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Requirements: Student Disability Copilot Project

Names:

Adam Forte

Ameena Mohammed

James Ocampo

Myat Phone Thant Kyaw

USF Computer Science and Engineering Students
Department of Computer Science and Engineering
University of South Florida
Tampa, FL 33620

Emails:

adamforte@usf.edu

ameenam@usf.edu

jamesocampo@usf.edu

myatphonetha@usf.edu

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- **Version 1.01** (2/8/2024) – Revised Requirements & Needs and Factors sections accordingly
- **Version 1.02** (2/15/2024) - Revised Requirements and improved organization
- **Version 1.03** (2/23/2024) - Rewrote requirement to make them more measurable
- **Version 1.04** (2/25/2024) - Rewrote all requirements and factors
- **Version 1.05** (2/29/2024) - Revised requirements with Professor Christensen

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1. Introduction

Creating an inclusive environment for students is a paramount objective across all colleges. However, students with disabilities face distinct challenges when navigating campus facilities.

Thus, the problem addressed by these requirements is “What tools and features should be integrated into a student disability copilot that helps students of various disabilities navigate the facilities on the USF Campus?”

2. Glossary

Copilot: A virtual assistant capable of understanding questions from the user to generate appropriate cues and suggestions. Not strictly text-based interaction. May include alternative features.

Disability: Any condition permanent or temporary which impairs or hinders the activities of an individual, especially that of navigation between locations.

Mobility Disabled User: Any disability which impairs one's ability to move between locations. Examples include but are not limited to users who are wheelchair-bound, on crutches, or on recovery knee scooters.

Facilities: This encompasses physical facilities such as elevators, ramps, disabled parking, automatic doors, first aid kits, blue light emergency phone stations, as well as non-tangible services such as access to health services and awareness of on-campus accommodations.

USF Campus: Since providing full details on all areas of the campus premises may be too ambitious, our project will pay special attention to the quality of navigation in the areas encompassing the Engineering Buildings, the MSC (Marshall Student Center), and the library.

3. Assumptions

The four assumptions for this project are:

- 1) The user is an individual active on the USF Tampa Campus
- 2) The user has access to the internet via a smartphone or other mobile device (tablet, laptop, etc.)
- 3) The user can operate their device of choice either conventionally or through speech commands.
- 4) The user has some difficulty navigating the USF Tampa Campus and accessing services.

4. Requirements

Mobility Disability Requirements

M1. AS A mobility disabled user I WANT to know where ramps, automatic doors, elevators are located SO THAT I can get from point A to point B.

- a) All ramps, etc. within 1 mile are known to me
- b) The status of ramps, etc. are known to me

M2 AS A mobility disabled user I WANT to be able to know of real time outages and be able to report such outages SO THAT I can get from point A to point B and help others to do the same.

- a) Report outage within 4 clicks
- b) Verify outage within app

Vision Disability Requirements

V1 AS A blind user I WANT to be able to know what is written on postings in bulletin boards SO THAT I can know what is posted.

- a) Voice control of the text to speech capability
- b) Accuracy of text to speech is 90%
- c) Text to speech occurs within 5 seconds of asking for it

V2 AS A blind user I WANT to know what any objects or obstructions are in my vicinity SO THAT I can be aware of my surroundings equally to a sighted user.

- a) Voice control of object to speech capability
- b) Warns user if object detection exhibits less than 50% confidence

V3. AS A blind user, I WANT to know if there is oncoming traffic while trying to cross roadways. Voice control of objects to speech capability

Copilot audibly warns user when there is oncoming traffic and says when it is safe to cross

Auditory Disability Requirements

D1 AS A deaf user I WANT to know that was said in a lecture SO THAT I can learn the material equally to a person that can hear.

- a) Can transcribe a 1-hour recording
- b) Transcription is completed within 5 minutes
- c) Accuracy of audio transcription is greater than 90%.

D2 AS a deaf user I WANT to know what is being said in realtime in a conversation SO THAT I can possibly participate in the conversation.

- a) Can transcribe in real time
- b) Accuracy of live transcription is greater than 90%

Chatbot Requirements

X1 AS A mobility or deaf user I want to know what resources are available on campus to help me with activities of daily living SO THAT I can be a successful student.

- a) Within 30 seconds I should be able to know what offices on campus support my needs
- b) Within 60 seconds I should be able to know what accommodations USF can provide for me

5. Needs and factors

5.1 Public health needs

Public health needs primarily revolve around ensuring accessibility to medical resources and services for students with disabilities. To address the health concerns of disabled students

effectively, the chatbot requirement (X1) must provide accurate responses within a minute. The responses will be validated by citations, ensuring reliable and efficient access to on-campus services.

5.2 Public safety needs

Ensuring campus safety and security is very critical and aligns with the purpose of the disability copilot. The UI features will incorporate accessible icons, clear alphanumeric labels, and a high-contrast color option, allowing intuitive navigation within 30 seconds for users with disabilities. Additionally, accessibility markers such as floor layouts and elevator locations contribute to safe navigation, as shown in mobility requirement (M1).

5.3 Public welfare needs

Public welfare needs emphasize inclusivity and accessibility. The copilot must provide free, online access to disability accommodations and services, as mentioned in the requirement X1, fostering an inclusive academic environment while removing barriers for disabled students.

5.4 Global factors

Global factors are not applicable to this project.

5.5 Cultural factors

The primary cultural factor in this project revolves around the language in which the copilot operates. Given that English is the primary language of operation within the USF community, the copilot must accommodate users primarily using English. This linguistic accommodation is addressed by vision requirement (V2), which mandates that all text and buttons within the copilot be readable aloud with appropriate alt-text.

5.6 Social factors

Social factors highlight the importance of access to education, recreation, and health services. The copilot's features, such as navigation guidance to classes and health resources, cater to these needs, promoting equitable access for all students, as highlighted in the mobility requirement (M1) and auditory requirement (A1).

5.7 Environmental factors

Environmental sustainability is a consideration. By offering the copilot online and reducing the need for paper maps and flyers, the project addresses environmental concerns, aligning with the assumption 2 to minimize waste and promote eco-friendly practices. Also, the implementation of requirements M1-M2 will ultimately reduce the use of paper maps and flyers.

5.8 Economic factors

Economic factors are addressed through accessibility and budget considerations. The Copilot must be free to use while adhering to budgetary restrictions regarding technology use. The use of Microsoft Technologies is needed for the implementation of requirements X1, U1, M1-M2, V1-V3, and A1.

References (APA)

List all references here.

- [1] USF. (n.d.). STUDENT HEALTH & WELLNESS CENTER A DEPARTMENT OF STUDENT SUCCESS. <https://www.usf.edu/student-affairs/student-health-services/>
- [2] Blake, R. (2019, July 1). *Downloadable disability access symbols*. The Graphic Artist Guild. <https://graphicartistsguild.org/downloadable-disability-access-symbols/>

Specification: AssistaBull Disability Copilot

Adam Forte, Ameena Mohammed, James Ocampo, Myat Phone Thant Kyaw
USF Department of Computer Science and Engineering Students
Department of Computer Science and Engineering
University of South Florida
Tampa, FL 33620

Email: adamforte@usf.edu
ameenam@usf.edu
jamesocampo@usf.edu
myatphonetha@usf.edu

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1. Introduction

The USF Tampa campus is a large and diverse community that offers a great deal of resources and support for its students; however, students with disabilities face many challenges accessing these resources due to the nature of their impairments. The AssistaBull Disability Copilot aims to improve the navigability of the USF Tampa campus for such disabled students and ease their student experience. More specifically, the copilot will support features for students with mobility, vision, and auditory impairments.

Needs of Mobility Disabled Students

A mobility disability constitutes any disability which impairs or hinders an individual's ability to move between or through locations. Common examples include wheelchair-bound individuals, those on crutches, and those on knee scooters. Mobility disabled students have reported their difficulty understanding where accessible relevant locations are including elevators, automatic doors, wheelchair accessible bathrooms, entrance ramps, and handicap parking spaces. To address these concerns, the copilot will display locations and statuses of these locations.

Needs of Vision Impaired Students

Vision impaired students (including those who are partially and completely blind) cannot read text on a screen or feasibly interact with a graphical user interface; thus, an optional auditory interface is required. After hearing a specific keyword from the user, the copilot will enter auditory mode and be able to speak to and be spoken to by the user. Auditory commands will invoke the user's desired features.

Due to the nature of their disability, vision impaired students cannot take advantage of graphics presented in class and may fall behind their peers for lack of context. To address this issue, the copilot will support AI image summary and text extraction. This feature is targeted at partially vision impaired students, since they will still need to know what general direction to point the camera.

Completely blind students have reported difficulty crossing the many intersections on campus. Crossing the street presents an obvious danger to those who cannot see whether cars are coming. To address this issue, the copilot will have a feature to detect moving traffic at intersections.

Needs of Auditory Impaired Students

Auditory impaired individuals cannot hear lectures. The copilot will address this issue by allowing users to submit prerecorded audio which the copilot will then transcribe into text.

2. Glossary

Disabilities

- Mobility – any disability which hinders the individual's ability to move between or through locations. Common examples include wheelchair-bound individuals, those on crutches, and those on knee scooters.
- Vision – Any disability which partially or fully obscures the individual's field of view.
- Auditory – Any disability which impairs the individual's ability to hear or perceive sound/speech.

Other

- Point of Interest (POI) - Refers to a location represented on a visual map interface by a marker or waypoint

3. Constraints

- a) **Budget** – This project is limited to a budget of \$150 worth of credit for the Azure services we use.
- b) **Time** – This project has a deadline for submission of April 26th, 2024.

4. Applicable standards

- GPS SPS
 - Implementing SPS standards in the app ensures accurate, interoperable, and reliable location services and maintaining consistency.
- WCAG 2.2
 - Adhering to accessibility standards, enabling keyboard navigation, ensuring screen reader compatibility, using high-contrast, allowing adjustable text size, providing clear navigation, conducting usability testing, supporting speech recognition and allowing input flexibility.

5. Design

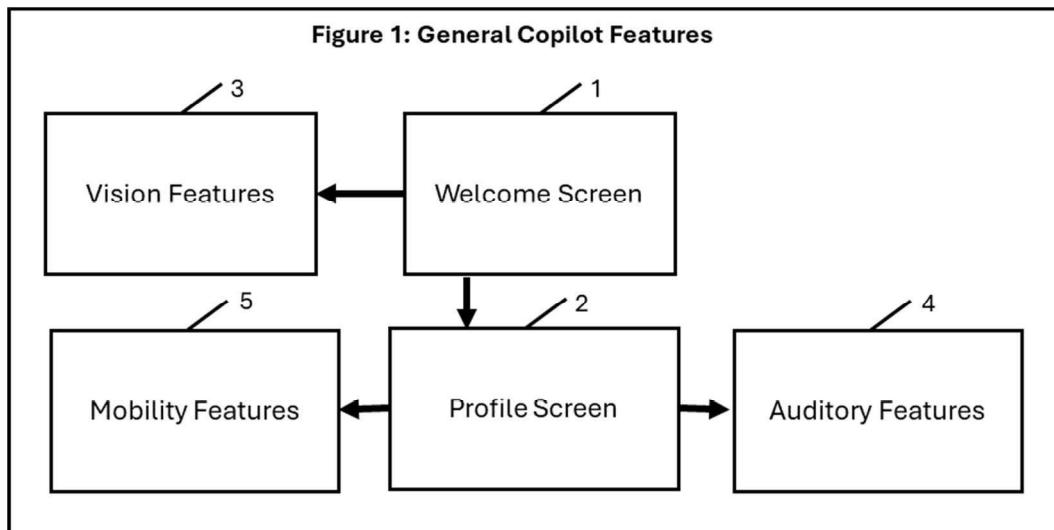
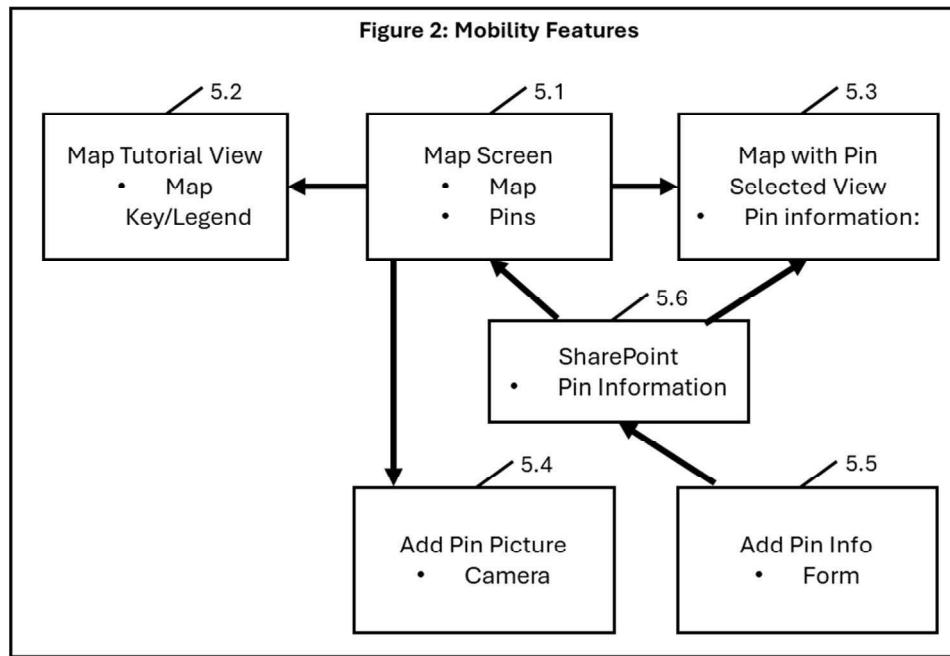


Figure 1 demonstrates the general design from which the rest of this section references. The Mobility Features (5) will include the accessibility map and the Chat Bot. The Vision Features (3) will include Text-Extraction, Object Detection, and Traffic Detection. The Auditory Features (4) will include features for mobility as well as the additional features of Transcribing Uploaded Audio Files and performing Live Transcriptions.

