

WEBINAR

Tech team presentation

Building the VINCE app: architecture, AI, and virtual spaces

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Jaakko Haavisto
Aapo Nikkola
26.2.2026



Agenda

1. Introduction
2. Development journey
 - a. Timeline & evolution
3. Project uniqueness
4. Technical overview
5. Feature deep dive
 - a. Virtual rooms
 - b. Ask AI
 - c. Language services
6. Security & privacy
7. Challenges & lessons learned
8. Next steps

Core development team

Axel Lindberg
Project engineer



System architecture
Cross-platform development
UI/UX

Jaakko Haavisto
Project engineer



Backend development
AI-integration

Aapo Nikkola
Project advisor



Visual design & development
2D graphics
3D environments

Futuristic Interactive Technologies

- (FIT) Research group, Turku UAS
- Focus:
 - Interactive technologies
 - VR & XR technologies
 - Social metaverse platform
 - AI-empowered software solutions
- Typical project technology readiness level (TRL) is 3–6.

TURKU AMK 

Futuristic Interactive Technologies

Blending business demands with pioneering tech to create effective, user-friendly outcomes.

Discover our cutting-edge work at the intersection of **Metaverse -technologies** and the real-world challenges.



<https://fit.turkuamk.fi/>

Finland 

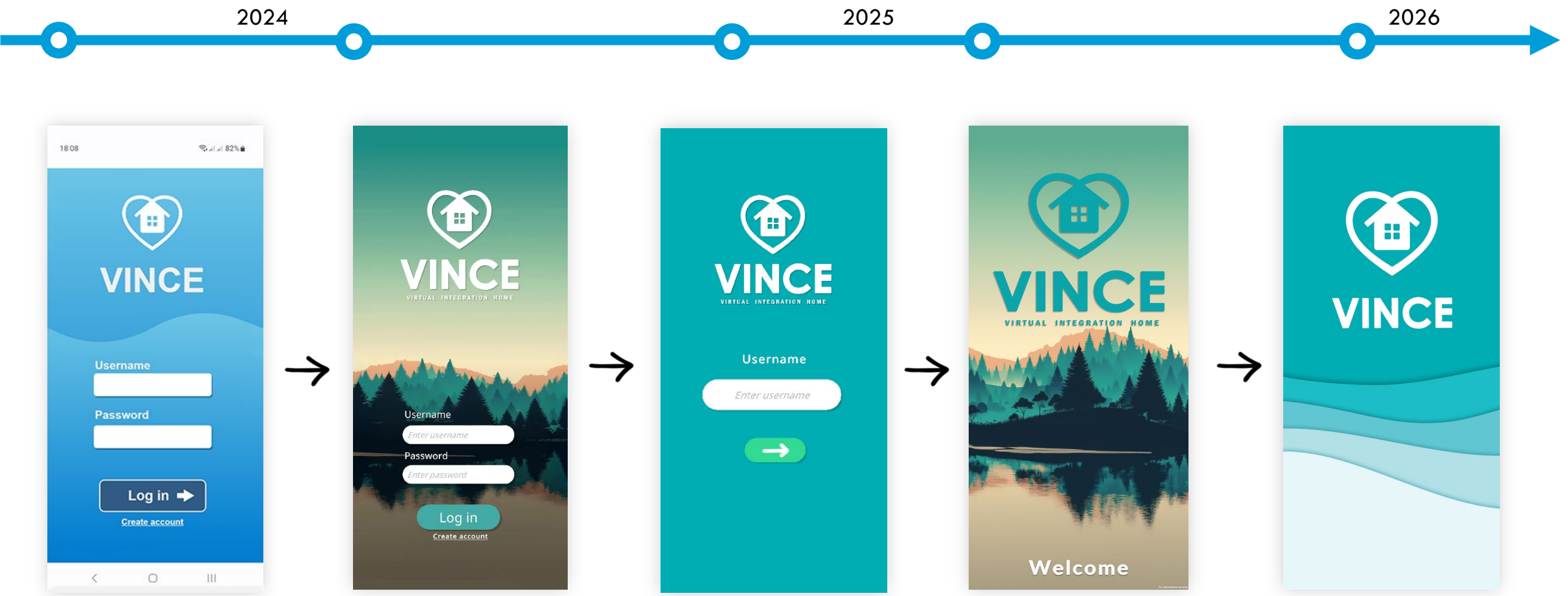


WHAT IS VINCE?

THREE CORE COMPONENTS



Visual development through the project

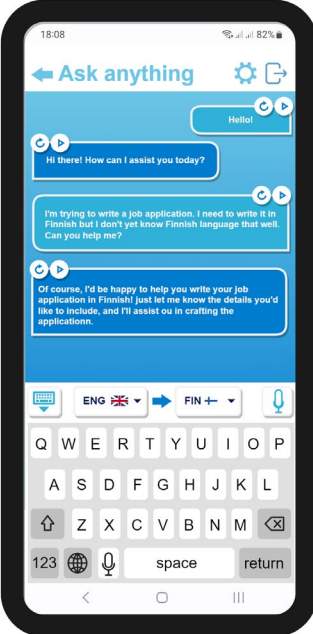
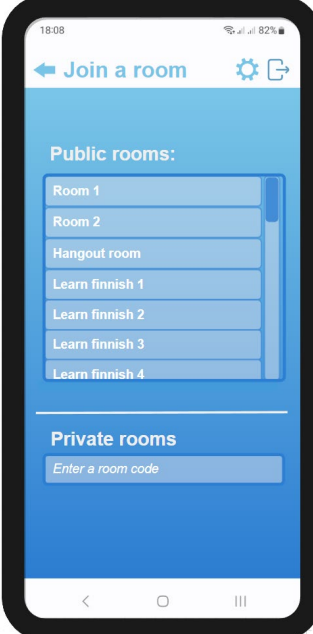
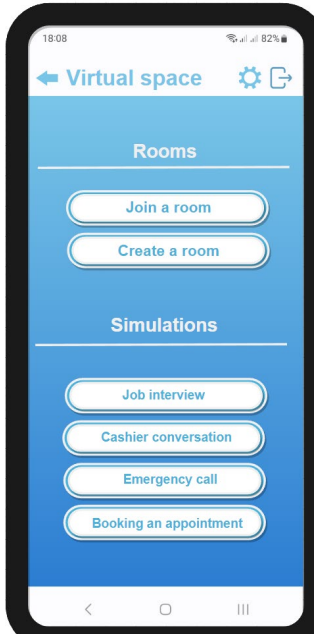
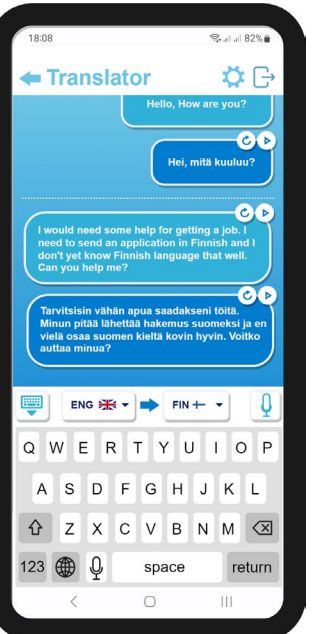
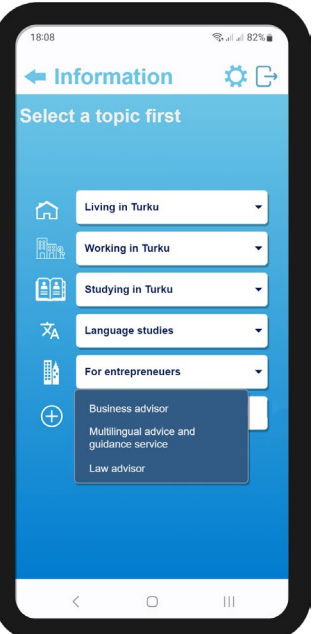
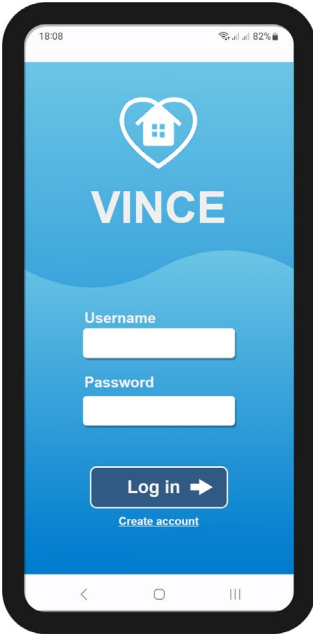


