple Choice Questions

What does the ERASMUS acronym stand for?

- European Committee Agency Scheme for the Mobility of University Students
- European Community Action Scheme for the Mobility of University Students
- European Continental Agility Scheme for the Mobility of University Students
- European Congress Ambassador Scheme for th Mobility of University Students

Monitoring

- Camera capture is enabled
- Voice capture is enabled
- Checkup running applications is enabled

TRUSTID will periodically capture your photo and voice for continuous identification purposes and will checkup the running applications and processes on your computer

User Feedback Mechanism

- I will impersonate with another person
- I will open a forbidden application

Send Feedback

Close Exam

Oral Examination Scenario

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Oral Examination



Oral Examination in Progress



Start Voice Capture

Stop Voice Capture

Monitoring

Camera capture is enabled

Checkup running applications is enabled

TRUSTID will periodically capture your photo and voice for continuous identification purposes and will checkup the running applications and processes on your computer

User Feedback Mechanism

- I will impersonate with another person
- I will open a forbidden application

Send Feedback

Close Exam

Examination Management Dashboard

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TRUSTID :: Intelligent Student Identity Management

Dashboard Examinations Management SS

Management

Add a new exam [Add Exam](#)

Edit existing exams [Edit Exams](#)

Enroll students to exam [Enroll](#)

Examination Management

Add Exam

Add Exam


Additional Material Yes No

Exam Duration:

Exam Type:

Name:

Privacy Policy

Scheduled date 

Edit Exam

Name	ID	Date	Enrolled Students
Introduction	61667302972	07/12/2022 00:00:00	59

LMS Integration and Synchronization Tools

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Upload and Enroll to Exam

Upload and Enroll Students:

Upload students:

C:\Users\argyr\Downloads\test_users (1).csv Browse File

First name	Last name	Email
Adamos	Adamou	aadamou@live.com

Exam id	Exam name
61667302972	Introduction to F

Select Exam:

61667302972

Select all students: Yes

All students selected

Sync Cancel

View Enroll Students

Students Enrolled in Exam: Introduction

First name	Last name	Email
Christou	Panikos	panikoschristou@yahc
Georgiou	Mariaeleni	mgeorg04@ucy.ac.cy
Panagi	Paraskevi	ppanag03@ucy.ac.cy
Tsakilioti	Evangelia	euatsakilioti@gmail.co
Tzamou	Maria	mtzamo01@ucy.ac.cy
Sofocleous	Elena	sofocleous.elena@ucy
Sofocleous	Elena	elenadepp1524@gma
Aristodemou	George	george.arist@email.co

Cancel

TRUSTID Backend – Application Programming Interface

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TRUSTID API

Base URL: localhost:19201/backend
http://localhost:19201/backend/docs/html/index.html

The endpoints for interacting with the TRUSTID server
[Terms of service](#)
[Contact the developer](#)
BSD License

Schemes

HTTP

Django Login

Authorize

Filter by tag

instructor

POST /instructor/add_exam instructor_add_exam_create

POST /instructor/enroll_students instructor_enroll_students_create

GET /instructor/list_exam instructor_list_exam_list

POST /instructor/update_exam_details instructor_update_exam_details_create

login

POST /login login_create

monitoring

POST /monitoring monitoring_create

refresh_token

POST /refresh_token refresh_token_create

register_user

POST /register_user register_user_create

student

POST /student/identification student_identification_create

GET /student/list_exam student_list_exam_list

trustid_version

GET /trustid_version trustid_version_list

update_exam_condition

POST /update_exam_condition update_exam_condition_create

login

POST /login

login_create

Creates a JSON Web Token if the provided credentials are correct

Parameters

Cancel

Name Description

data * required

(body)

Edit Value | Model

```
{
  "email": "string",
  "password": "string"
}
```

Cancel

Parameter content type

application/json

Execute

Responses

Response content type application/json

Code Description

201 `JSON Web Token has been created successfully. The value is returned in resource_obj .`

Example Value | Model

```
{
  "message": "string",
  "resource_name": "string",
  "resource_obj": {}
}
```

Web API – Documentation



- Search...
- Authentication
- instructor >
- login >
- monitoring >
- refresh_token >
- register_user >
- student >
- trustid_version >
- update_exam_condition >

Documentation Powered by ReDoc

instructor

instructor_add_exam_create

The view that allows instructors to add examinations

AUTHORIZATIONS: **Bearer**

REQUEST BODY SCHEMA: application/json

additional_material	boolean (Additional material)
duration required	integer (Duration in minutes) [0 .. 9223372036854776000]
exam_type required	string (Exam type) Enum: "Oral", "Written"
privacy_policy required	string (Privacy policy) non-empty
scheduled_date required	string <date-time> (Scheduled date)

Responses

^ 200 Success

RESPONSE SCHEMA: application/json

message	string A general message description
resource_name	string The name of the resource

POST /instructor/add_exam

Request samples

Payload

application/json

Copy Expand all Collapse all

```
{
  "additional_material": true,
  "duration": 0,
  "exam_type": "Oral",
  "privacy_policy": "string",
  "scheduled_date": "2021-12-13T13:28:55Z"
}
```