MOBILITY FEATURES



Map Screen Views (5.1 - 5.3)

On selecting the Map Button, users are navigated to the Map Screen (5.1) from which they may type into the search box to filter which pins are shown on the map. Pins are color coded and defined on the Map key/legend pop-up (5.2) upon selecting the information button at the top right corner. Users may also select pins displayed on the map to view pertinent information such as the pin's type of POI, approval votes, outage votes, picture of the POI, and a timestamp of when it was last checked/updated (5.3). All of these are shown in **Figure 3**.

User Generated Points of Interest (POI) and Status Update Requests (5.4 - 5.6)

Located on the map screen, there will be a button the user can tap to add additional points of interest. Pins are created at the user's current location and require the user to take a picture of the POI (5.4) which enforces accurate pin creation. The app screens supporting this feature is shown on **Figure 4**.

However, due to limitations of the Power-App's Geo-sensing capabilities, this is not completely accurate for indoor mapping. After users complete the rest of the pin information form (5.5) by entering a comment of the POI and selecting the type of POI, the information will be submitted to the SharePoint Map Pins List (5.6) which stores the data used on the map Screen. The SharePoint List can be seen in **Figure 5**.

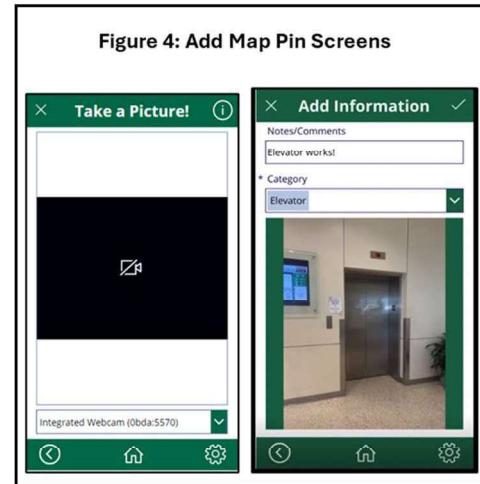
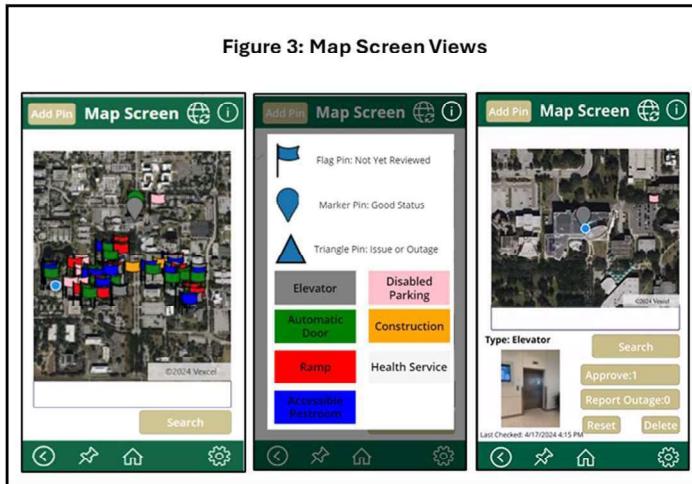
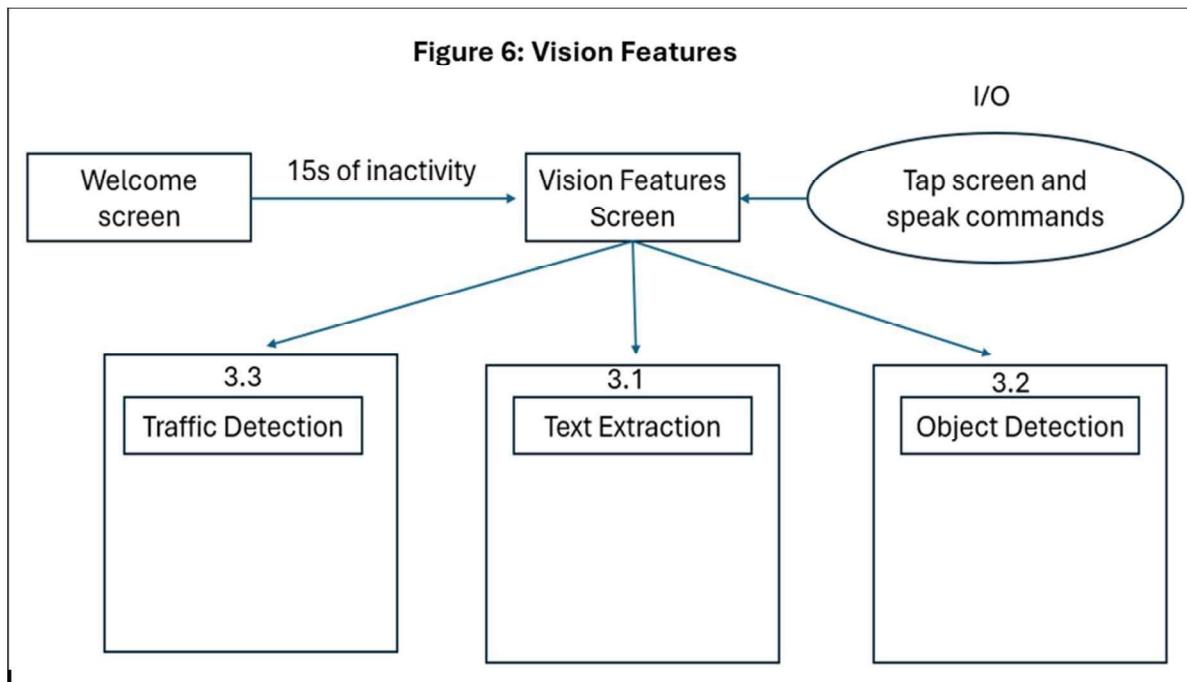


Figure 5: SharePoint Admin Dashboard

A screenshot of a SharePoint list titled 'MapPinsv6'. The columns are: Title, Category, Picture, Good..., BadVotes, Timestamp..., Latitude, Longitude, Color, and Icon. The data rows are:

Title	Category	Picture	Good...	BadVotes	Timestamp...	Latitude	Longitude	Color	Icon
CPR elevators	Elevator		1	0	April 11	28.0598549	-82.41081351	Gray	marker
Elevator works!	Elevator		1	0	April 17	28.06383618	-82.41332532	Gray	marker
Gender Neutral room	Accessible Re		0	0	April 9	28.05978207	-82.4148351	Blue	flag

VISION FEATURES



I/O

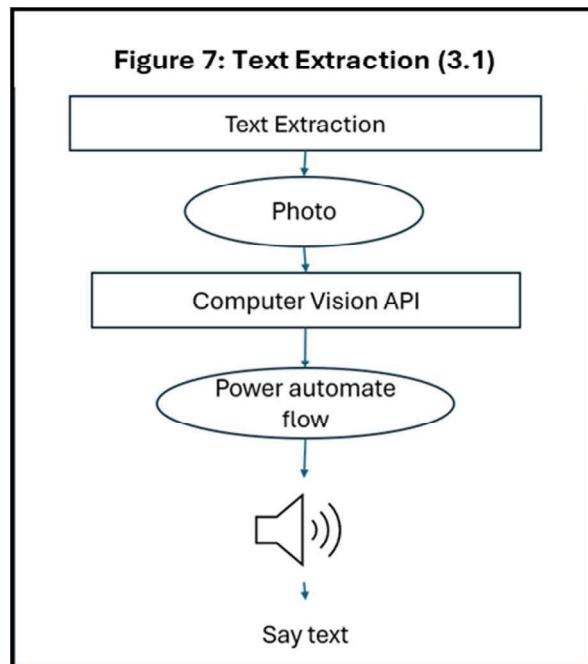
All inputs on the vision screen are spoken directly by the user, and interpreted via OpenAI's Whisper API. Likewise, outputs are spoken audibly to the user via the VoiceRSS text to speech API.

Audible Tutorial Info

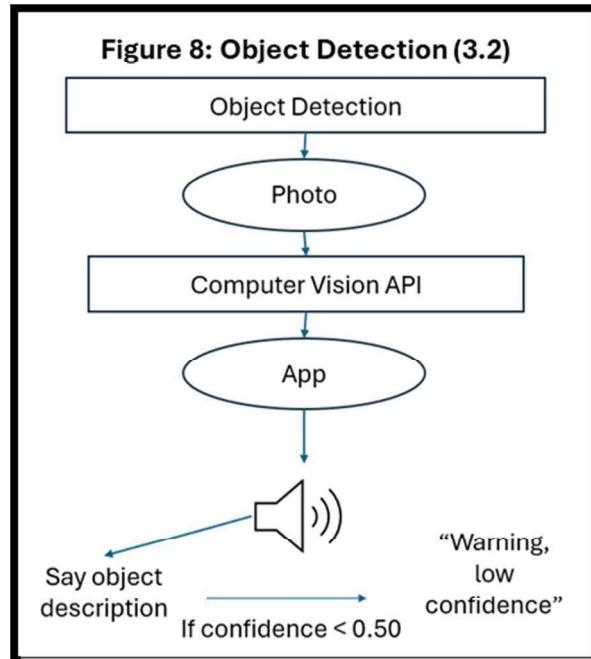
Once a user enters the disability copilot app, if they are inactive for 15 seconds, they are automatically routed to the vision disability features. Once there, they are audibly prompted to say 'info' to hear all available voice commands.

Text Extraction (3.1)

Users are able to say 'extract' while pointing their phone's camera at a sign, bulletin board, or anything else with text on it; the app will then send a photo of the text to the Azure Computer Vision API. After a period of no more than 5 seconds, the app will then read out the result of that API call, i.e what the text says, to the user.

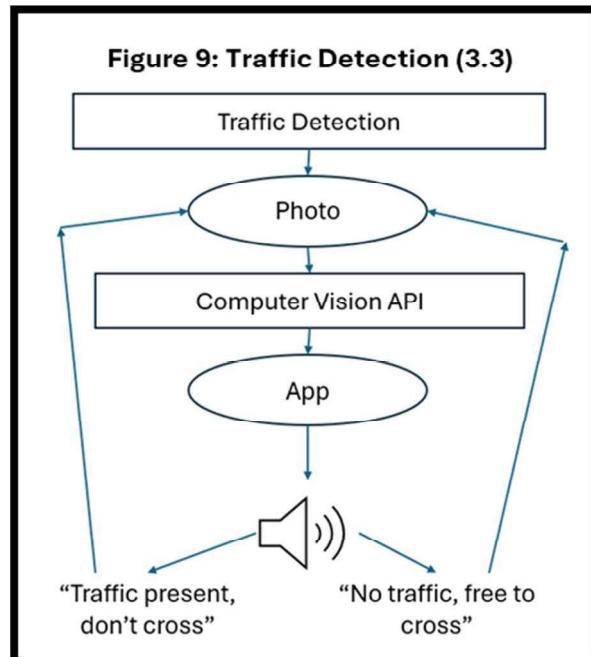
***Object Detection (3.2)***

Similarly to text extraction, users can say 'detect' while pointing their camera at an obstruction or any other object. This will send a photo to the Azure Computer Vision API. The API will then respond to the app, which reads out a description of the object. Additionally, if the Computer Vision has low confidence in its analysis, the app will audibly warn the user.



Traffic Detection (3.3)

Users may say ‘traffic’ to begin traffic detection to cross roadways. This will allow them to point their camera at a road, and the app will use Azure Computer Vision’s API to detect whether or not traffic is present. If there is traffic, the app will warn the user not to cross. Otherwise, it will tell them that it is safe to cross. Users may say ‘stop’ to end traffic detection.



AUDITORY FEATURES

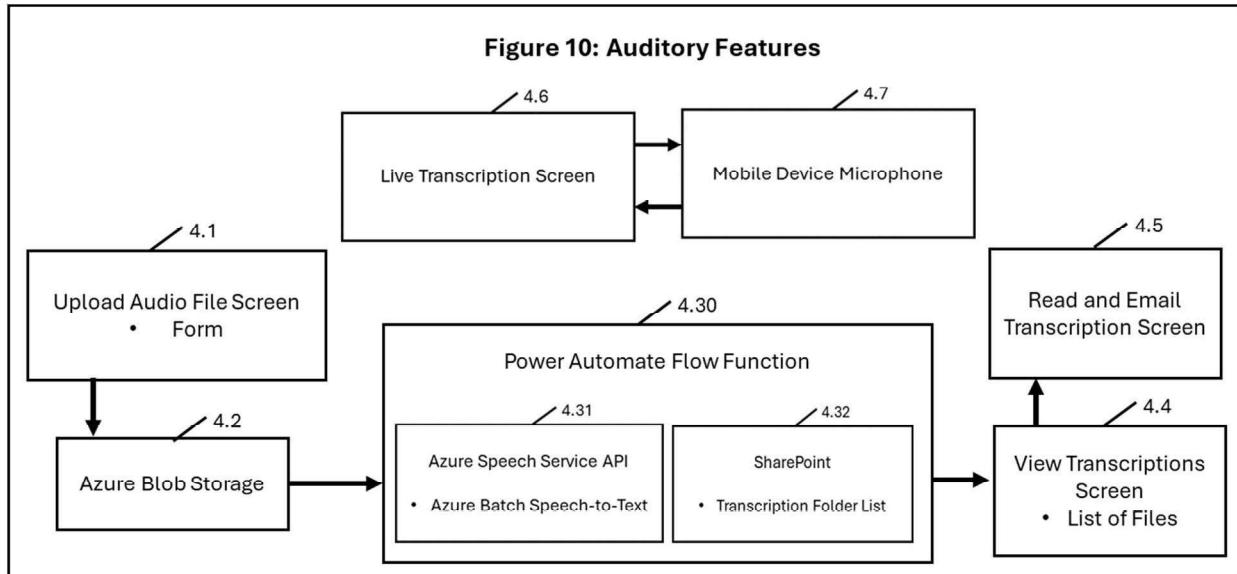
Transcription Upload Feature (4.1 - 4.5)

After navigating to the Transcribe Upload Screen (4.1 and shown in the first pair of screens on Figure 8), users can upload either mp3, wav, or ogg audio files to the form due to the limitations of what the Azure Batch Speech-to-Text Service (4.31) can transcribe. Once the Form is submitted, this creates a new entry in the Azure Blob Storage Container (4.2) which acts as the backend service to store the audio files. This triggers out Power Automate Flow Function (4.30) which uses the Azure Batch Speech-to-Text Service (4.31) to transcribe the audio file. The transcription is finally uploaded to a SharePoint List so that it can be referenced on the gallery of transcriptions screen (4.4 and shown in the 2nd pair of screens in Figure 8) and displayed on the app screen (4.5 and the last pair of screens in **Figure 11**).