Visual development through the project

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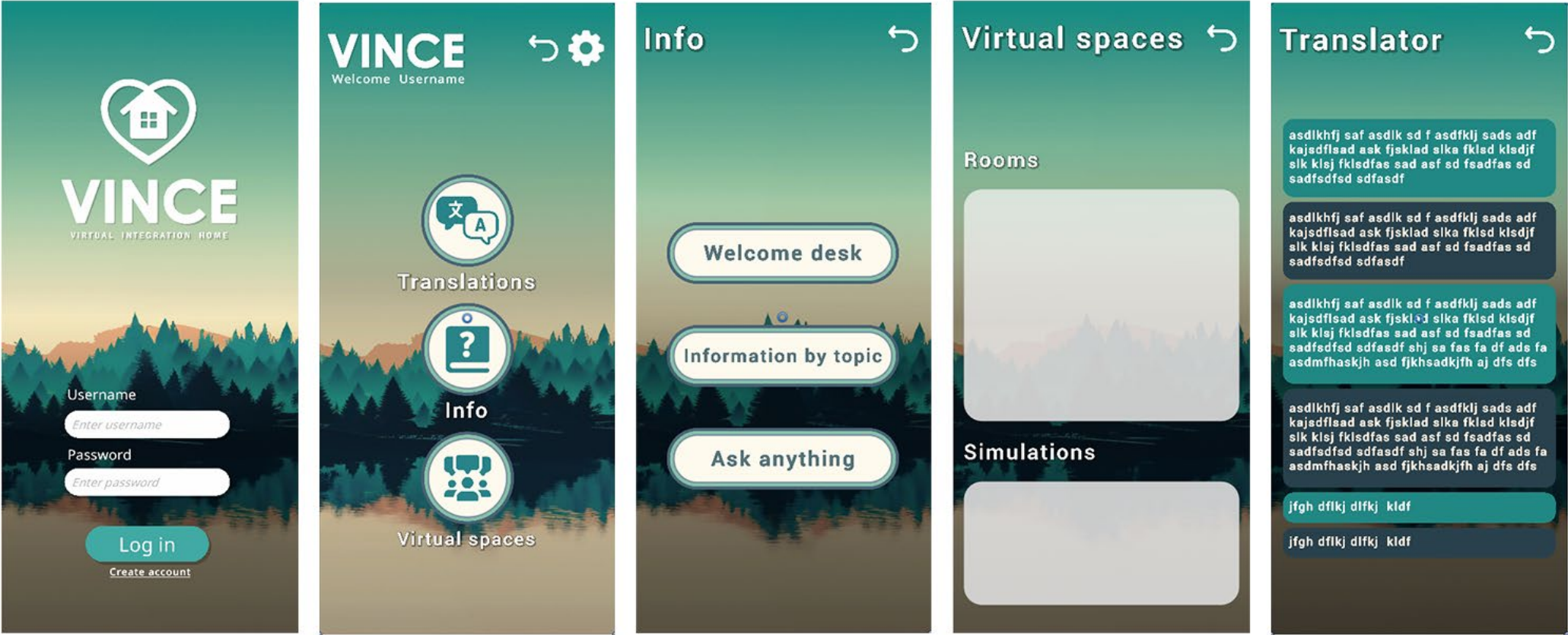


Visual development through the project

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Visual development through the project

