Assistive Application for Patient to Healthcare Profession Interpretation

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Background

The Problem

Miscommunications in healthcare due to language barriers can lead to negative outcomes and missed diagnoses[1,2,3].

Current Solutions

Method	Shortcoming
In-person Interpreters	High cost, limited capacity, increased time
Current family members	Not certified, not always available
Other translation services/apps (i.e. Stratus)	Difficult to scale, technical issues, not always available, high cost for technology

Needs Statement

Patients and healthcare providers who speak different languages → need to exchange information in brief healthcare interactions → to reduce medical miscommunications and negative health outcomes

Our Solution

An easy to use Android application that can be used by patients and healthcare professionals to translate key phrases for optimal patient care.

The Inspiration
Modeled after adaptive communication devices given to children with speech or language delays.

Design Criteria

Criterion	Requirement
Translation	50+ phrases, 3+ other languages
Simplicity	New clinician: Learn in <5 min. New patient: Learn in <10 min. Trained user: Ready for use in <1 min.
Usability	Not dependent on Wi-fi
Customizability *	Language packs Phrases based on healthcare setting and location
Cost	<$100 per unit
Organization *	Phrase categorization Easily searchable phrases

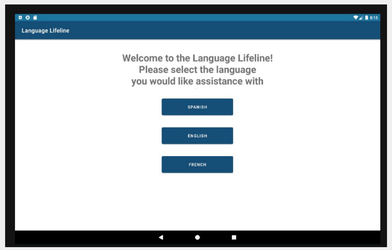
* Out of scope for this semester

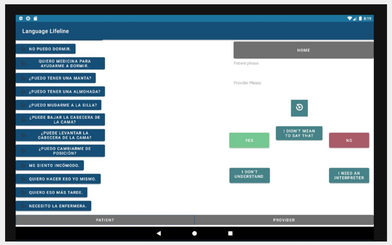
Workflow

Final Prototype

Key Characteristics
- Functional Spanish, French, and English Provider interface
  - 30+ phrases with corresponding audio
- Android compatible (Android Studio)

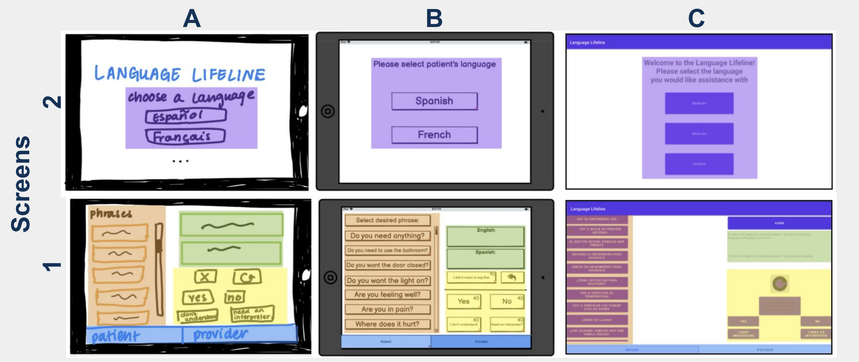
Use Case
1. Select patient language
   - Spanish, French, or English
2. Select phrase to play translated audio
   - Text is in user's language
   - Audio is in listener's language
3. Use toggle at bottom of screen to transition patient/provider role
   - All text on screen switches to new role's corresponding language
4. Respond using quick-use buttons
   - Audio clip can be replayed
5. Read last-used-phrase in top-right to confirm intended communication





User Interface Design

Iterations



Language selection | Scrollable phrase list | Last-used-phrase variable text box | Quick-access conversational phrases | Patient/provider toggle

Screens
1: Initializing home screen
2: Guided interpretation screen with phrases in interchangeable languages

Iterations
A: Hand-drawn UI flow
B: Balsamiq Wireframes interactive mock-up
C: Final prototype in Android Studio

Software Architecture

Scrollable Phrase List
- RecyclerView adapter populates the buttons with phrases based on the scrolling position of the left side of the screen
- Phrases are stored in Array Lists as Strings

Buttons
- Constraint layout ensures the positions of the UI elements don't change based on the size of the screen

Translation Audio
- All audio files are stored in HashMaps that map a string value to the resource file

Engineering Standards

Translation & Interpretation
- ISO 17100:2015
- ASTM F3130
- ASTM F2575
- ASTM F2089

Medical Application Design
- IEEE: Graphic User Interface: Needed Design Characteristics for Successful Physician Use
- FDA Digital Health Guidance
- ASTM E2350

Future Directions

Short-Term Goals		Long-Term Goals	
Search Bar	• Decrease time spent to find correct phrase	Verification	• SUS testing • Test with patients • Contact native speaker
Tutorial	• Create a tutorial video in multiple languages • Increases usability	Customizable	• Certification by hospital interpretation services
Add Other Languages	• Add Mandarin and Kanjobal • Determine audio, translation, icon, etc.	Link application on two devices	• Connect Language Lifeline app across multiple tablets

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References

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