Live Transcription Feature (4.6 - 4.7)

Since the Power App's microphone component only returns the audio once it is finished recording, we found an alternative method of listening to live conversations in the mobile device's built-in microphone feature.

After navigating to the Live Transcription Screen (4.6 and **Figure 12**), selecting the input text field and enabling the built-in microphone (4.7), the last 50 characters from the field will be displayed in the text box at the top of the screen.



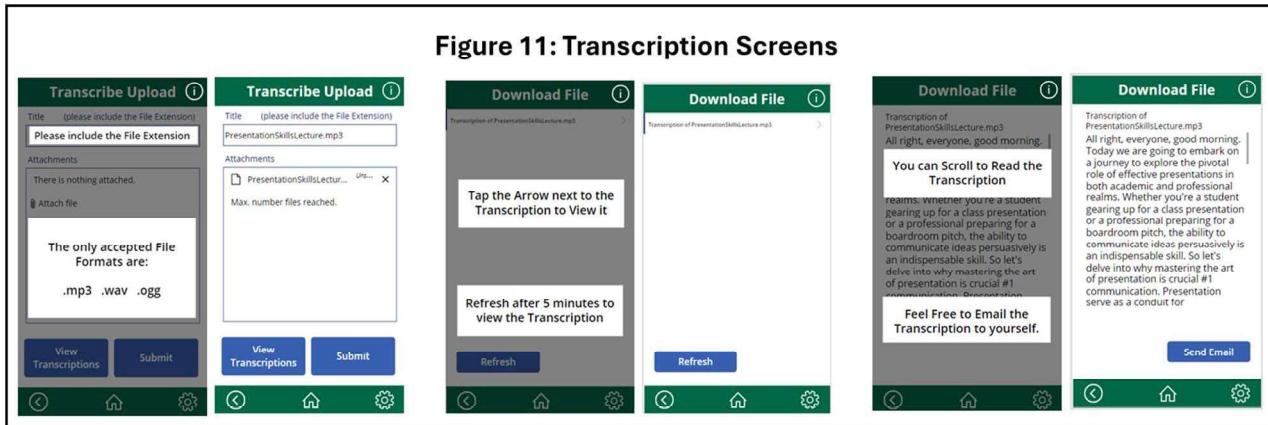
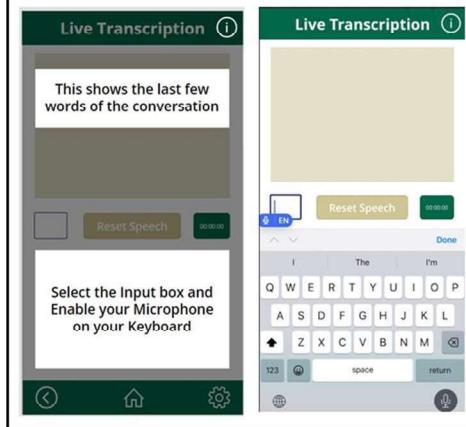
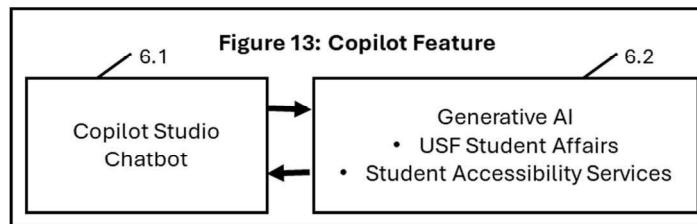


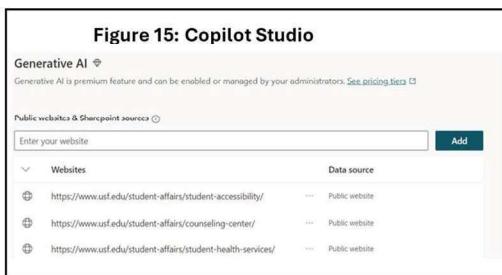
Figure 12: Live Transcription Screen



CHATBOT FEATURE

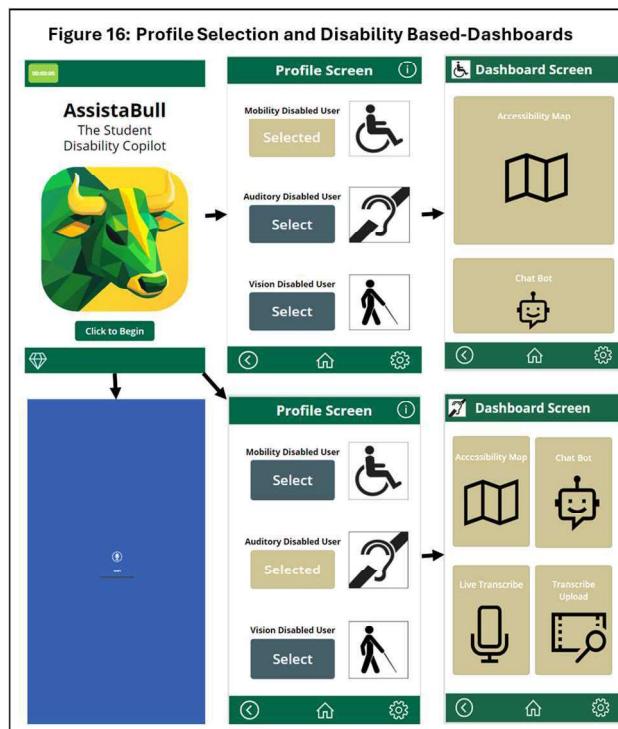
The Chat Bot was developed with Copilot Studio's Generative AI feature (**Figure 14**) which allowed us to add websites from which the Chatbot can read and cite when answering questions from the user pertaining to the on-campus offices that supports the user's needs as well as what other accommodations are available on campus. The USF websites provided to the chatbot pertained to student affairs and student accessibility services. The Chat bot Screen also provides a pop-up tutorial seen on the left side of **Figure 15** for first-time users.





UI DESIGN

Overall, the fundamental screen layouts meet the second requirement. It incorporates clear alphanumeric labels and accessible icons for easy navigation. There is a user dashboard catered to the needs of each type of disability profile which can be selected on the profile screen. Even if you are blind, the app's timer can predict you are blind and navigate you to the vision dashboard after the user exhibits 15 seconds of inactivity with the app upon startup. This is shown on **Figure 16**.



6. Risk analysis and mitigation

Description	Probability	Impact	Mitigation
Data security and privacy	Medium: As data breaches are not uncommon.	High: Could lead to loss of sensitive data.	Mitigated by Azure security features
Loss of Azure services	Low: Azure services are reliable	Medium: Could disrupt service but alternatives are available	Alternate map services (Google Maps)
Loss of a Team Member	Medium: Unforeseen circumstances can occur.	High: Could delay project completion	Plan ahead and allow a two-week buffer window for project completion. Each team member will write readable and accessible documentation for personal tasks.
Loss of Project Sponsors	Low: Sponsors typically commit for the duration of the project.	Medium: Could affect project funding but alternatives are available.	We retain access to the Azure services through student accounts. Rather than \$150, our budget would drop to \$100.

7. Design trade-offs

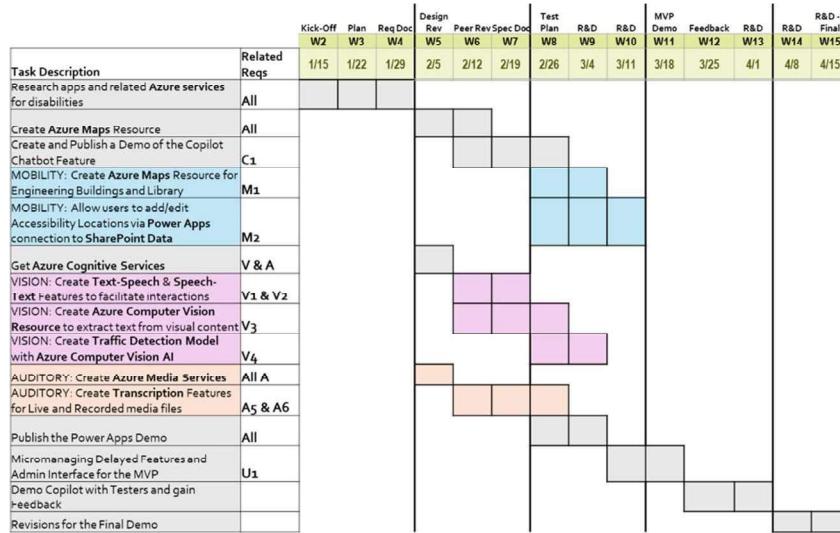
Although we would've liked to implement all features with the Copilot Studio's custom chatbot creation service, we found much difficulty in implementing non-text-based functionality with the chatbot. As a result, we expanded the copilot's apps capabilities by developing other major features onto the Power App platform with connections to the Azure Services which provided faster and easier development.

We recently discovered that the Azure Maps service has catastrophic potential to spend the entire budget if not used correctly. Although we originally planned to use either the Google Maps API or the Bing Maps API as an alternative, we found an even better solution with Power App's Built-In Map feature that allows for connections to SharePoint Data.

Since users do not have Power Apps Premium, we realized we cannot use any of the Microsoft Power App's AI (Artificial Intelligence) Models that have a premium tag, including the prebuilt Text-Extraction and Object Detection Models. We tried creating a Flow in Power Automate to simulate the actions of the API, however we found a better alternative in direct connections from the Azure Computer Vision API to Power Apps.

We also chose to use the VoiceRSS API service for text to speech rather than Azure's Microsoft Translator because after we switched tenets a bug appeared with the API connector which increased complexity in making API calls. Thus we settled with VoiceRSS's easier implementation at the expense of better audio feedback.

8. Project plan



9. Traceability to requirements

Specs Items	Requirement Items							
	C1	U1	M1	M2	V1	V2	V3	A1
1		X						
2	X	X						
3.1			X		X	X	X	
3.2					X	X	X	
3.3					X	X	X	
4.1		X						X
4.2		X						X
4.3		X						X
5.1	X	X	X					
5.2	X		X					
5.3				X				
6		X						

10. Traceability to needs and factors

Specs	Factors							
	5.1	5.2	5.3	5.4	5.5	5.6	5.7	5.8
1	X		X					X
2	X		X					X
3.1					X			X
3.2								X
3.3					X			X
4.1						X		X
4.2								X
4.3						X		X
5.1		X				X	X	X
5.2		X				X	X	X
5.3							X	X
6	X		X					X

References

- 1) GPS SPS - <https://www.gps.gov/technical/ps/2020-SPS-performance-standard.pdf>
- 2) WCAG 2.2 - <https://www.w3.org/TR/WCAG22/>

Test Plan: Student Disability Copilot Project

Adam Forte
Ameena Mohammed
James Ocampo
Myat Phone Thant Kyaw
USF Computer Science and Engineering Students
Department of Computer Science and Engineering
University of South Florida
Tampa, FL 33620

Emails:
adamforte@usf.edu
ameenam@usf.edu
jamesocampo@usf.edu
myatphonetha@usf.edu

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- **Version 2.00** (March 22, 2024) – Updated document from feedback

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1. Introduction

The Assist-a-Bull Disability Copilot is a web application targeting mobile devices which aims to assist disabled USF students by leveraging Microsoft Azure services to make daily tasks easier. The copilot will target three disability groups: mobility-impaired, blind, and deaf individuals. Each group will have multiple features that will require testing.

Mobility Features

Users with a mobility disability will have access to a map containing marked points of interest relevant to their disability. Upon clicking on these points, an information card will display over the point. Additionally, users will be able to add new points and update the status of pre-existing points (see specifications document section 5).

Blindness Features

Blind users will interface with the copilot using speech recognition; users will give auditory commands and be spoken to by the copilot in response. Blind users will also be able to use their cellphone camera to take pictures of signs and bulletin boards. They will then receive an audible summary of postings and a spoken transcript of the text on the signs. Additionally, blind users will be able to take pictures of their environment and receive an AI generated summary of the objects in front of them. Lastly, the copilot will detect moving traffic at intersections and inform the user when it is safe to cross.

Deafness Features

Deaf users will have access to live and pre-recorded audio transcription. For live transcription, this should display automatically generated text onscreen at the pace of conversation. Pre-recorded audio may also be uploaded through an audio file format. The user should receive a transcript of the audio file.