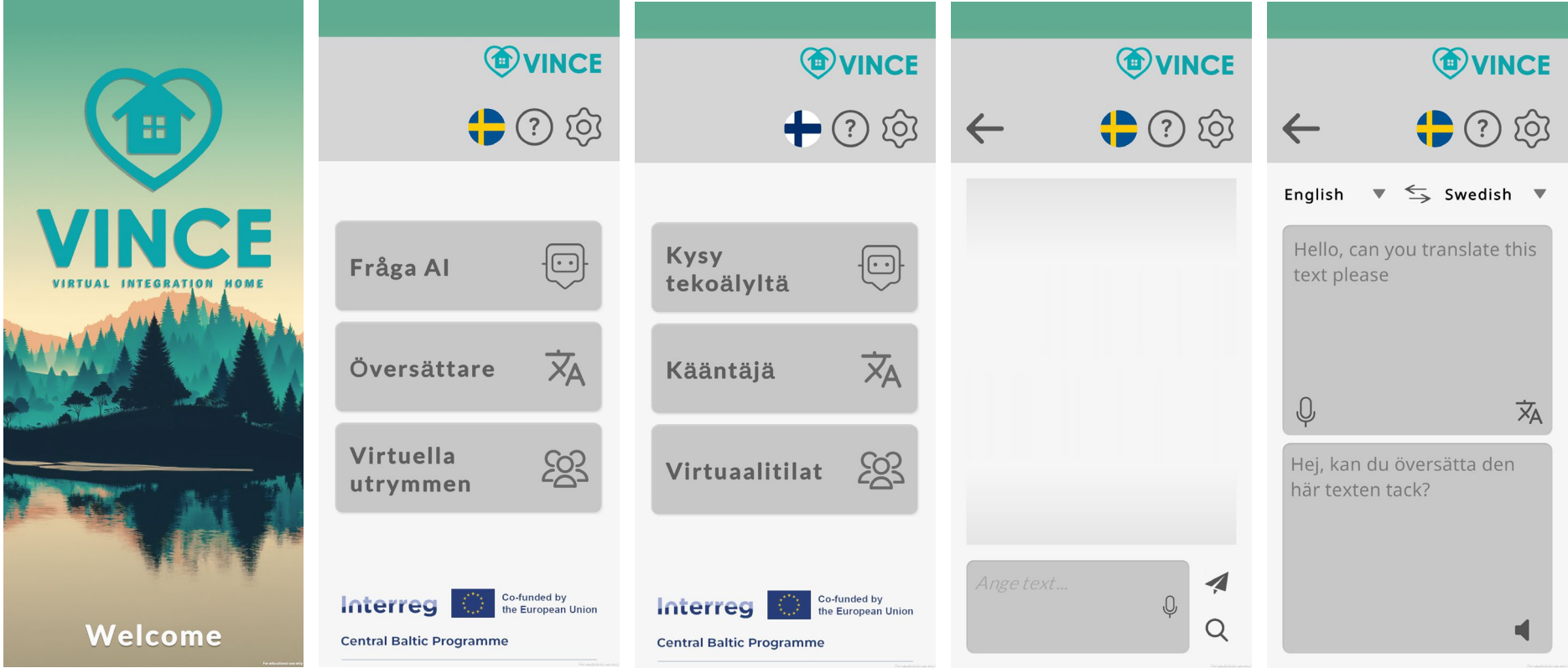
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Visual development through the project

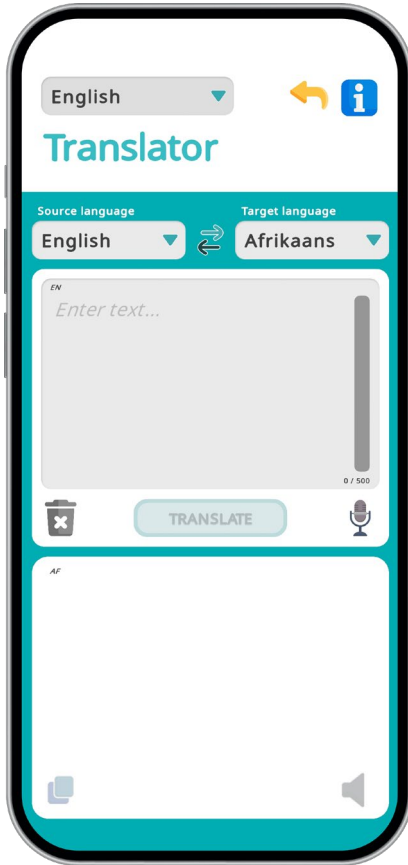
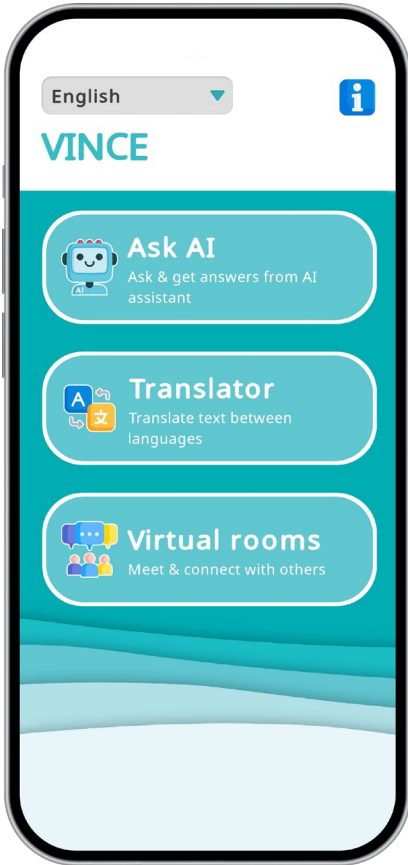
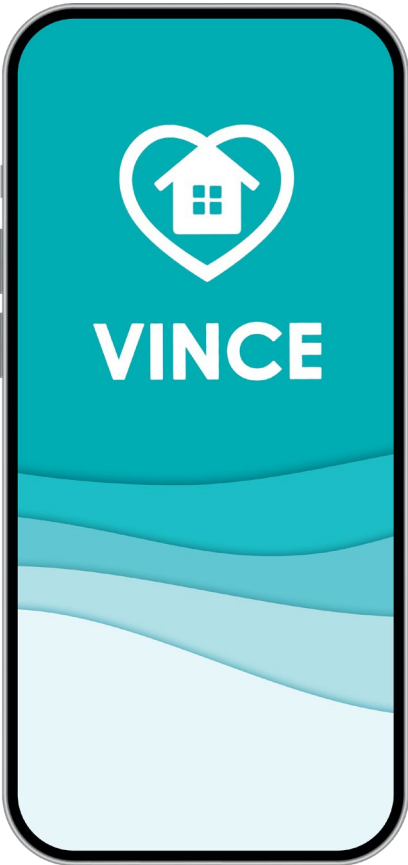


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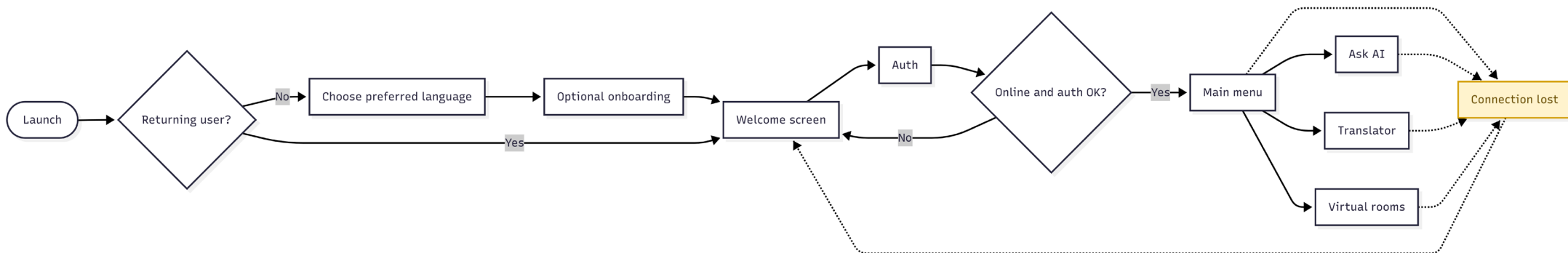


Unique aspects vs. previous projects

- **Starting point:** existing research metaverse platform.
- **Gap identified:** no mobile support.
- **Work done:** mobile architecture, UI/UX, cross-platform support from scratch.
- **Key challenges:** mobile limits, touch controls, optimization, multi-device interaction.
- **Outcome:** reusable mobile foundation for future projects.

