
Gamified Mobile Pronunciation Tutor for Language Learners Design Review



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Mentor: Fabio Santos



Meet SmartTalk



Client Dr. Okim Kang



Team Mentor Fabio Santos

Team Members:

- Joseph Vargovich -> Leader
- Kehan Cao -> Release manager
- Andrew Munoz -> Customer Communication
- Christian Bito-on -> Architect
- Malik Jones -> Editor & Recorder

Importance of a Gamified Language Learning App



e: estimated; p: projected

Source: Secondary Research, Expert Interviews, and MarketsandMarkets Analysis

Dr. Okim Kang



- ❖ Director of the Applied Linguistics Speech Lab, NAU
 - **Three members of her lab:** Kevin H., SungEun C., An Hoang N.
 - Research focuses on Computer-Assisted Pronunciation Training (CAPT)
- ❖ Main goal is to analyze the nature of accent speech of non-native speakers in english

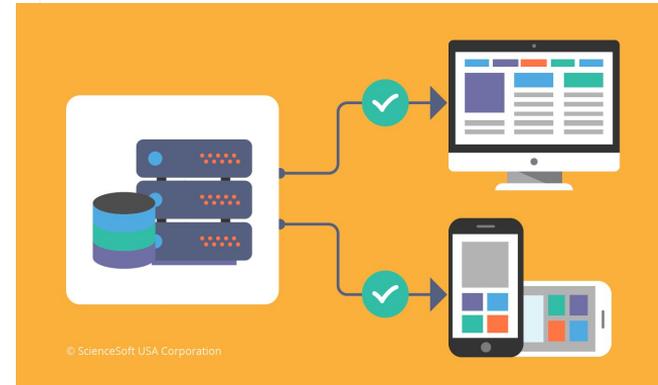
Problem Statement



- ❖ Lack of mobile software for foreign language learners that both focuses on pronunciation and encourages learning through gamification.
- ❖ CAPT Software drawbacks:
 - Can be both costly to the learner and prohibitive for researchers.
 - Does not allow course designers to create relevant tasks for learners.
 - No relevant feedback on key features of pronunciation
 - Does not implement gamification to motivate the practice of pronunciation.
 - Most modern ASR technology is difficult for linguistics researchers to use

Solution Overview

- ❖ Solution: Develop a gamified mobile app with Web integration designed to be fully customizable.
- ❖ Gamified Mobile App
 - Fun and Engaging
 - Educational and memorable
 - User accounts to keep track of progress and Achievements
- ❖ Web Application
 - Simple UI
 - Allows for customization of lesson plans
 - Can Communicate lessons and lesson plans out to users and provide feedback on work



Tech Integration of Proposed Solution

SmartTalk System Diagram

Malik Jones | October 4, 2020

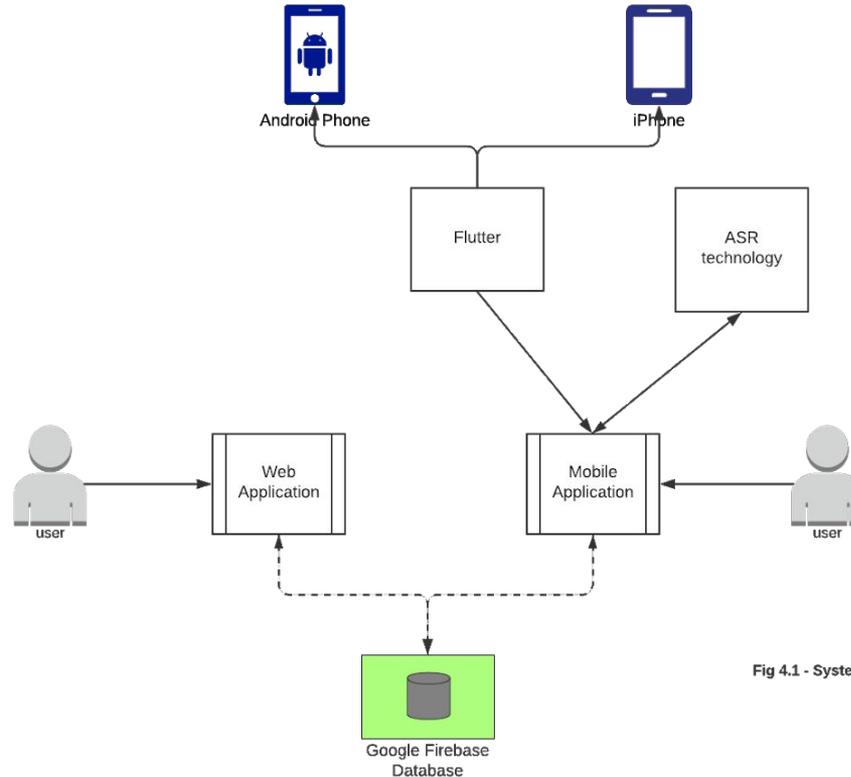


Fig 4.1 - System Diagram

Requirements gathering process

- ❖ Gathered requirements through client meetings
 - Reviewed and drafted requirements with client's team in detail.
- ❖ Studied linguistics terms and provided resources
 - Phonemes
 - Segmentals
 - Suprasegmentals
 - ASR technologies
- ❖ Compared to other language learning apps that incorporate gamification
 - Duolingo
 - Rosetta Stone
 - What do they do wrong? Or right?