2. Glossary

Traffic Detection

- Negative – Indicates that there is no moving traffic, and it is safe to cross • Positive – Indicates that there is moving traffic, and it is not safe to cross.
- Scan – series of images taken and analyzed for the purpose of detecting moving traffic

3. Parameters to be tested (need to add references)

Mobility Test Parameters (1)

- 1) Completeness of map locations
 - a) Elevators, ramps, inclines, automatic doors, accessible bathrooms, and accessible parking facilities within a one-mile radius are displayed on the copilot map.
- 2) Information card and status of locations is viewable upon clicking the map marker.
 - a) For operable locations (elevators and automatic doors), status of order is visible upon click. Status includes a description, an image of the location, the number of reports within 24 hours, and timestamps for those reports.
- 3) Correctness of information cards

- a) Information displayed on information cards includes the type of location, the floor, the status, timestamps of the status reports and their associated images.
- 4) Status updates and new points are reflected on the map.
 - a) Status reports and new points are viewable by other users in no more than 5 minutes after posting.

Blindness Test Parameters (2)

- 1) Navigability of blindness related user interface
 - a) After using the auditory mode tutorial (see specifications document section 5), user is able to navigate to an arbitrary blindness feature from the dashboard using only auditory commands within 30 seconds.
- 2) Accuracy of text extraction
 - a) Extracted text from signs and bulletin boards is 90% accurate. There is no more than one inaccuracy per ten words.)
- 3) Timeliness of text extraction
 - a) Text to speech after text extraction begins playback no more than 5 seconds after taking a picture.
- 4) Accuracy of object detection
 - a) Objects are correctly identified 90% of the time.
 - b) User is read a confidence rating of the object detection.
- 5) Timeliness of object detection
 - a) Text to speech after object detection begins playback no more than 5 seconds after taking a picture.
- 6) Accuracy of traffic detection
 - a) Traffic detection follows **Table 1** for all scans.

Table 1: Traffic Detection Confusion Matrix

	Positive	Negative
True	$\geq 90\%$	
False	$\leq 9\%$	$\leq 1\%$

Deafness Test Parameters (3)

- 1) Maximum length of submitted audio.
 - a. Lengths of up to one hour for submitted audio files are permissible.
 - b. Submissions of greater than one hour return an error message.
- 2) Accuracy of prerecorded transcribed audio
 - a. Transcribed audio is at least 90% accurate. There is no more than one mistake for every 10 words.
- 3) Timeliness of transcription
 - a. Transcription is available no more than one minute after the audio file is completely uploaded.
- 4) Pace of real-time transcription

- a. Live audio transcription displays speech-to-text over the entire screen in a legible font and font size no more than 10 seconds after words are spoken.

Copilot Test Parameters (4)

1) Response Time

- a) For inquiries regarding relevant offices (within 30 seconds)
- b) For inquiries regarding accommodations for the disabled user (within 1 min)

4. Design of testing

Mobility Testing Tables

Test Case	Pass/Fail	Output A Satisfied	Output B Satisfied	Output C Satisfied
1	Pass	Yes	N/A	N/A
2	Pass	Yes	N/A	N/A
3	Pass	Yes	N/A	N/A
4	Pass	Yes	N/A	N/A

Blindness Testing Table

Test Case	Pass/Fail	Output A Satisfied	Output B Satisfied
1	Pass	Yes	N/A
2	Pass	Yes	N/A
3	Pass	Yes	N/A
4	Pass	No	Yes
5	Pass	Yes	N/A

Auditory Testing Table

Test Case	Pass/Fail	Output A Satisfied	Output B Satisfied
1	Fail	No	Yes
2	Pass	Yes	N/A
3	Pass	Yes	N/A

Chatbot Testing Table

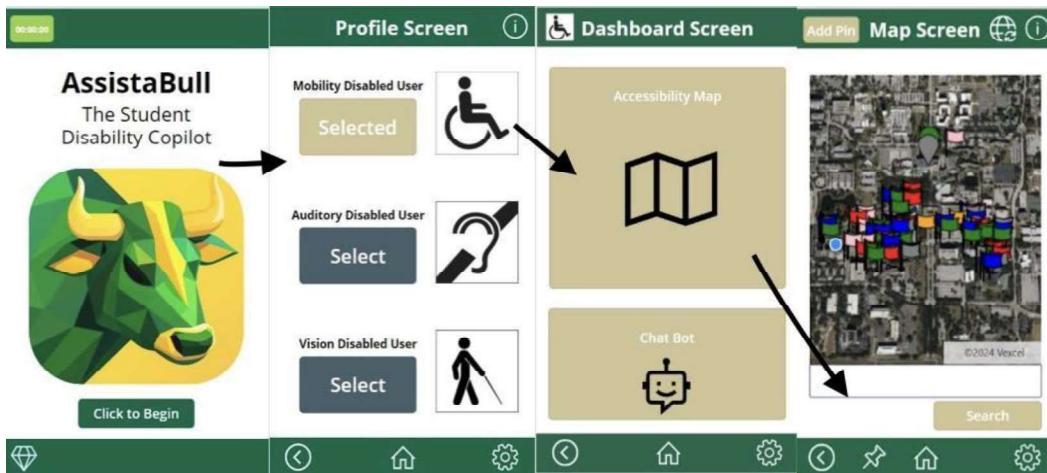
Test Case	Pass/Fail	Response Time <= 30 seconds	Expected Output Check
1	Pass	Yes	Yes

5. Tests

General System Configuration: User has a mobile device with the app installed and internet connection.

MOBILITY

(System Config for Test Cases 1-3)



Test case #M1: Engineering Complex (parameters 1.1-3)

- System config: User opens the app and navigates to the map screen via the map button on the user dashboard.
- Input A: User is located in Engineering Building 2 (ENB).
- Output A: All accessibility-related locations within a mile of the user's location are displayed on the map.
- Input B: User selects each of the pins to display the info card for each marked accessibility.
- Output B: All accessibility-related locations within a mile of the user's location are correct and complete (regarding Latitude, Longitude, Type of Accessibility, Building, and Status)

Test case #M2: Marshall Student Center (parameters 1.1-3)

- System config: User opens the app and navigates to the map screen via the map button on the user dashboard.
- Input A: User is located in Marshall Student Center (MSC).
- Output A: All accessibility-related locations within a mile of the user's location are displayed on the map.
- Input B: User selects each of the pins to display the info card for each marked accessibility.
- Output B: All accessibility-related locations within a mile of the user's location are correct and complete (regarding Latitude, Longitude, Type of Accessibility, Building, and Status)

Test case #M3: Marshall Student Center (parameter 1.4)

- System config: User opens the app and navigates to the map screen via the map button on the user dashboard.
- Input: User is located in the Marshall Student center and attempts to update the status of one of the elevators from running to out of order. Updater includes picture of the elevator.
- Output A: Within five minutes, update with image is viewable on updater's device and other devices. Timestamp is included.
- Output B: After 24 hours, the update is removed from viewable updates on the information card.

Test case #M4: Library (parameter 1.4)

- System config: User opens the app and navigates to the map screen via the map button on the user dashboard.
- Input A: User is located in Engineering Building 2.
- Output A: All accessibility-related locations within a mile of the user's location are displayed on the map.
- Input B: User selects each of the pins to display the info card for each marked accessibility.
- Output B: All accessibility-related locations within a mile of the user's location are correct and complete (regarding Latitude, Longitude, Type of Accessibility, Building, and Status)

Test case #M5: New Location (parameter 1.4)

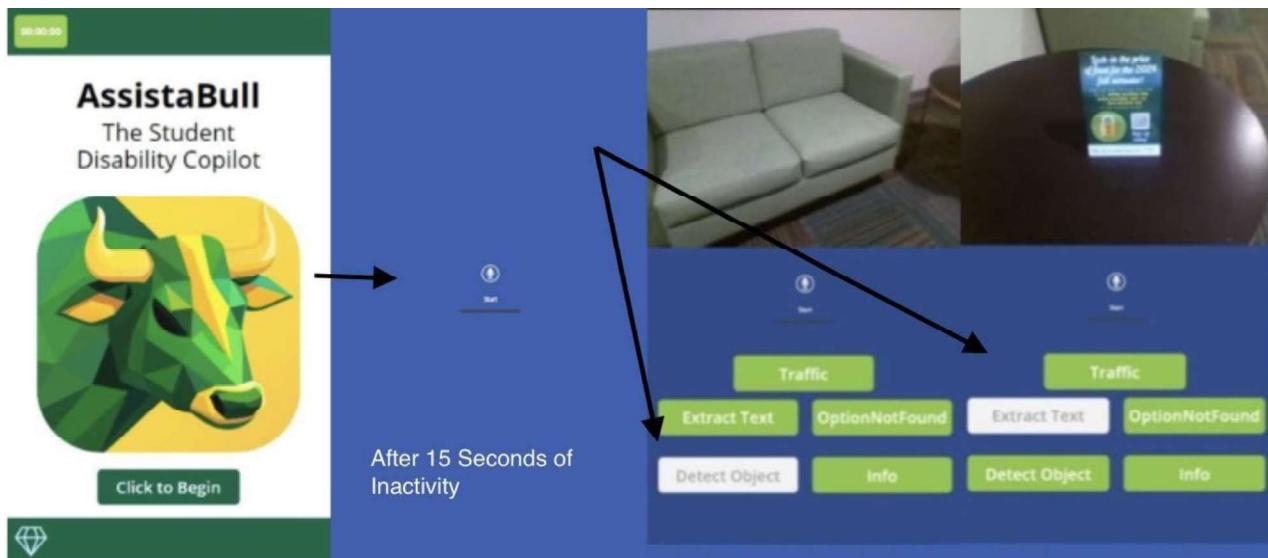
- System config: User opens the app and navigates to the map screen via the map button on the user dashboard, and then selects the Add a Location Button to navigate to the Add a Location Screen.



- Input: User enters the following before selecting the Submit Button
 - Title = [Label for their Location (Building Name)]
 - Category = [Appropriate Type of Accessibility]
 - Picture = [Attached picture of the Accessibility]
- Output A: Users can see new pin, at their location, with a different color denoting a new map pin request.
- Output B: Users may click on the new pin and validate the information displayed on the info card matches their input.
- Output C: Admins can see a new entry for Map Locations on the SharePoint with additional information of the map pin's Latitude, Longitude, and Time Stamp.

BLINDNESS

(System Config for Test Cases 1-2)



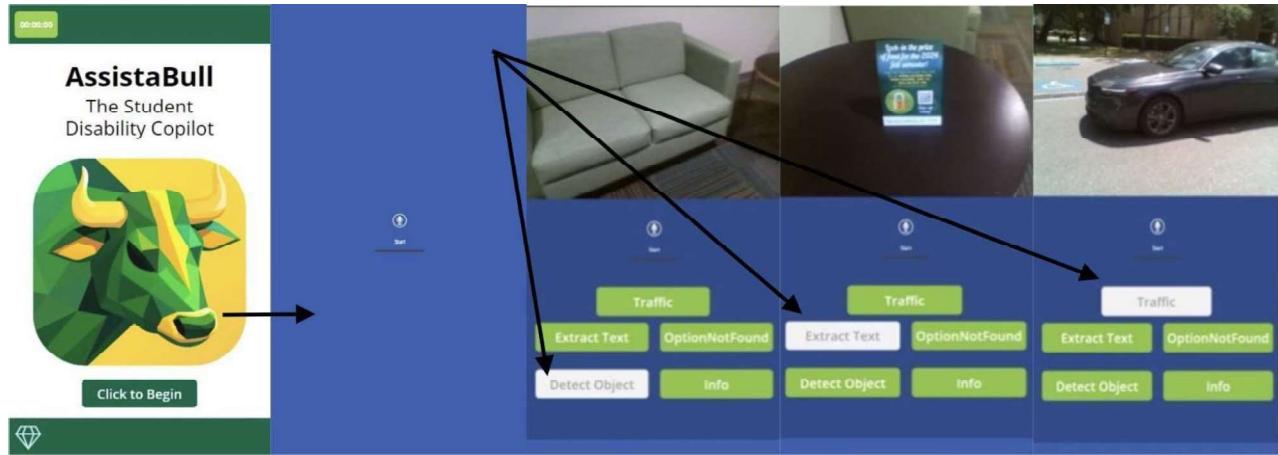
Test case #B1: Auditory Navigation to Text Extraction (parameters 2.1)

- System configuration: User begins on the copilot dashboard in auditory mode. User has completed the tutorial.
- Input: User attempts to navigate to text extraction feature via voice commands.
- Output A: Camera opens for text extraction. Log time taken.
- Perform test with at least five individuals. Test passed if the average time for all testers is less than 30 seconds.

Test case #B2: Auditory Navigation to Object Detection (parameters 2.1)

- System configuration: User begins on the copilot dashboard in auditory mode. User has completed the tutorial.
- Input: User attempts to navigate to object detection feature via voice commands.
- Output A: Camera opens for object detection. Log time taken.
- Perform test with at least five individuals. Test passed if the average time for all testers is less than 30 seconds.

(System Config for Test Cases 3-5)



Test case #B3: Quality of Text Extraction (parameters 2.2 and 2.3)

- Assumption: Cards on the Bulletin Board are spaced out by at least 0.5 inches to prevent overlap.
- System Configuration: User has navigated to text extraction feature and opens camera.
- Input: User points camera at a bulletin board and takes a picture.
- Output A: The copilot reads extracted aloud within 5 seconds of pointing at the text.
- Output B: The Copilot correctly reads the text from the bulletin board with at least 90% accuracy.