Technical architecture

- Mobile client communicates with multiple backends: authorization services, AI services, and a headless server for virtual environments.
- Silent, anonymous authorization at startup validates real connections and protects backend resources.
- Main menu offers Ask AI, Translator, and Virtual rooms.
- PC client provides service providers with admin rights for content upload.
- Architecture avoids caching sensitive data, and stores only minimal preferences locally.



VIRTUAL ROOMS

Concept

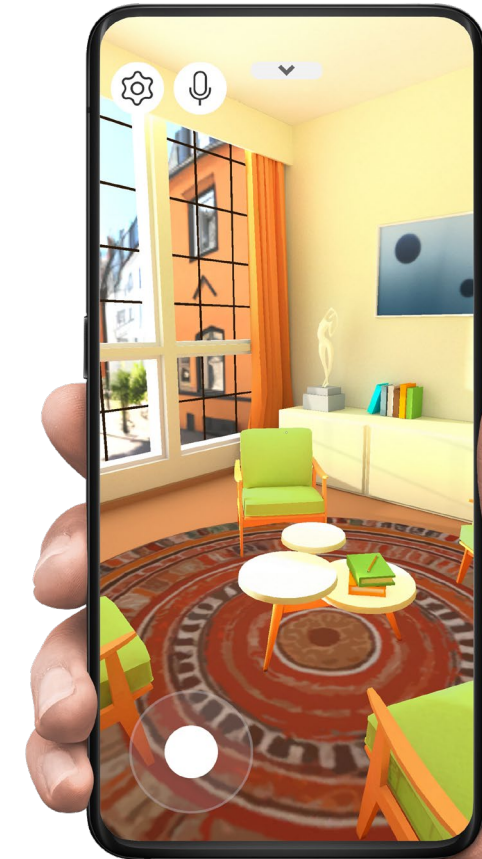
- Utilizes FIT research group's social metaverse platform
- A place for:
 - Info and counselling sessions
 - Classes, language and culture orientation
 - Events, hangouts
 - Meeting and connecting with like-minded people
 - Much more...
- Regardless of physical location
- In a safe, moderated environment



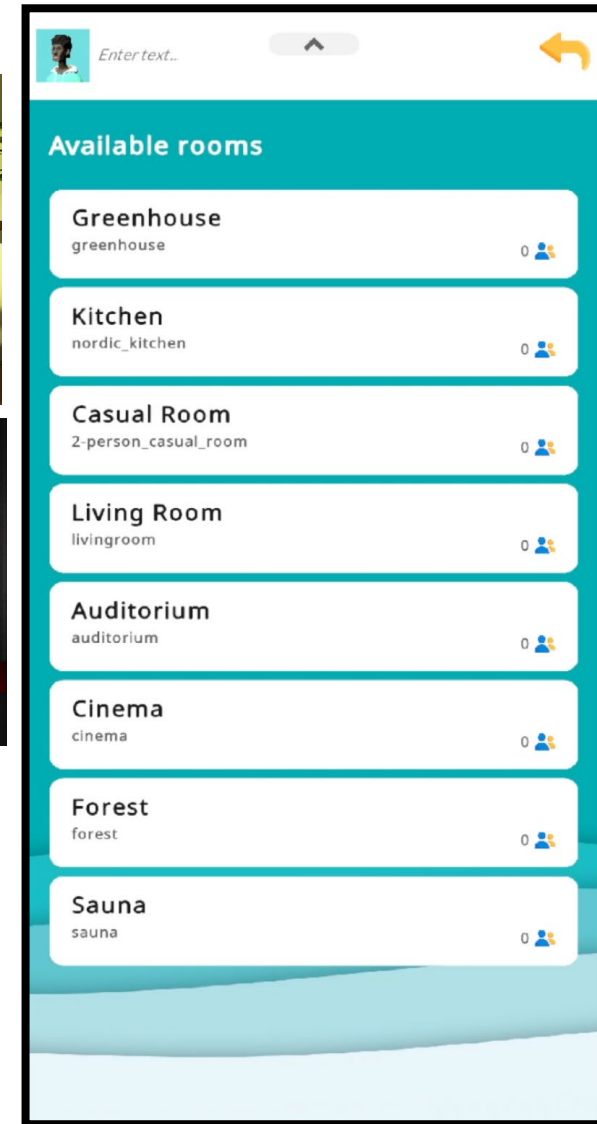
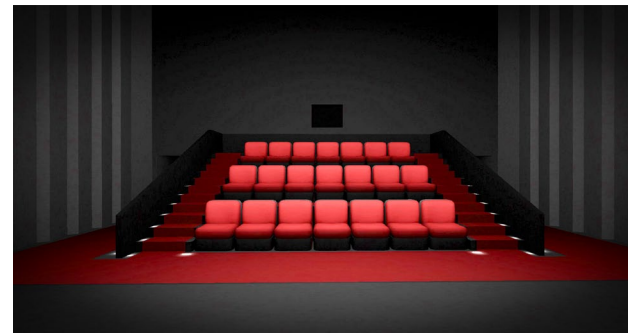
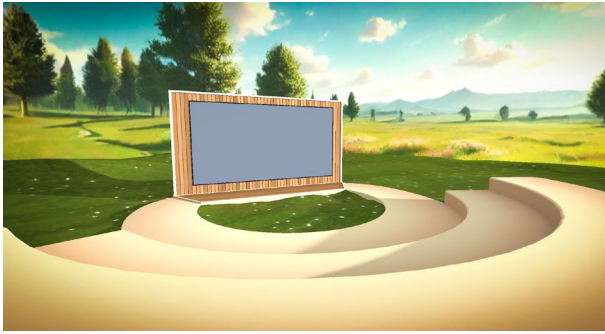
VIRTUAL ROOMS

Features

- Virtual rooms allow users to look around in first- or third-person, move using teleportation or an optional virtual joystick, and interact with grabbable or interactive objects.
- Communication tools include real-time voice chat and text chat.
- Users can upload and display presentations within a room, with zoomable virtual screens.
- VINCE introduces avatar customization, allowing users to personalize their appearance.



