

University of Idaho

Speech Therapy Application **Engineering Release** Review

Team Dialectric

Lucas Jackson (CS) Ian Wood (CE) **Yiqing Ma (CS)**

Sponsored by: Micron Foundation



Value Proposition

- About 8% of children need speech therapy globally and while there are many speech therapy apps intended to help these children, most only supplement typical sessions, require a therapist to use, or are of little use for research.
- This project aims to create a one-stop-shop application for speech therapy that is useful to children, therapists, researchers, and caregivers alike.







Product Requirements

User Interface

- A complete interface to navigate through the application
- Intuitive enough for young children
- Grants therapists, caregivers, and researchers
 viewability of patient records and allows
 filtering of data fields

Security

- Ensure only users wi access patient data
- Authenticate users before every database access request



Audio Parsing

- Patients must be able to record audio and store
 it with their associated account
- Audio recognition software must **parse the audio into text** and filter out any background noise

• Ensure only users with proper credentials can





Testing Requirements

- Ensure Speech-To-Text granularity is on the level of phonemes • Ensure records can only be viewed by the associated caregivers,
- researchers, or therapists
- Minimize amount of data loss as a result of compression when uploading recordings.
- Ensure the front end connects to a backend consistently Ensure the front end can call all functions from the backend Ensure session tokens are bound to the correct accounts at the
- correct times





Programming Framework: Angular

- All-in-one
- Platform agnostic
- Scalability
- Longevity
- **Source-code Editor**
- Vs code
- Intellij









Interface Context Diagram







Component Communications







Full System Diagram







First Pass Complete:

- Login Screen
- Register Screen
- Records Viewing Screen

In progress: Upload Audio Screen







Children Speech Therapy

Login Register Help

Login		
Username		
Password		
Login		

Children Speech Therapy

Login

CareGiver Register

Create











Children S

Login

haracter		
CareGiver		
sername		
assword		
rthday:mm/dd/yyyyy	Submit	
ex		
Female		
ace		
ationality		
peech Ability		
iagnosis		
nerapist First Name		

Speech	Therapy			
Register	Help			
			•	

Patient Records

Filte	r
ID:	patient1
ID:	patient2
ID:	patient3
ID:	patient4
ID:	patient5
ID:	patient6
ID:	patient7
ID:	patient8
ID:	patient9
ID:	patient10
ID:	patient11





Filte	er
ID:	patient1
ID:	patient2
ID:	patient3
ID:	patient4
ID:	patient5
ID:	patient6
ID:	patient7
ID:	patient8
ID:	patient9
ID:	patient10
ID:	patient11

Patient Records

patient5 Details:

id: patient5 birthday: 06/22/2010 sex: m race: caucasian nationality: United States speech ability: low diagnosis: apraxia therapist: therapist4 caregiver: caregiver4