Test case #B4: Quality of Object Detection (parameters 2.4 and 2.5)

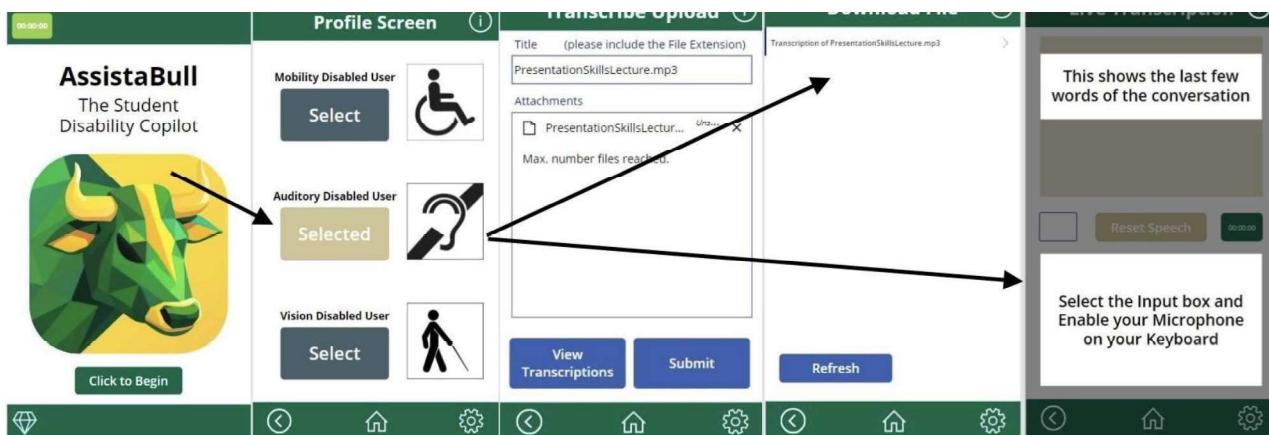
- System Configuration: User has navigated to text extraction feature and opens camera.
- Input: User points camera at an object and takes a picture.
- Output A: The copilot reads object detection description aloud within 5 seconds of pointing at the object.
- Output B: The Copilot correctly reads the text from the bulletin board with at least 90% confidence and at least 90% accuracy.

Test case #B5: Quality of Traffic Detection (parameter 2.6)

- System Configuration: User has navigated to text extraction feature and opens camera.
- Input: User points camera at the road/crosswalk.
- Output A: The Copilot correctly detects motion between captured images and announces that it is unsafe to cross if there is a moving vehicle present. If no moving vehicles are present, it will announce it is safe to cross.
- Output B: Traffic Detection follows **Table 1** for all scans.

DEAFNESS

(System Config for Test Cases 1-3)



Test case #D1: Copilot Accepts MP3 Audio Files of 1-hour length (parameter 3.1 and 3.3)

- System configuration: User navigates to the Upload Audio File Screen for the Transcription Feature by selecting the Transcribe button on the Copilot Dashboard Screen.
- Input: User attempts to upload an MP3 Audio Files of 1 hour length by selecting the Import Recording button and selecting the MP3 File.
- Output A: Copilot accepts the audio with no file input errors.
- Output B: Copilot immediately navigates to the Transcription Screen and then displays a text-transcription for the audio file within 5 minutes of the successful file upload.

Test case #D2: Copilot Accurately Transcribes Pre-Recorded Audio Files (parameter 3.2)

- System configuration: User navigates to the Upload Audio File Screen for the Transcription Feature by selecting the Transcribe button on the Copilot Dashboard Screen.
- Input: User uploads an MP3 Audio Files of 1 hour length by selecting the Import Recording button and selecting the MP3 File.
- Output A: Copilot displays transcription with 90% accuracy.

Test case #D3: Copilot Accurately Transcribes Real-Time Audio (parameter 3.4)

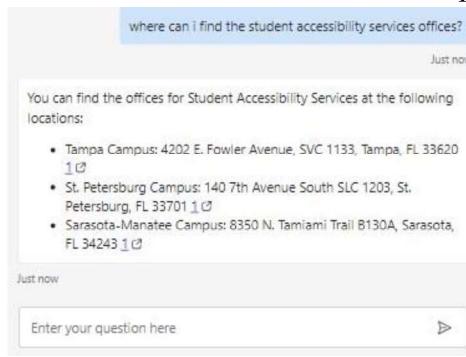
- System configuration: User navigates to the Upload Audio File Screen for the Transcription Feature by selecting the Transcribe button on the Copilot Dashboard Screen.
- Input: User begins the Live Transcription by selecting the Import Recording button.
- Output A: Copilot displays transcription with 90% accuracy.
- Output B: Copilot displays transcription of words within 10 seconds after they are spoken.

CHATBOT

(System Config for Test Cases 1-3)

***Test case #C1: Inquiries regarding locations of accessibility services offices***

- System configuration: User opens the app and navigates to the chatbot screen via the chatbot button on the user dashboard.
- Exact Input:
 - User prompts the Chat Bot: “Where can I find the accessibility services office?”
- Exact Output:
 - Chatbot responds within 30 seconds. ○ Chatbot Output:



- Clickable Citation

sends the user to the appropriate web pages for each office.

Test case #C2: Inquiries regarding accommodations for the auditory disabled user.

- System configuration: User opens the app and navigates to the chatbot screen via the chatbot button on the user dashboard.
- Exact Input: User prompts the Chat Bot: “As a student with a hearing disability, what are the accommodations I am entitled to?”
- Exact Output:
 - Chatbot responds within 30 seconds. ○ Chatbot Output:

As a hearing disabled user, what accommodations am I entitled to?

As a hearing disabled user, you are entitled to reasonable accommodations and services to assist you in your academic environment [10]. Here is a partial list of common academic accommodations that have been used by students who are deaf or hard of hearing:

1. Sign Language Interpreting
2. Communication Access Realtime Translation (CART)
3. C-Print - Transcription Services
4. Assistive Listening Devices (ALD)
5. Note taking
6. Captioning
7. Preferred seating

The University of South Florida provides sign language interpreting, CART, or C-Print services for qualified deaf and hard of hearing students [10]. CART and C-Print are transcription services that provide access to the spoken word. If any class syllabus mentions the use of movies, films, or audio streaming on Canvas, it is important to notify your coordinator as soon as possible so that they can research the media for captioning or transcribing before the first day of class [10].

To request interpreting or transcribing services for classroom purposes, you can follow these steps:

1. Inform the Coordinator for Deaf and Hard of Hearing Services of your preference for interpreting and interpreting needs (oral, ASL or PSE) or transcribing. They will strive to accommodate your

Enter your question here >>

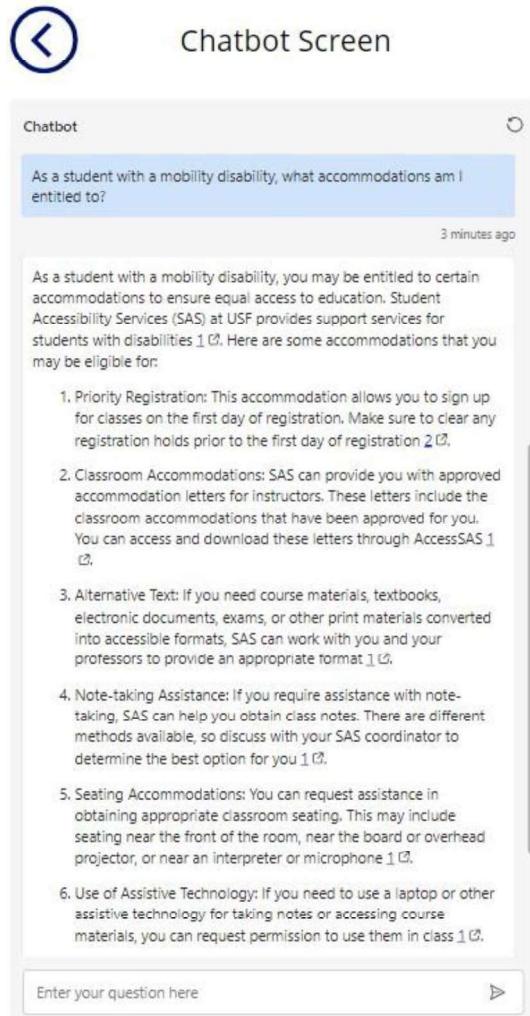
AI generated content can have mistakes. Make sure it's accurate and appropriate before using it. Read the privacy terms.

- Clickable Citation sends the user to <https://www.usf.edu/student-affairs/studentaccessibility/accommodations/hearing-impaired.aspx>

The screenshot shows the 'STUDENT ACCESSIBILITY SERVICES' website. The top navigation bar includes links for 'ACCESS SAS', 'ACCOMMODATIONS', 'TECHNOLOGY', 'RESOURCES', 'FORMS', and 'ABOUT US'. The main content area is titled 'Accommodations' and specifically lists 'DEAF AND HARD OF HEARING ACCOMMODATIONS'. It includes a sub-section titled 'SERVICES/ACCOMMODATIONS FOR STUDENTS WITH A HEARING LOSS OR DEAFNESS' which states: 'Reasonable accommodations and services are available to assist students who are deaf or hard of hearing. Accommodations are individualized and flexible, based on the nature of the disability and the student's learning needs. Below is a partial list of common academic accommodations that have been used by students who are deaf or hard of hearing.' A bulleted list follows, starting with 'Sign Language Interpreting'.

Test case #C3: Inquiries regarding accommodations for the mobility user.

- System configuration: User opens the app and navigates to the chatbot screen via the chatbot button on the user dashboard.
- Exact Input:
 - User prompts the Chat Bot: "As a student with a mobility disability, what are the accommodations I am entitled to?"
- Exact Output:
 - Chatbot responds within 30 seconds.
 - Chatbot Output:



- Clickable Citation sends the user to <https://www.usf.edu/student-affairs/studentaccessibility/accommodations/classroom-accommodations.aspx>

The screenshot shows a web browser displaying the "STUDENT ACCESSIBILITY SERVICES" website. The page title is "Accommodations". It includes a sidebar with links like "CLASSROOM ACCOMMODATIONS", "EXAM ACCOMMODATIONS", and "OTHER ACCOMMODATIONS". The main content area features a section titled "CLASSROOM ACCOMMODATIONS" with a sub-section "Accommodation Memo". The memo text is as follows:

Accommodation Memo
The Office provides students with approved accommodations letters for instruction. The Memo of Accommodation is a Microsoft Word document accommodated app created for a student. To access accommodation memo students must:
 1. Be registered with SAS and have accommodations approved by a Coordinator
 2. Log into their account on each service, students must click Available and log in using their email and password.
 3. Students will be able to download and print their Memo of Accommodation as PDF.

References

- 1) Requirements Document
- 2) Specifications Document

Student Disability Copilot Tool

**Adam Forte, Ameena Mohammed
James Ocampo, Myat Phone Thant Kyaw**
Department of Computer Science and Engineering
University of South Florida
Tampa, FL 33620
Adamforte@usf.edu
Ameenam@usf.edu
Jamesocampo@usf.edu
Myatphontha@usf.edu

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- **Bradley Lawrence (Microsoft Cloud Architect)**
- **Deborah McCarthy (Director of SAS)**

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Agenda

- **Background**
- **Problem**
- **Requirements**
- **Design**
- **Constraints**
- **Applicable standards**
- **Risk analysis and mitigation**
- **Project plan**

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Background

- **Difficulties for USF students with disabilities**
 - Poor access to campus resources
 - Medical
 - Academic (library, classrooms)
 - Social (Marshall Student Center)
 - Difficulties with navigating to those resources
 - Ramps inhibit wheelchair-bound students
 - Difficulty locating and navigating established
- **Disabled students need an application to alleviate these issues**
- **Definitions**
 - Copilot: A virtual assistant capable of understanding questions from the user to generate appropriate cues and suggestions.
 - Disability: Any condition permanent or temporary which impairs or hinders the activities of an individual, especially that of navigation between locations.
 - Azure: Cloud Resources Platform used for the Copilot features

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Problem

- **The problem addressed is**
- **"Can a copilot application help USF Tampa disabled students navigate the campus and access health and educational resources using the Azure platform?"**

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Requirements

All Students Users

S1. As a disabled student, I want to have a responsive and intelligent AI chat experience so that I can get information regarding campus resources, and so that I know what accommodations I am entitled to.

– **Acceptance Criteria**

S1a) Copilot implements an AI chat experience which is able to dynamically give campus information tailored to the user and their disability.

S2. As a USF student, I want a copilot with an intuitive and simple user-interface so that I can easily navigate the app to access features relevant to my experience on campus despite potential language barriers.

– **Acceptance Criteria**

S2a) Copilot should support multiple languages for auditory commands and feedback, as well as basic UI text.

S2b) Copilot should make ample use of graphics and icons to convey meaning wherever possible to enhance accessibility.

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Requirements

Mobility Disabled Users

M1. As a wheel-chair user, I want to know where to find ramps, automatic doors, and elevators that are relevant to my route so that I can quickly navigate to where I need to go.

- **Acceptance Criteria**

- M1a) – User should receive turn by turn guidance navigating them to the fastest feasible path to their destination.
- M1b) – If the user specifies that they cannot use stairs, the Copilot should respond with directions of the fastest feasible path that uses ramps or elevators.
- M1c) – If an elevator is out of order, the copilot's navigation should know to avoid paths that use that elevator.

M2. As a user with a mobility disability, I want to ensure that the information of the accessibility facilities are accurate so that I can rely on the copilot for optimal directions.

- **Acceptance Criteria**

- M2a) – Users may create new markers denoting unmapped accessible locations
- M2b) – Users may issue requests to update the status of accessible locations if changes occur

Requirements

Vision Disabled Users

V1. As a student with a vision disability, I want to interact with the student disability copilot via verbal communication so that I may use it despite my inability to use the on-screen keyboard on my phone.

- **Acceptance Criteria**

- V1a) – User can command the Copilot to listen and can accurately understand verbally communicated input for prompts.
- V1b) – Copilot gives an audible response and can repeat the response for the user on command.

V2. As a blind student, I want the copilot to extract info and analyze visual content so that my impaired vision does not inhibit my studies of class notes/lectures.

- **Acceptance Criteria**

- V2a) – User may take pictures of graphics and the copilot will generate a textual summary of the content.