VIRTUAL ROOMS



VIRTUAL ROOMS

Design process (1/6)

From idea to implementation



VIRTUAL ROOMS

Design process (2/6)

Phase: Initial design

Testing layout &
Placing main objects

Figuring out
color scheme

Rough shapes &
sharp edges



VIRTUAL ROOMS

Design process (3/6)

Phase: Refining the idea

Modelling 3D assets
in more detail

Adding smaller 3D assets
to support the theme



VIRTUAL ROOMS

Design process (4/6)

Phase: Finalizing

More adjustments,
adding smaller details

Creating & baking the
lighting data

Preparing the room for
export



VIRTUAL ROOMS

Design process (5/6)

Finished room in
3D software



VIRTUAL ROOMS

Design process (6/6)

Finished room
in the VINCE application



VIRTUAL ROOMS

Avatars

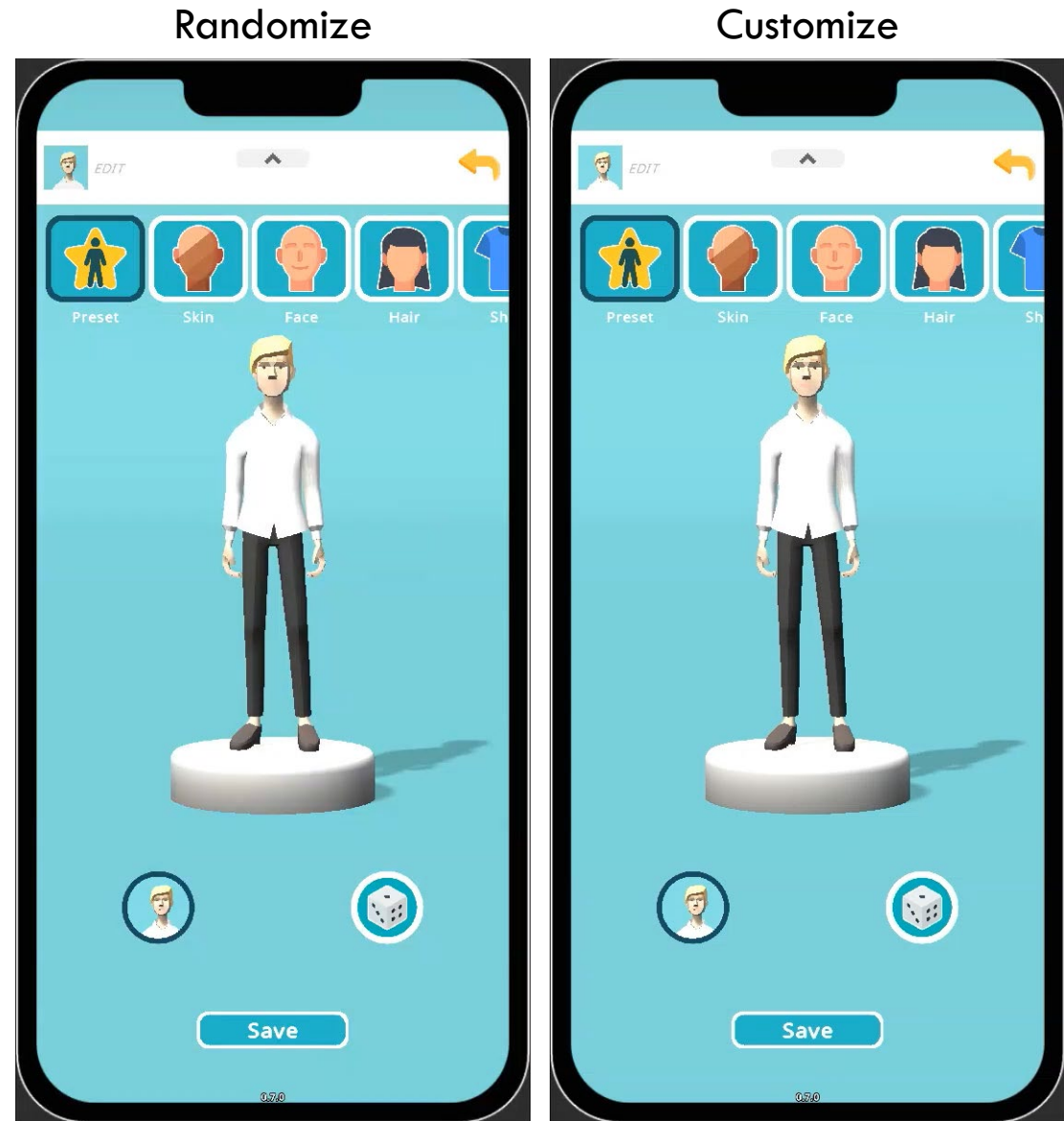
Fully customizable avatars with a strong focus on diversity and cultural inclusivity.

Over 3 000 000 unique combinations possible, extended by full color sliders for virtually unlimited customization.

Avatar editor with two modes:

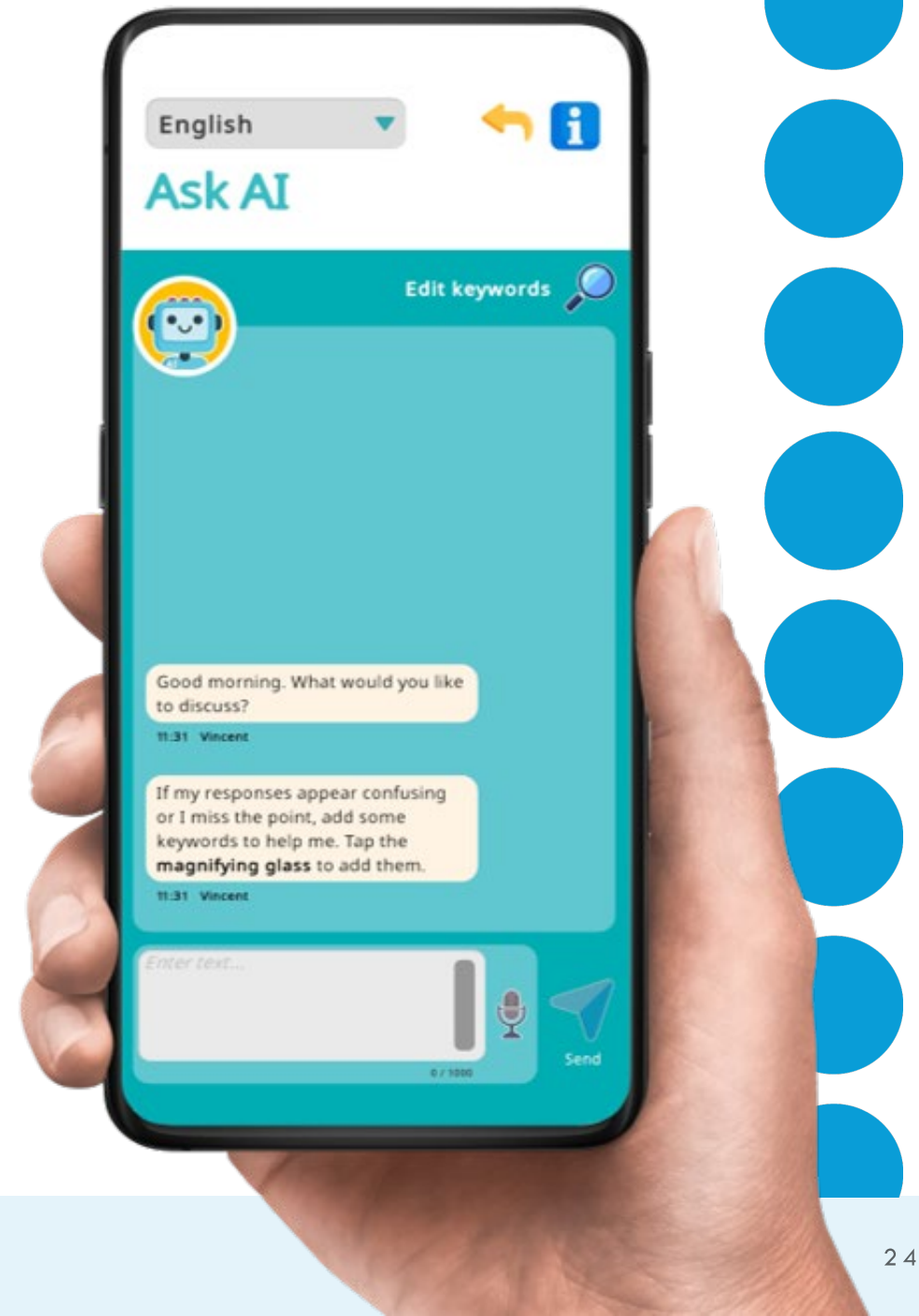
- **Random Mode:** one-click full avatar generation.
- **Custom Mode:** full manual customization of clothing, hair, colors, and accessories, etc.

Developed by **Bowen Zhou** during his internship.



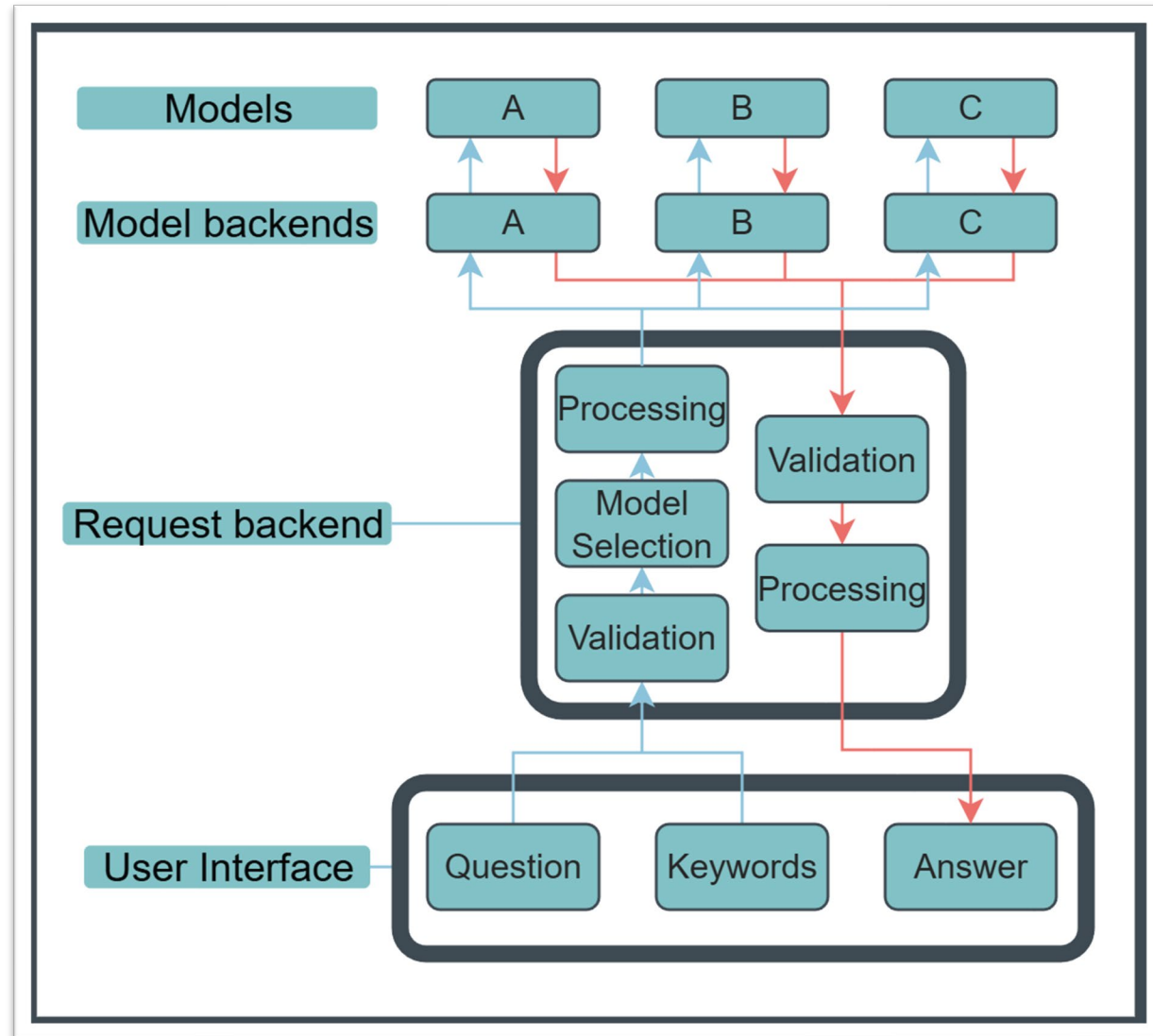
ASK AI Overview

- Users can use natural language combined with keywords to ask questions from an AI specifically trained with curated datasets.
- The response from the AI also contains a list of sources with which to verify the information.
- The aim is to always provide correct and verifiable information with minimal sacrifices to user experience.