Key High-Level Requirements

- ❖ **Gamification**
 - Badges and rewards selected by course designers.
- ❖ **Learning Tasks**
 - Editable through website, two categories.
- ❖ **Course Structure**
 - Courses -> Modules -> Lessons -> Tasks.
- ❖ **Website Dashboard**
 - Course Design and administration, feedback and data review.
- ❖ **Mobile App**
 - Course and exercise completion, view designer feedback.
- ❖ **ASR and Manual Review + Feedback**
 - Ties into the task type

Requirements



Functional Requirement: Types of learning tasks

❖ Perception (listening) tasks

- Users listen to audio recordings and select a response
- Spoken response, open answer, multiple choice
- Sentence analysis and highlighting of key words.



❖ Production (speaking) tasks

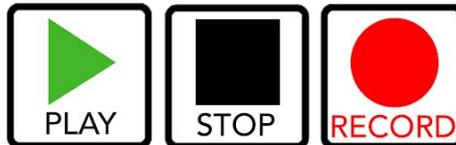
- Constrained Speech - ASR Focused Task for short verses and phrases
- Unconstrained Speech - Longer speech sample with manual review from dashboard
- Percentage to determine a passing score, ability to override ASR reading manually through dashboard





Workflow for a Constrained Production Task

1. Learner opens the production task in their selected lesson
2. Learner reads the question text and image provided by the lesson Designer
3. Learner records themselves speaking the word or sentence presented in the question.
4. Learner can re-record the audio response if desired.
5. Learner can then move on to the next exercise, which prompts the audio response to be sent for ASR analysis and feedback.



Non-functional Requirements



- ❖ Usability and Interface Design
 - Survey of users, percentage and timing of key tasks
 - Example Goal: 80% of users were able to log in and access their course of choice in 2 minutes.
- ❖ Speed of ASR and associated feedback
 - It took 2 minutes for the user to see their calculated score sent back from the ASR program
- ❖ Battery Life
 - How strenuous is the ASR analysis on the phone battery and CPU?

Summary of Requirements



- ❖ App should provide quick ASR feedback on production (speaking) tasks, and instant feedback on recognition tasks that do not require ASR
- ❖ App should incorporate gamification in the form of badges and rewards for good progress.
- ❖ App should be useful to learners, helping them to track what they need to practice and what they are already good at.
- ❖ App should integrate well into a classroom setting as an easy-to-use application that allows for data analysis and feedback on students' work.



Risks

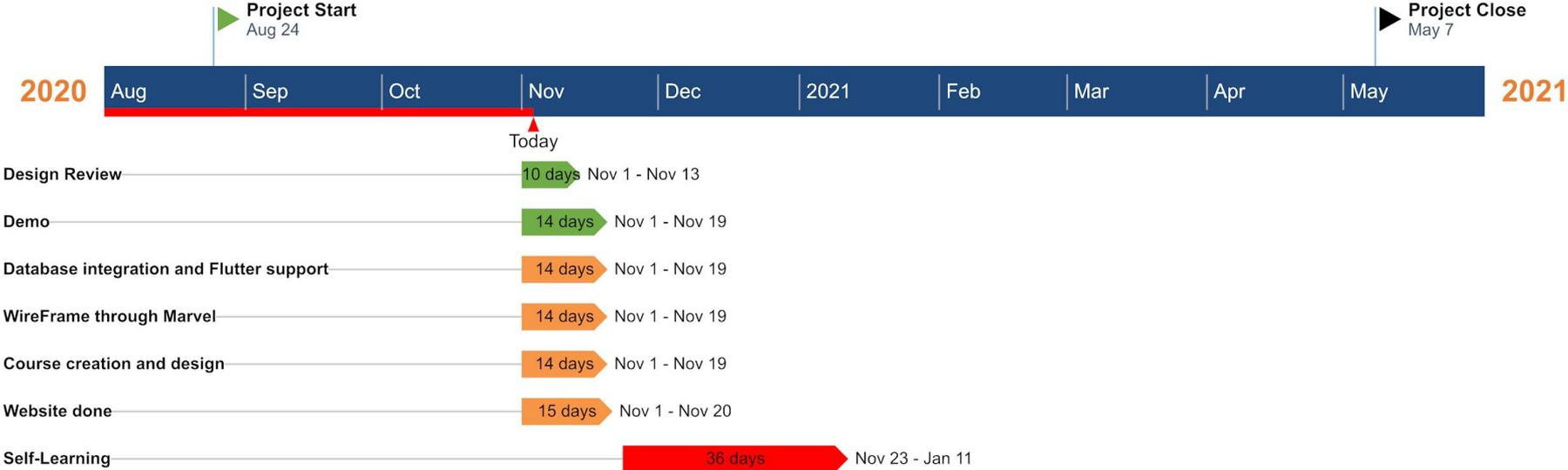
- ❖ Data Loss through database failure
 - Impacts both users and researchers
 - Researchers lose data from users
 - Course information gets lost
 - Solution
 - Offload risks to third party provider
 - Save information on devices as backup
- ❖ Correctness/Ethics
 - Impacts users mainly
 - “What is considered native?”
 - Solution
 - Add disclaimers
 - Give course designers power to correctly address different dialects



Feasibility

- Mobile Framework
 - Feasible: a number of cross-platform options including Flutter and Ionic
- Web Framework
 - Feasible: a number of options with accompanying mobile platforms including Flutter
- Multiplatform Database
 - Feasible: there are providers that offer database services between their platforms
- ASR Technology
 - Feasible: either a server-based or on-device implementation
- Gamification
 - Feasible: multiple ways to implement through levels and achievements

Smart Talk Schedule



Conclusion



- ❖ **Problem:** Language learner apps lack gamification elements and do not make users focus on pronunciation
- ❖ **Solution:** Mobile Application with
 - ASR feedback
 - Gamification elements
- ❖ We want to create a better, more entertaining learning experience for our users through gamification.
- ❖ Additionally, this application will serve as a convenient yet valuable tool for linguistics research.