V3. As a blind student, I want to use the copilot to help detect moving traffic (cars, bikes, golf carts, etc.) so that I can safely cross the street.

- **Acceptance Criteria**

- V3a) – User can command the Copilot to scan the street.
- V3b) – Copilot can detect moving traffic at least 90% of the time.
- V3c) – Copilot gives audible cues of when the user may cross a street safely.

Requirements

Auditory Disabilities

A1. As a person with a hearing disability, I want the copilot to be able to transcribe lecture content so that I can read along with the class.

- **Acceptance Criteria**

- A1a) Copilot can live transcribe audio and save to the user's device.
- A1b) Copilot can transcribe videos/audio files on user's device.

Other (Sponsors and Administrators)

O1. As a project sponsor, I want the copilot to incorporate Microsoft Azure services so that we can gauge the effectiveness of the Azure platform for this kind of product.

- **Acceptance Criteria**

- O1a) Copilot utilizes Azure platform resources.

O2. As an administrator, I want to be able to access and edit user/map data so that new features can be implemented and issues with users can be resolved.

- **Acceptance Criteria**

- O2a) Designated admin users can access user and map data to make necessary changes or to maintain the data.

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Design

The screenshot shows two messages in a Microsoft Teams chat window:

User message (Just now): Need to know how to get disability accommodations

AI response (Just now): Hello, I'm AccessiBULL, a virtual assistant. Just so you are aware, I sometimes use AI to answer your questions. If you provided a website during creation, try asking me about it! Next try giving me some more knowledge by setting up generative AI.

User message (Just now): To obtain disability accommodations, you can follow these steps:

AI response (Just now):

1. First, you need to complete the online Application for Accommodations and Services [1]. Make sure to provide all the necessary information and attach any supporting medical documentation [2].
2. Submit the completed application and supporting documentation through one of the following methods:
 - o Attach it to the online application in electronic format (e.g., PDF, DOC).

User message (Just now): Check on the status of the elevators at the Beard Drive Parking Garage

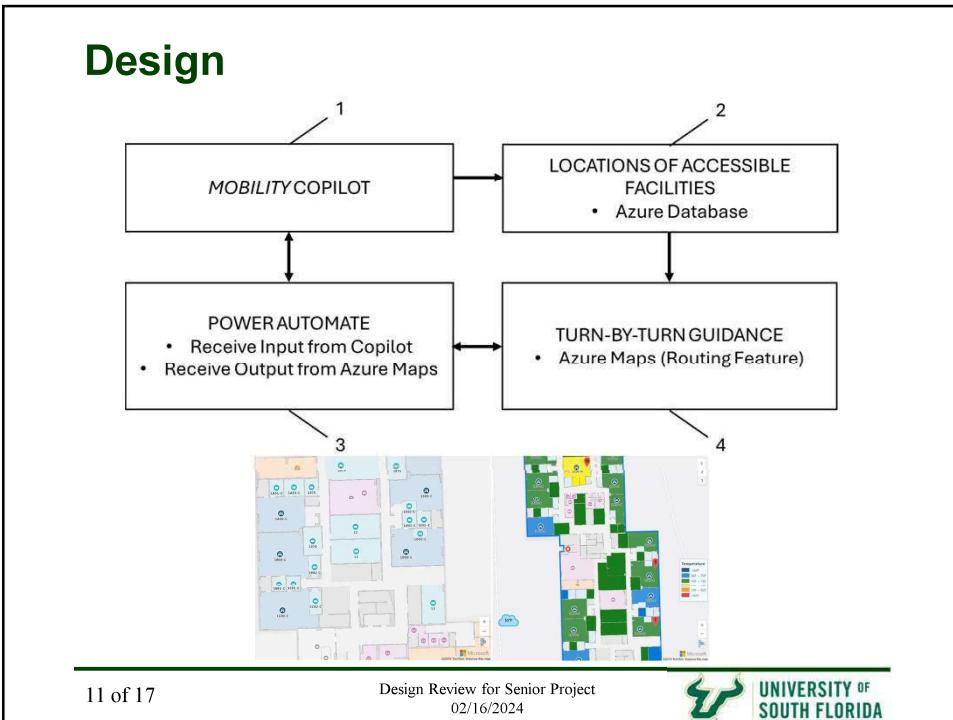
AI response (Just now): The elevators at the Beard Drive Parking Garage are inactive [1].

Reference: Citation-1

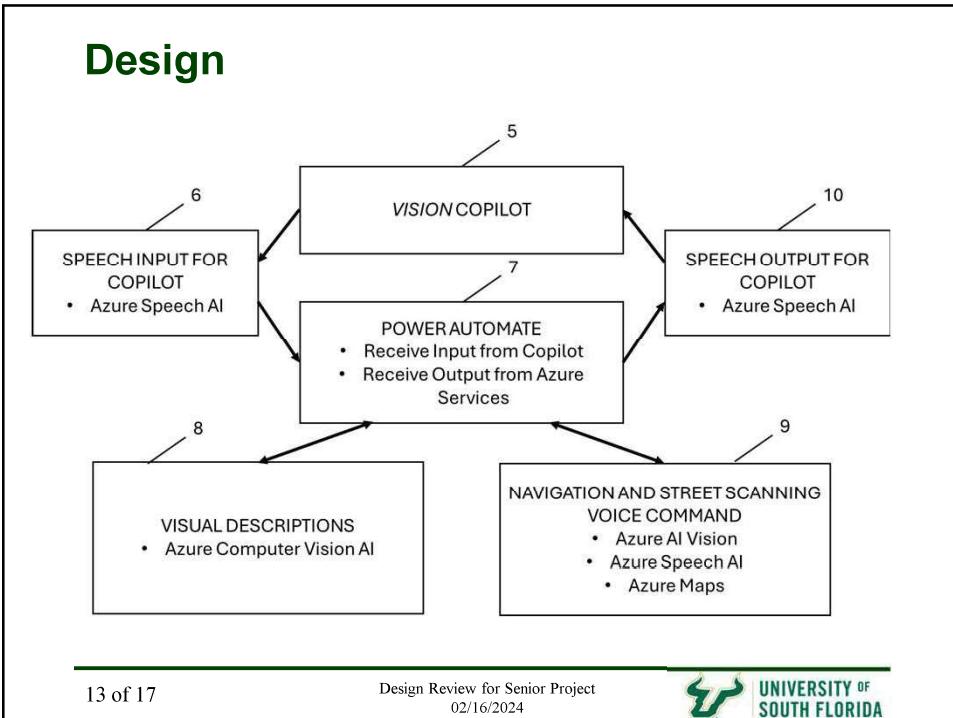
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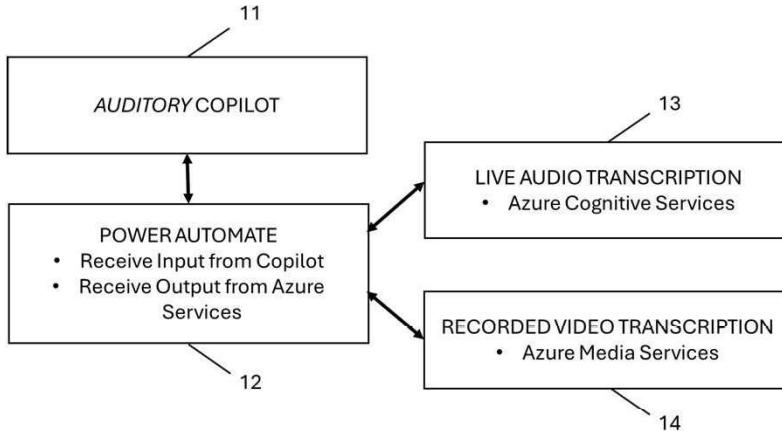


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Design



Constraints

- **Budget**
 - Azure cloud resources needed to develop, design and testing the project must not exceed \$150 per month.
- **Restrict use of project resources**
 - Our team must use the resources sponsored or produced by Microsoft.
- **Users**
 - The target users and data collection should only be USF staffs and students.
- **Time**
 - Project must be completed and presentable by April 26, 2024.

Applicable standards

- **GPS SPS**
 - Implementing SPS standards in the app ensures accurate, interoperable, and reliable location services and maintaining consistency.
- **WCAG 2.2**
 - Adhering to accessibility standards, enabling keyboard navigation, ensuring screen reader compatibility, using high contrast, allowing adjustable text size, providing clear navigation, conducting usability testing, supporting speech recognition and allowing input flexibility.

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Risk analysis and mitigation

- **Data security and privacy**
 - Mitigated by Azure security features
- **Loss of Azure services**
 - Alternate map services (google maps)
- **Loss of a Team Member**
 - Plan ahead and allow two-week buffer window for project completion
 - Each team member will write readable and accessible documentation for personal tasks
- **Loss of Project Sponsors**
 - We retain access to the Azure services through student accounts. Rather than \$150, our budget would drop to \$100.

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Kick-Off	Planning	Req Doc	Design Rev	Peer Rev	Spec Doc	Test Plan	R&D	R&D	MVP Demo	Feedback	R&D	R&D	R&D > Final
W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12	W13	W14	W15
1/15	1/22	1/29	2/5	2/12	2/19	2/26	3/4	3/11	3/18	3/25	4/1	4/8	4/15
Research apps and related Azure services for disabilities													
O₁ Create Azure Maps Resource for the MSC M₂ & V₃ Demo the Routing Feature (Turn-by-Turn) from Azure Maps M₁ Create Azure Maps Resource for Engineering Buildings and Library M₃ Allow users to add/edit Accessibility Locations via Power Automate or Azure API Connection to Azure Dataverse M₂ V & A Create Text-Speech & SpeechText Features to facilitate interactions Create Azure Scanning Model to extract text from visual content V₁ V₂ Create Traffic Detection Model with Azure Computer Vision AI V₃ A₁ Research Azure App Service to host and deploy Copilot Demo O₁ Micromanaging Delayed Features and Admin Interface for the MVP O₂, S₁, S₂ Demo Copilot with Testers and gain Feedback Revisions for the Final Demo													

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Final Demo: Student Disability Copilot Tool

**Adam Forte, Ameena Mohammed
James Ocampo, Myat Phone Thant Kyaw**
Department of Computer Science and Engineering
University of South Florida
Tampa, FL 33620
Adamforte@usf.edu
Ameenam@usf.edu
Jamesocampo@usf.edu
Myatphontha@usf.edu

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- **Dr. Christensen**
- **Chad Hage (Microsoft Cloud Architect)**
- **Bradley Lawrence (Microsoft Cloud Architect)**
- **Deborah McCarthy (Director of Student with Disabilities)**
- **Microsoft Team #1**

Agenda

- **Background**
- **Problem**
- **Requirements**
- **Demo**
- **Design**
- **Constraints**
- **Applicable standards**
- **Trade-offs made**

Background

Definitions:

- Copilot: A virtual assistant capable of understanding questions from the user to generate appropriate cues and suggestions.
- Disability: Any condition permanent or temporary which impairs or hinders the activities of an individual, especially that of navigation between locations.
- Azure: Cloud Resources Platform used for the Copilot features

Background

Difficulties for USF students with disabilities

- Visually-Impaired / Blind
 - Access to Written Learning Materials
 - Difficulty maneuvering safely around campus
- Auditory-Impaired/ Deaf
 - Barriers in Live Lectures
 - Barriers during Recorded Lectures
- Mobility-Impaired
 - Physical Accessibility Around Campus (physical barriers/obstacles)
 - Navigation

Overall, There is poor access to campus resources that pertain to disabled students.

Problem

The problem addressed is

"Can a copilot application help USF Tampa disabled students navigate the campus and access health and educational resources using the Azure platform?"

Requirements

- **Mobility Disability Requirements**

- M1. AS A mobility disabled user I WANT to know where ramps, automatic doors, elevators are located SO THAT I can get from point A to point B.
 - a) All ramps, etc. within 1 mile are known to me
 - b) The status of ramps, etc. are known to me
- M2. AS A mobility disabled user I WANT to be able to know of real time outages and be able to report such outages SO THAT I can get from point A to point B and help others to do the same.
 - a) Report outage within 4 clicks from the Welcome Screen
 - b) Verify outage from the app

Requirements

- **Vision Disability Requirements**

- V1. AS A blind user I WANT to know what is written on postings on bulletin boards SO THAT I can know what is posted.
 - a) Voice control of the text to speech capability
 - b) Accuracy of text to speech is 90%
 - c) Text to speech occurs within 5 seconds of asking for it.
- V2. AS A blind disabled user I WANT to know what objects are in my vicinity SO THAT I can be aware of my surroundings equally to a sighted person.
 - a) Voice control of object to speech capability
 - b) Warns if object detection exhibits less than 50% confidence
- V3. AS A blind user, I WANT to know if there is oncoming traffic while trying to cross roadways.
 - a) Voice control of objects to speech capability
 - b) Copilot audibly warns user when there is oncoming traffic and says when it is safe to cross

Requirements

- **Auditory Disability Requirements**

- D1. AS A deaf user I WANT to know what was said in a lecture SO THAT I can learn the material equally to a person that can hear.
 - a) Can transcribe a 1-hour recording.
 - b) Transcription is completed within 5 minutes
 - c) Accuracy of audio transcription is greater than 90%
- D2. AS a deaf user I WANT to know what is being said in a real-time conversation SO THAT I can participate in the conversation.
 - a) Can transcribe in real time
 - b) Accuracy of live transcription is greater than 90%

Requirements

- **Chatbot Requirements**

- X1. AS A mobility disabled or deaf user, I WANT to know what resources are available on campus to help me with activities of daily living, SO THAT I can be a successful student.
 - a) Within 30 seconds, I should know what on-campus offices support my needs
 - b) Within 30 seconds, I should know what accommodations the USF can provide for me

Demo

- Link to Demo: <https://youtu.be/AvQfB6WadCQ?si=iNPYUmilyPTsMGc>

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11

Design – Profile

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12

The image shows three sequential screenshots of a SharePoint application interface:

- Screenshot 1:** A map view titled "Design Map" showing various locations marked with colored pins (red, blue, green). Buttons include "Add Pin", "Map Screen", and a gear icon.
- Screenshot 2:** An "Add Information" dialog box. It has fields for "Notes/Comments" (containing "Elevator works!"), "Category" (set to "Elevator"), and a preview image of an elevator interior. Buttons include "Search", "Approve:1", "Report Outage:0", "Reset", and "Delete".
- Screenshot 3:** A summary screen showing the map again with a blue pin, and a table of pinned locations. The table includes columns for Title, Category, Picture, Good..., BadVotes, Timestamp, Latitude, Longitude, Color, and Icon. Entries include:

Title	Category	Picture	Good...	BadVotes	Timestamp	Latitude	Longitude	Color	Icon
CPR elevators	Elevator		1	0	April 11	28.0598549	-82.41081351	Gray	marker
Elevator works!	Elevator		1	0	April 17	28.06383618	-82.41332532	Gray	marker
Gender Neutral room	Accessible Restroom		0	0	April 9	28.05978207	-82.4148351	Blue	flag

At the bottom, it says "13 of 26" and "Final Presentation for Senior Project, April 26, 2024". The University of South Florida logo is in the bottom right.