Select recording

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Download Patient Data

Audio Parsing





Upload audio file



<u>Security</u>





<u>Remaining Schedule</u>

Dialectric Schedule

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Project Section	Task	Start Date	End Date	1	4	6	8	11	13	15 1	18 2	0 2	2 2	25 2	7 29	1	1	3 5	8	3 10	12	2 15	5 17	19	22	24	26 2	9	1	3	6
	Draft budget	9/12/2019	9/19/2019								T	1	T				T			Γ	1		T	T				T		1	
	Product Rquirement Document	9/12/2019	9/26/2019								+	+	T	1	1	t	t	\top	1	1	t	1	T	1			-	Ť	1	T	
	Project Schedule	9/17/2019	10/8/2019						1		+	t	t	+	+	t	t	+	F	t	t	t	t	t			+	t	+	T	
	Logbook & Portfolio 1	9/5/2019	10/16/2019						1		+	t	t	+	-	t	t	-	t	t	t	t	t	1			-	t	+	T	
	Shapshot Day 1	9/24/2019	10/15/2019							-	+	t	t	+	+	t	t	+	t	t	t	t	t	t			+	t	+	T	
	Design Validation Plan	10/10/2019	10/24/2019						1	-	+	t	t	+	+	t	t	+	t	t	t	t	t	t			+	t	+	+	
	Project Value Proposition	10/22/2019	10/31/2019							-	+	t	t	+	T	t	t	t	t	t	t	t	t	t			+	t	+	+	
	WikiPage 1	10/22/2019	11/7/2019						1	+	+	+	t	+	+	t	t	$^{+}$	t	t	t	t	t	t			+	t	+	+	
	Logbook & Portfolio 2	10/10/2019	11/22/2019	1						+	+	+	t	+	+	t	t	+	t	+	t	+	+	t			+	t	+	+	
	Concept Design Review	10/22/2019	11/22/2019	t						+	+	+	t	+	+	t	t	t	t	t	t	t	t	t			+	t	+	+	1
Project	Team Member Citizenship 1	11/7/2019	11/22/2019						1	-	+	+	t	t	+	t	t	+	t	t	t	t	t	t			+	t	+	T	
Documentation	Shapshot Day 2	11/5/2019	12/3/2019								+	+	t	+	-	t	t	-	t	t	t	1	1	t			-	t	+	T	
	Portfolio & Logbook 3 WikiPage 2	11/14/2019	12/13/2019																									1		1	
	Engineering Release Review	2/18/2020	2/21/2020					-	-	-	+	+	+	+	+	-	-	+	⊢	-	+	-	-	-		-	_	+	+	+	-
	Logbook 3	1/16/2020	2/21/2020					-	-	-	+	+	+	+	+	+	+	+	⊢	+	+	-	+	-		_	_	+	+	+	-
	Snanshot Day 3	2/18/2020	3/10/2020			_	-	-	-	+	+	+	+	+	+	+	+	+	-	+	+	+	-	-		-	-	+	+	+	-
	Team Member Citizenshin 2	2/13/2020	3/10/2020					-	-	-	-	+	+	-	-	+	-	-	÷	-	+	-		-				+	+	+	-
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	Loobook 4	1/26/2020	4/17/2020							-	+															_	+	+	+	+	_
	Design Expo	3/22/2020	5/1/2020	-						-	+		+	+	+		╞	+	╞	+	╞	+	╞					╧		+	-
	Deliverables submitted	5/1/2020	5/8/2020	-		_	_	-	-	-	+			-					Ļ	-	-		-					4			
	Design and Dispains Dises	3/1/2020	10/01/2020	<u> </u>		_	_	_	_	_	_	-	-	-	-	-	-	-	Ļ	-	-		-			_	_	_		Щ	4
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	Implementation	1/16/2020	2/25/2020																												
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User Interface	Basic Records Screen Implementation	1/25/2020	2/25/2020																									1			
	Implementation	1/25/2020	2/25/2020																												
	Interface Decoration Phase	2/26/2020	4/24/2020																												
	Java Wrapper Integration	2/26/2020	3/14/2020																									Τ		Τ	
Backend	Google Cloud Integration	2/26/2020	3/14/2020								t	t	t	t	t		t	t	T	t	t	t	t	t			T	t	1	T	
1	Records Filtering	3/22/2020	4/5/2020										Í				Ì		Γ									Ť		T	
	Audio File Uploading	3/22/2020	4/1/2020													Г	Г	Т		T	T	T	T	T			1	Ť	1	T	Π
Data	Speech-to-Text Parsing	4/5/2020	4/11/2020							-			Т	Т		h	1			T				1				t		1	
	Downloading Records	4/12/2020	4/24/2020							-	-	1	t	Ť		Г	Г	Т		П	h						-	t	+	Ť	
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Security	JWT Implementation	3/22/2020	4/24/2020										14																		
	Thinksgiving Holiday	11/25/2019	11/28/2019																									Γ			
School	Winter Break	12/21/2019	1/15/2019																									T		T	
Schedule	Spring Beak	3/16/2019	3/20/2019																									T			
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- Next couple of weeks:
 - Integrate the backend into the frontend and finalize communication to Google Cloud
 - Finish up first pass of frontend screens
- After Spring break:
 - Add upload and download of recordings
 - Parse uploaded recordings with Speech-to-Text
 - Add in a JWT authentication system in the backend



<u>Risk Management</u>

• Areas of risk:

• Failure to implement a feature in time

- Features will be created in order of highest priority to lowest with prior completion on higher priorities
- Features will be dropped from lowe priorities to ensure higher priorities success
- This is an ongoing project so any feat that need to be cut to deliver the proon time can always be eventually add by the next team



	<u>Priority</u>	<u>Feature</u>	<u>Specific</u>
9		Recording audio as a speaker dependent model	-Must allow the ability to the user for various time
		Storing audio with the associated profile	-Must ensure data is link recorder's user database
ity of		Basic interface functionality	-Must be minimally funct
ILY OI	High Priority	Patient data access	-Researchers, caregivers must be able to access th patient records
r		Searching and filtering of patient data	-Patient data must be ab by various filters such as genders, etc.
5'		Security overhaul and authentication implementation	-Security must be expand comply with modern stan
		HIPAA* and COPPA* compliance	-The program must comp medical and child privac
tures		Complete interface functionality	-Must be fully functional for all user types
duct	Medium	Dynamic interface dependent on user type	-Information displayed m for children
uuct	Priority	Feedback for patient recordings	-Recordings should provi accuracy feedback for th
lea		Recording audio as a speaker independent model	-Audio should be divided different voices detected recording
	Low Priority	Mobile porting	-The application should a ported to mobile devices





<u>Risk Management</u>

• Areas of Risk:

- Failure to comply with laws such as COPPA or HIPAA
 - and children data
 - App cannot be marketed if in violation of these laws, but will still function correctly
- Authentication mistakes

 - JWT will expire tokens periodically to help alleviate mistakes



These privacy laws require "reasonable" levels of security for medical

Authentication system will be extensively tested to make sure no unauthenticated users can view records they don't have access to



Manufacturing Plan

Cost
~\$100 monthly
Included with Clo
Included with Clo
Free
Free
Free
Free



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Google Cloud cost depends on amount of time services are used

• Average use has been from \$70 - \$100 a month









Budget







University of Idaho

Thank You!

Any Questions?