ASK AI Pipeline

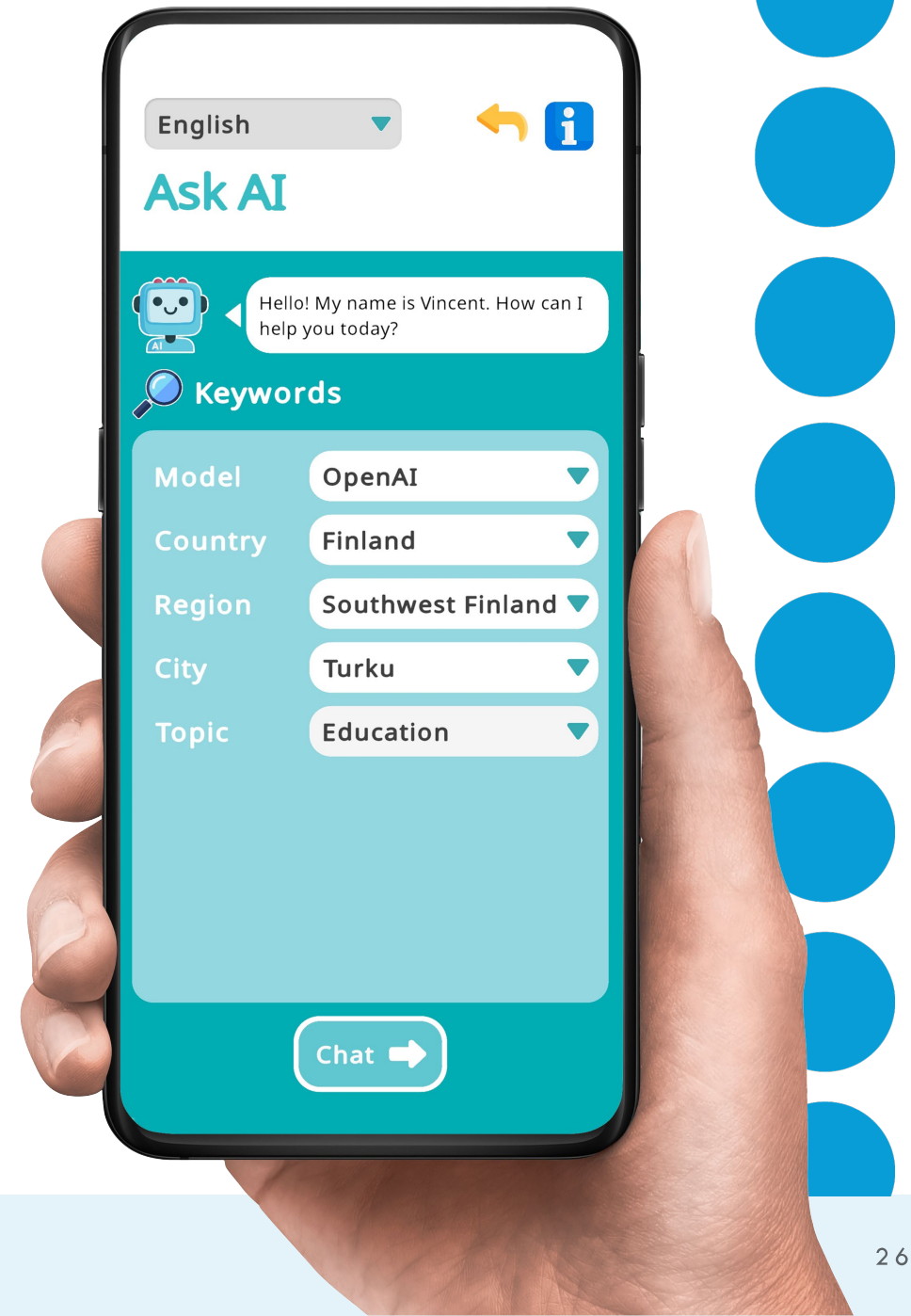
- The application receives valid keywords at runtime and populates the interface.
- The user query and keywords are combined and sent to the request backend.
- The request backend validates and redirects the request to the appropriate model backend.
- The model backend feeds the keywords and query to the model and the generated response travels back through the pipeline to the user.



ASK AI

UX & output

- To prevent overloading the user with information, keywords can be defined to only be selectable under certain conditions.
- Users can input their questions either through text or voice
- AI responses contain superscript references to sources listed at the bottom of each response
- If the AI is unsure about how to answer, it will ask clarifying questions or request the user to specify more keywords