13

The image shows two main windows from the Copilot Studio interface:

- Left Window:** Titled "Copilot Studio | Power Copilot". It shows a sidebar with "Copilots", "Overview", "Topics", "Entities", "Generative AI" (which is highlighted with a large green arrow pointing to it), "Analytics", "Publish", "Extend Microsoft Copilot (preview)", and "Settings".
- Right Window:** Titled "Chat Bot Screen". It shows a "Test copilot" section with a "Chat" button and a "Generative AI" section with a note about it being a premium feature. Below is a "Public websites & Sharepoint sources" section with a search bar and a list of websites:

Website URL	Data source
https://www.usf.edu/student-affairs/student-accessibility/	Public website
https://www.usf.edu/student-affairs/counseling-center/	Public website
https://www.usf.edu/student-affairs/student-health-services/	Public website

A green arrow points from the "Generative AI" section in the left window to the "Generative AI" section in the right window. The right window also features a "Link" button and a "Just now" timestamp. At the bottom, it says "14 of 26" and "Final Presentation for Senior Project, April 26, 2024". The University of South Florida logo is in the bottom right.

14

Design – Transcribe Upload

The screenshot shows two windows side-by-side. On the left is a 'Transcribe Upload' interface with a green header. It has a title input field containing 'PresentationSkillsLecture.mp3', an attachments section showing a file named 'PresentationSkillsLecture.mp3' with a note 'Max. number files reached.', and two blue buttons at the bottom labeled 'View Transcriptions' and 'Submit'. On the right is an 'Azure Blob Storage' interface showing a container named 'audiotable1'. It displays a list of blobs including 'log', 'trans', and 'PresentationSkillsLecture.mp3'. The interface includes standard Azure navigation and search tools.

Transcribe Upload

Azure Blob Storage

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15

Design Transcribe Upload

The screenshot shows two windows side-by-side. On the left is a 'Download File' interface with a green header, showing a transcription for 'PresentationSkillsLecture.mp3'. It has a 'Refresh' button and three navigation icons at the bottom. On the right is a 'Connections' interface from Microsoft Power Automate, showing three connections: 'Azure Blob Storage', 'Azure Batch Speech-to-text', and 'SharePoint Permissions'. Below it is a 'Power Automate' interface showing a flow titled 'Transcribe audio files to text from Azure Blob - James' that ran successfully on April 21, 2024. The flow consists of four steps: 'When a blob is added or modified (properties only) (V2)', 'Input locale', 'ContainerName', and 'Check audio format and transcribe into text'.

Download File

Connections

Power Automate

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16

Design Transcribe Upload

Download File ⓘ

Transcription of PresentationSkillsLecture.mp3
All right, everyone, good morning. Today we are going to embark on a journey to explore the pivotal role of effective presentations in both academic and professional realms. Whether you're a student gearing up for a class presentation or a professional preparing for a boardroom pitch, the ability to communicate ideas persuasively is an indispensable skill. So let's delve into why mastering the art of presentation is crucial #1 communication. Presentation serve as a conduit for

Send Email

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Final Presentation for Senior Project, April 26, 2024

UNIVERSITY OF SOUTH FLORIDA

The screenshot shows a presentation slide with a green header and footer. The main content area displays a transcription of a presentation audio file. Below the transcription is a 'Send Email' button. The footer contains the slide number '17 of 26' and the date 'April 26, 2024'. To the right of the slide, there are two screenshots of Microsoft SharePoint and Outlook interfaces. The SharePoint interface shows a list titled 'TranscriptionFolder' with one item: 'Transcription of PresentationSkillsLecture.mp3'. The Outlook interface shows an email message from Grady Archie with the same subject and content.

17

Design – Live Transcribe

Live Transcription ⓘ

This shows the last few words of the conversation

Reset Speech 00:00:00

Select the Input box and Enable your Microphone on your Keyboard

1

Live Transcription ⓘ

EN Reset Speech 00:00:00 Done

I The I'm

Q W E R T Y U I O P
A S D F G H J K L
Z X C V B N M ↻
123 ☺ space return

2

18 of 26

Final Presentation for Senior Project, April 26, 2024

UNIVERSITY OF SOUTH FLORIDA

The screenshot shows a presentation slide with a green header and footer. The main content area displays a 'Live Transcription' interface with a text box showing 'This shows the last few words of the conversation' and a 'Reset Speech' button. Below it, instructions say 'Select the Input box and Enable your Microphone on your Keyboard'. The footer contains the slide number '18 of 26' and the date 'April 26, 2024'. To the right of the slide, there are two screenshots of a mobile application interface. The first screenshot shows a text input field with placeholder text and a microphone icon. The second screenshot shows a virtual keyboard with a microphone icon and a 'Done' button.

18

Design – Vision (Audible Feedback/Output)



- AssistaBull utilizes OpenAI's Whisper API to translate speech commands to text.
- Output is spoken to blind users via the VoiceRSS text to speech API
- If a voice command is not understood, or is not an available option, AssistaBull says "option not found".

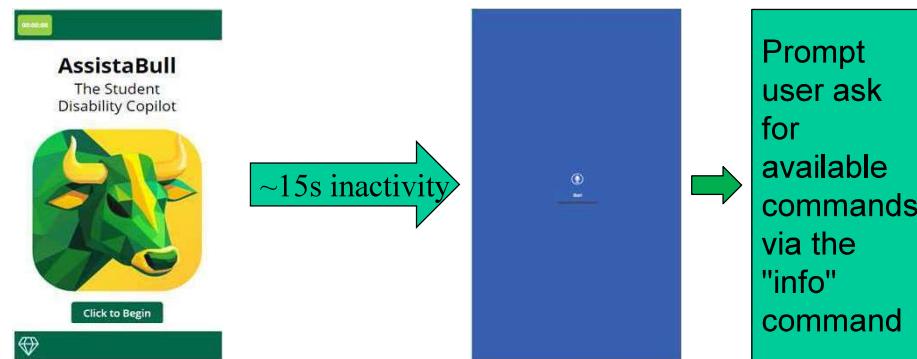
19 of 26

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19

Design – Vision (Automatic routing)

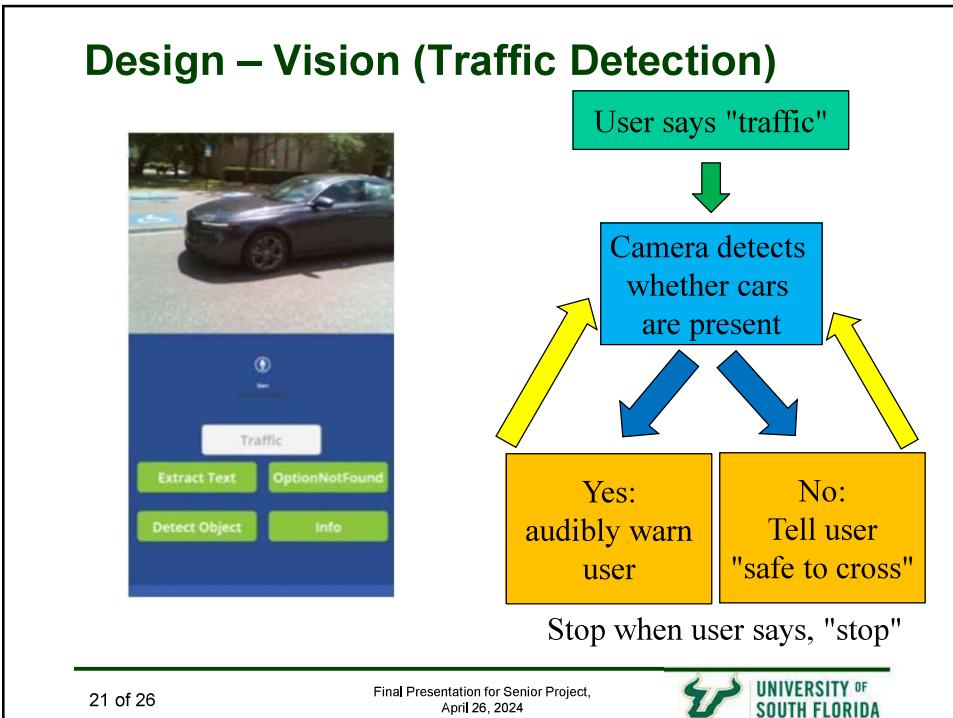
Use voice commands by tapping the screen, speaking, and then tapping the screen again.



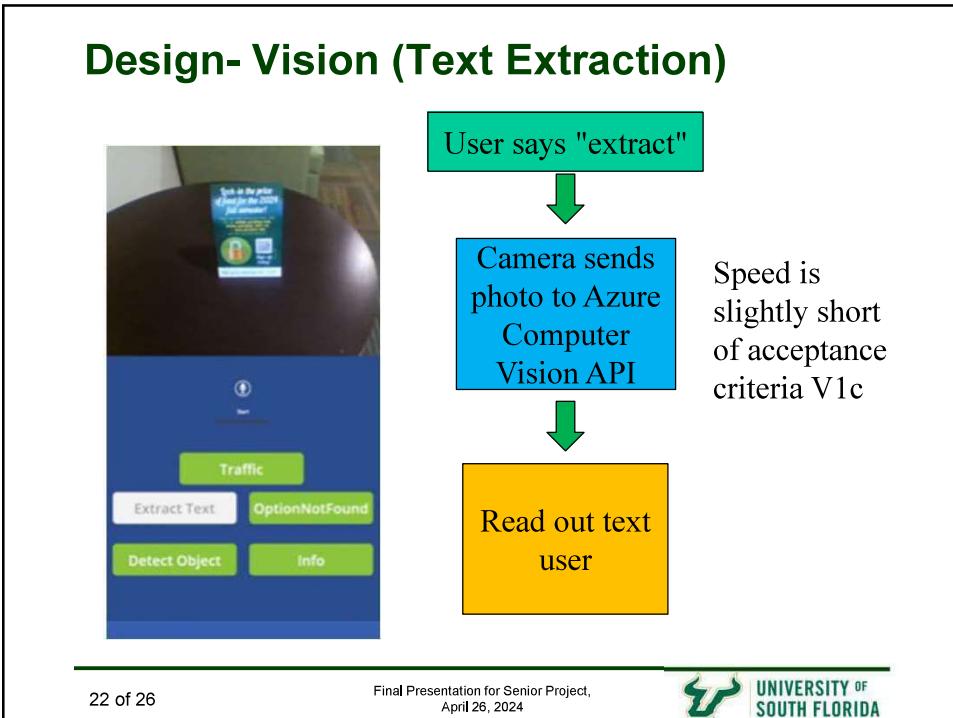
20 of 26

Final Presentation for Senior Project,
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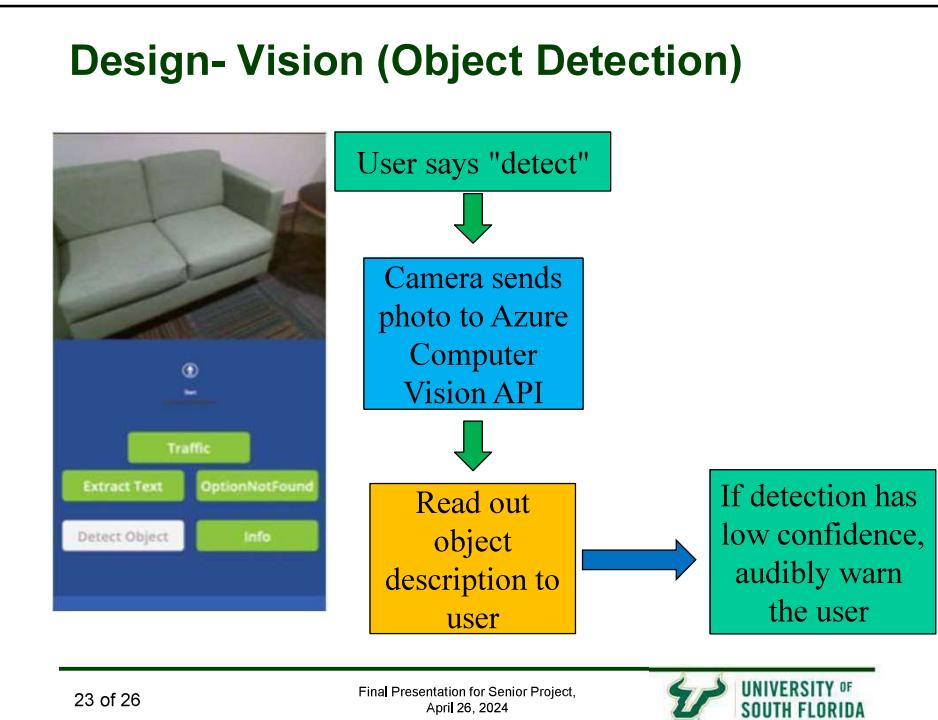
20