Response samples

200

400

401

403

404

405

415

500

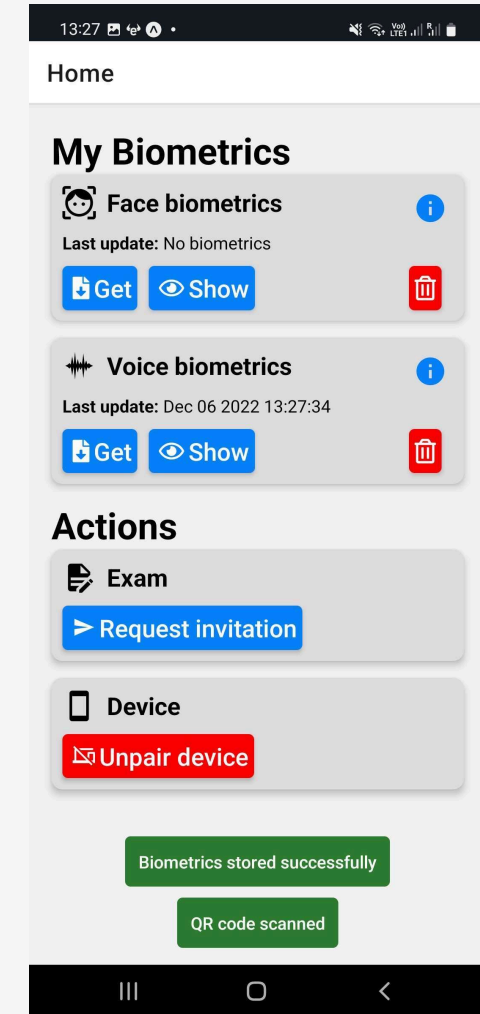
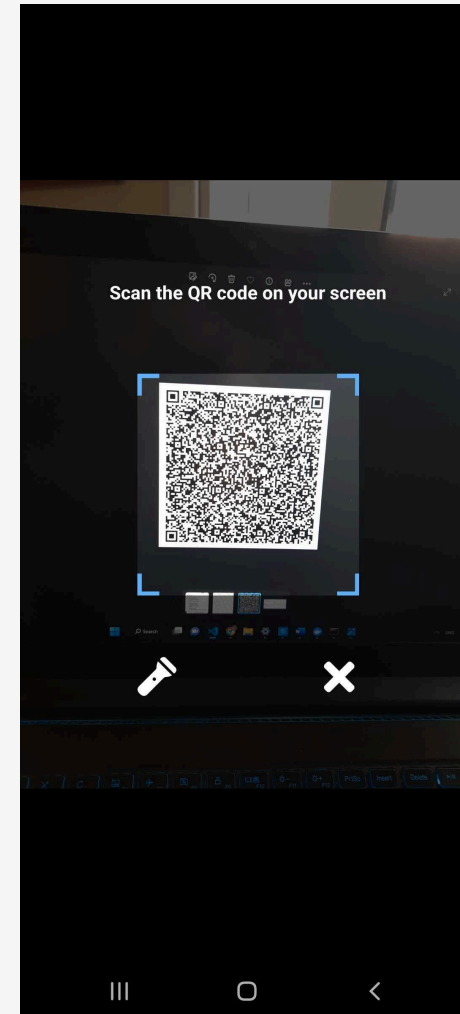
application/json

Copy Expand all Collapse all

```
{
  "message": "string",
  "resource_name": "string"
}
```

Wallet for biometrics models

- Pair mobile application with TRUSTID system to fetch and store the biometric models locally