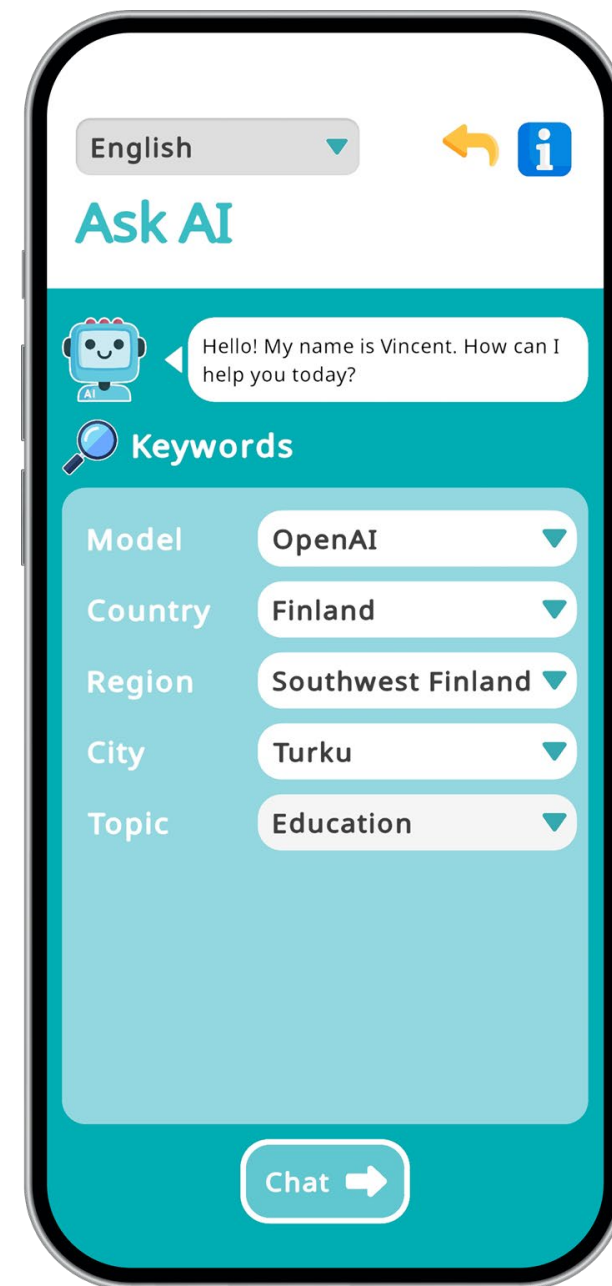
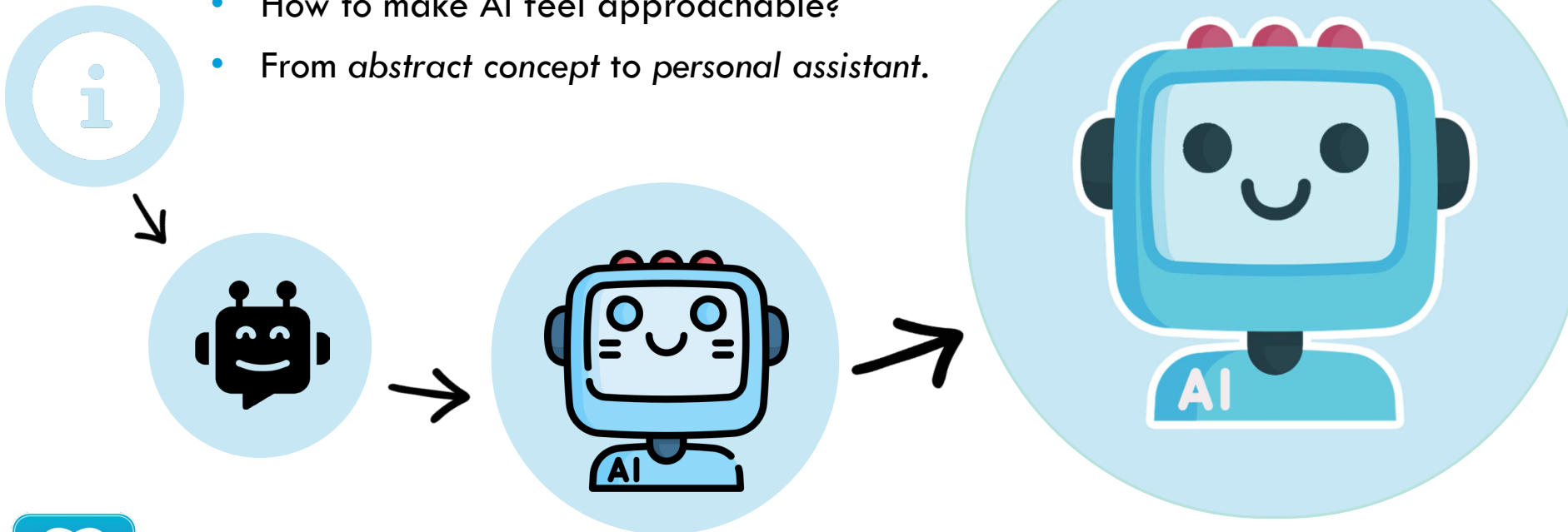


ASK AI

Visual design

Meet Vincent

- How to make AI feel approachable?
- From *abstract concept* to *personal assistant*.



LANGUAGE SERVICES

Overview

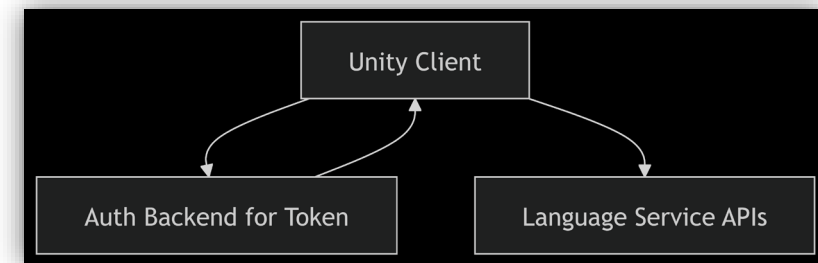
- The app uses speech-to-text, translation, and text-to-speech capabilities, currently powered by OpenAI's language services.
- Users can access these capabilities through the Translator feature, with entry and exit points integrated into the mobile UI.
- Language services support accessibility by enabling spoken input and output, and the app currently provides UI localization in English, Finnish, Swedish, and Ukrainian.



LANGUAGE SERVICES

Pipeline

- A language request follows a simple flow: the app converts speech to text, translates the text when needed, and can read the result aloud using text-to-speech.
- OpenAI's models handle different accents and general speech variability, while the app performs basic preprocessing such as silence trimming and light noise reduction.
- All language features require internet connectivity, but the app's UI localization is stored locally and remains translated even without a network connection.



Security & privacy



- **Threat focus:** key misuse, automated abuse, man-in-the-middle (MITM) attempts.
- **Privacy-first access:** no login, no data retention.
- **Trade off:** anonymity limits abuse tracking and support.

Challenges



- Designing and validating the **AI features**.
- **Developing the mobile framework**; UI/UX, controls, accessibility, performance, and cross-platform behavior.
- Multi-national consortium: coordinating **cross-border testing** and tech-support.
- **Defining key features** set to include.

Lessons learned



- Test earlier with real users. → Better insights, fewer bugs.
- Regular test builds. → Smoother coordination.
- Early scope and vision alignment. → Less rework.
- Multidisciplinary partners. → End-to-end coverage.
- Mobile-ready platform. → Future-proof development.

Next steps



- **Finalize remaining tasks:** complete the Ask AI round-up and prepare the next version of the app.
- **Establish an upkeep and maintenance plan** to ensure stability beyond the project's active development phase.
- Project **dissemination activities**.
- During the project we have gathered a large backlog full of ideas and user feedback, clearly demonstrating its **potential** and providing a **strong foundation** for continued, scalable development.

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Thank you!

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