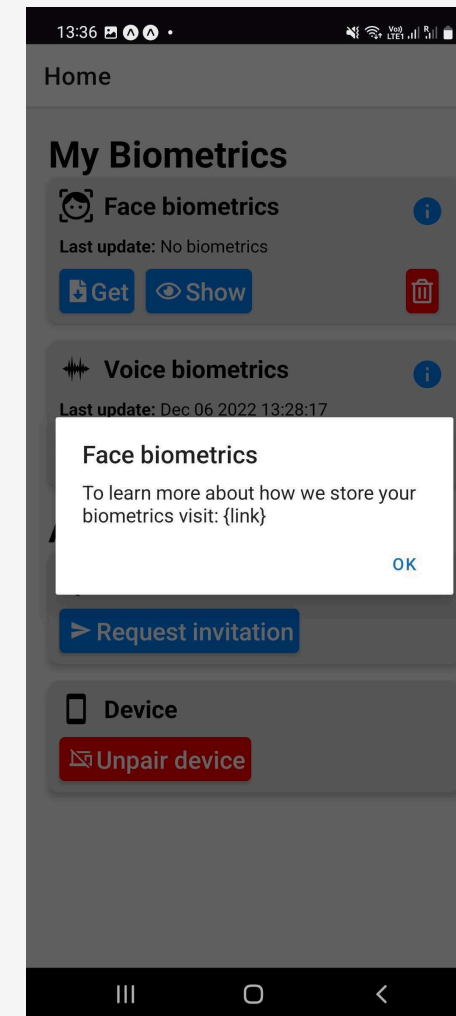
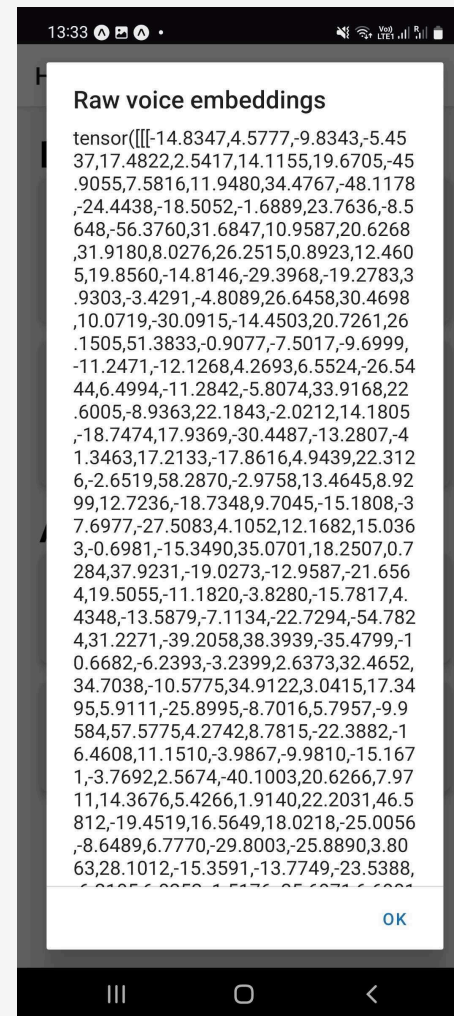


Wallet for biometrics models



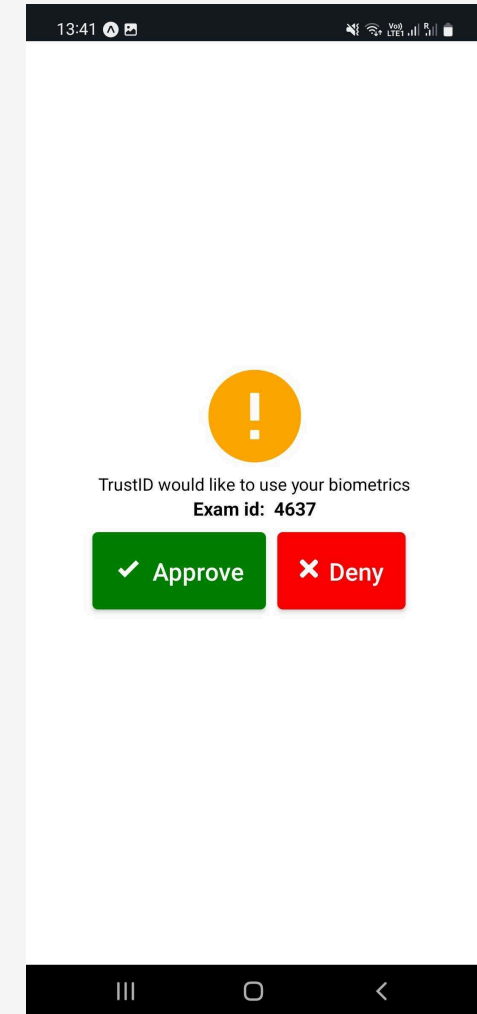
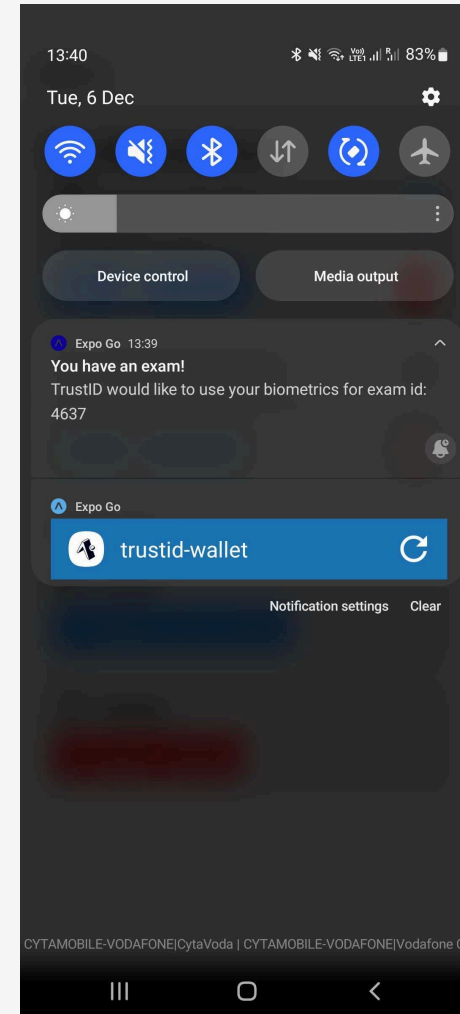
- Management of biometrics models

- Display
- Delete
- Privacy policy



Wallet for biometrics models

- Push notification for approval of sharing of biometrics models during online examination



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Thank you!

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