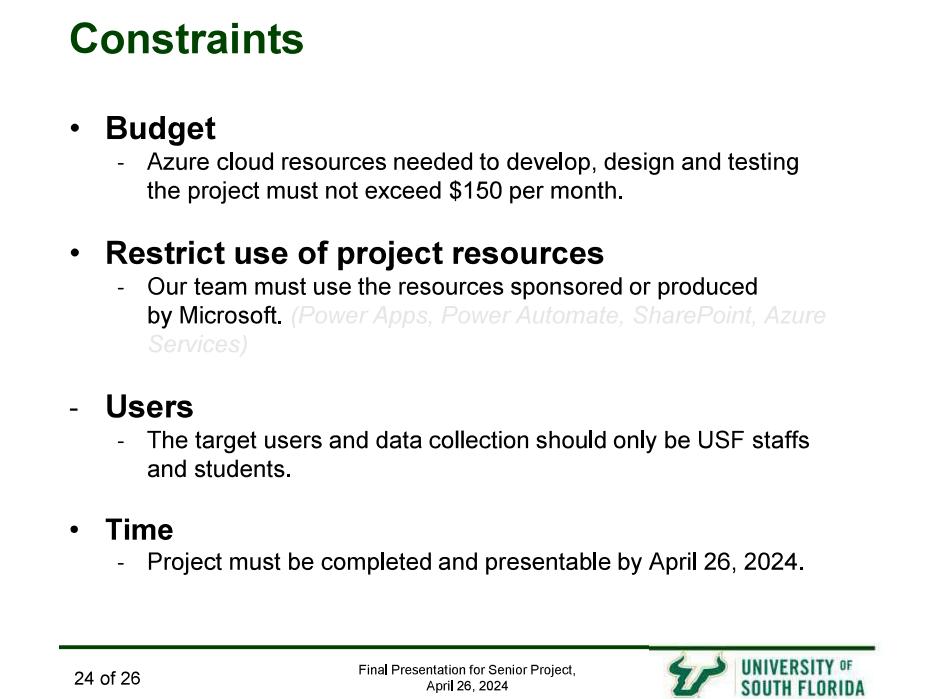
21



22



23



24

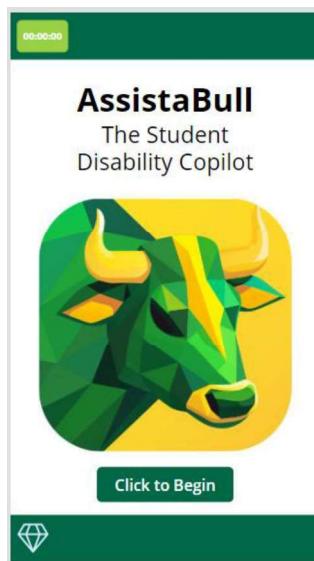
Applicable standards

- **GPS SPS**
 - Implementing SPS standards in the app ensures accurate, interoperable, and reliable location services and maintaining consistency.
- **WCAG 2.2**
 - Adhering to accessibility standards, enabling keyboard navigation, ensuring screen reader compatibility, using high contrast, allowing adjustable text size, providing **clear navigation**, conducting usability testing, supporting **speech recognition** and allowing input flexibility.

Trade offs

- **Map Feature:**
 - Power Apps Map Component with SharePoint vs Azure Maps Service
 - Better cost management at expense of advanced indoor mapping
- **Speech to Text:**
 - VoiceRSS vs Azure Translator
 - Easier implementation at the expense of better audio feedback
 - *Bug with Power Apps increased complexity when using Azure Translator
- **Vision Features:**
 - Azure Computer Vision API with Power Automate vs Azure AI Builder Models
 - Quicker development at the expense of accuracy

Press Release



(Tampa, Florida, April 26, 2024) – USF Computer Science and Engineering students, James Ocampo, Adam Forte, Myat Phone Thant Kyaw, and Ameena Mohammed introduced **AssistaBull**, a copilot app which serves to enhance the on-campus experience of disabled students.

Mobility disabled students have access to a map view of the accessibility related accommodations on campus and a chat-bot which can answer questions regarding on-campus accommodations and helpful offices. Auditory disabled students will have a live transcription tool which allows them to read a conversation as it is happening. Vision disabled students have 3 different computer vision features which they can navigate to via voice commands. Text extraction uses AI optical character recognition to allow users to know what is written on signs; object detection similarly uses AI computer vision to detect what is in front of them. Finally, the innovative traffic detection feature allows blind users to scan the road to look for cars so that they can cross safely.

After viewing the app, Nathan Taylor said, "I think this is a great concept for an app. I like the flexibility with different types of inputs, as well as being able to update the status of locations on the map. This could help a lot of people."

These features were achieved through the integration of advanced and robust Microsoft technologies on Azure Services and the Power Platform, enabling computer vision capabilities and facilitating an accessible user interface to fit the profile and needs of the disabled user. Additionally, Microsoft's SharePoint proved to be a strong back end, storing the Accessibility Map pin information with high performance speed. Furthermore, external APIs, namely Voice RSS and OpenAI's Whisper Model, have been employed for text-to-speech and speech-to-text functionalities.

Student Disability Co-pilot Tool : Assist-A-BULL

Adam Forte, Ameena Mohammed, James Ocampo, and Myat Phone Thant

Overview

Acknowledgements:

Dr. Christensen
 Chad Hage (Microsoft Cloud Architect)
 Bradley Lawrence (Microsoft Cloud Architect)
 Deborah McCarthy (Director of SAS)
 Microsoft Team #1

Requirements

Mobility Disability Requirements

- M1. AS A mobility disabled user I WANT to know where ramps, automatic doors, elevators are located SO THAT I can get from point A to point B.
- M2. AS A mobility disabled user I WANT to be able to know of real time outages and be able to report such outages SO THAT I can get from point A to point B and help others to do the same.

Background:

Students with disabilities at the University of South Florida (USF) face a range of challenges that can hinder their academic experience and overall well-being.

For visually-impaired or blind students, accessing written learning materials poses a huge obstacle. Similarly, maneuvering safely around campus can be difficult without proper accommodations and accessibility features. Auditory-impaired or deaf students encounter barriers in both live and recorded lectures, which can limit their ability to engage with course content. Mobility-disabled students face physical accessibility issues around campus, including barriers and obstacles that hinder navigation. Overall, there is a pressing need for improved access to campus resources and accommodation for disabled students at USF.

Design

General Features:

Profile Screen (1), User Dashboards

Mobility Features:

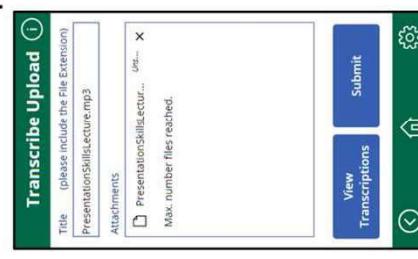
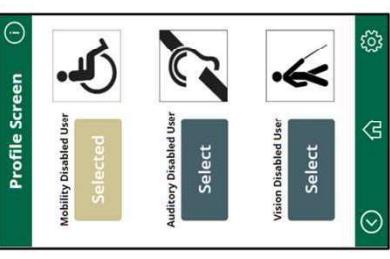
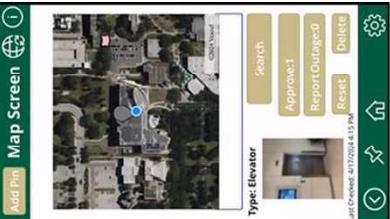
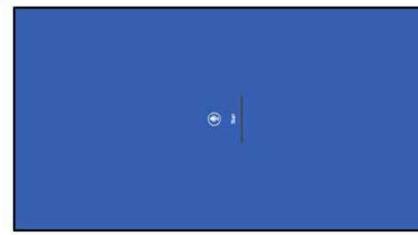
Accessibility Map (2) and User Contribution Form (3)

Auditory Features:

Transcribe Upload (4) and Live Transcription (5)

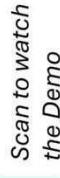
Vision Features:

Text Extraction (6), Object Detection (6), Traffic Detection (6)



Scan to watch the Demo

CIS 4910 Computer Science and Engineering Senior Project – Spring 2024



Status Report for Microsoft 2 for Week #3**What were the goals for this two-week period?****Adam**

- 1) Gather data via interview on students with disabilities regarding their needs navigating the USF Tampa Campus.

Ameena

- 1) Research disability groups active on USF that would help us gain insights into the accessibility issues at USF.
- 2) Create a survey to distribute to USF individuals on various social media platforms (Reddit, BullsConnect)

James

- 1) Find and learn about at least 2 Web-app frameworks which work well with Azure
- 2) Research for APIs to implement Map Features into the application
- 3) Create a Demo site for the Status report meeting

Myat

- 1) Research and try out Power Apps and its implications with copilot
- 2) Look for USF disability services or groups
- 3) Trying out Microsoft learn to get familiar with Azure
- 4) Creating the login page with data based using Microsoft's tech

What goals were accomplished in this two-week period?

- 1) Interviewed wheelchair-bound friend and gained valuable insights on his difficulties and some features that would make his life easier.
- 2) Found groups, training, and individuals that would be beneficial to our research. Reached out if necessary.
- 3) Distributed survey online to Bulls Connect.
- 4) Find and learn about Web-app frameworks which work well with Azure – Blazor Web App Framework
- 5) Research for APIs to implement Map Features into the application – Google Maps API and Azure Maps Creator
- 6) Create a Demo site for the Status report meeting - <https://assistabulldemo120240125101835.azurewebsites.net/>
- 7) Research and try out Power Apps and its implications with copilot
- 8) Trying out Microsoft learn to get familiar with Azure

Reflect critically on any goals not accomplished.**Adam**

- 1) All goals were accomplished.

Ameena

- 1) I haven't been able to distribute the survey to various places so we can get a good sample population.

James

- 1) I have yet to correctly configure a back-end DB that keeps track of profiles and allows users to specify their disabilities
- 2) I have not integrated a map onto the application

Myat

- 1) I've not met the Student Accessibility Services in person or any USF disability groups.
- 2) I've wasted some time on Microsoft Power apps figuring out that it would not work well for creating login page or fit well without project.

What are the goals for the next two weeks?

- 1) Integrate feedback from collected data to generate a requirements document.
- 2) Add a User Data Model to the Database
- 3) Add a Profile Page to Demo to allow users to store their type of disability/disabilities
- 4) Create an Azure AI Resource and verify connection between demo prompts and API
- 5) Add Q&A Page to Demo with Inputs for the user's disability and their question and Outputs for the prompt response
- 6) Decide which Map API to use for the Application (and decide if it is practical or feasible)
- 7) Add a Map Page to Demo with Markers on Mobile Disability Facilities

How many hours were spent on each goal noted above in the past two weeks?**Adam**

- 1) Scheduled and conducted interview with disabled friend, gathered notes and generated report (2 hours)

Ameena

- 1) Research disability groups, accessibility services on campus, (2 Hours) and survey creation and posting (1.5 Hours)

James

- 1) Find and learn about at least 2 Web-app frameworks which work well with Azure - 2.5 Hours
- 2) Research for APIs to implement Map Features into the application - 1 Hour
- 3) Create a Demo site for the Status report meeting – 1.5 Hours

Myat

- 1) Research and try out Power Apps and its implications with copilot – 2 Hours
- 2) Look for USF disability services or groups - 30 mins
- 3) Trying out Microsoft learn to get familiar with Azure – 1.5 Hours

Status Report for Microsoft #2 for Week #5

What were the goals for this two-week period?

1. Integrate feedback from collected data to generate a requirements document.
2. Add a User Data Model to the Database
3. Add a Profile Page to Demo to allow users to store their type of disability/disabilities
4. Create an Azure AI Resource and verify connection between demo prompts and API
5. Add Q&A Page to Demo with Inputs for the user's disability and their question and Outputs for the prompt response
6. Decide which Map API to use for the Application (and decide if it is practical or feasible)
7. Add a Map Page to Demo with Markers on Mobile Disability Facilities

What goals were accomplished in this two-week period?

1. Integrate feedback from collected data to generate a requirements document.
5. Add Q&A Page to Demo with Inputs for the user's disability and their question and Outputs for the prompt response

New goals that were made as the week progressed:

8. Research and consolidate information of on-campus accessibility services, accommodations, and verification forms for disabled students.
9. Contact Director of USF Student Accessibility Services (SAS), Deborah McCarthy, to raise awareness among disabled students.
10. Create an MVP using the **Microsoft Copilot Studio Demo** that can answer questions by referencing USF SAS pages.
11. Integrate a **Copilot Plugin** to the **Demo** and demonstrate its potential application for the project.
12. Gather ingress and egress data from Engineering Buildings 2 and 3, the Library, and the MSC
13. Gather data on stairways and elevators from buildings in goal (12).
14. Compile data collected in goals (12) and (13) in an excel file and feed to AI chatbot.

Reflect critically on any goals not accomplished.

Creating Database and Website Pages (Goals 2 & 3)

Initially, we considered using Microsoft's Blazor framework as it can be easily deployed to Azure App Services. However, since the team members are not well versed in C#, we started considering Django Python as our Website Framework which has prebuilt authentication and storage.

Using Azure AI Resource (Goal 4)

We redirected our focus towards understanding the capabilities which the Microsoft Copilot Studio provides in relation to our app to gauge its potential use in the finished product.

Integration of Map Tool (Goal 6 & 7)

We have some research done but more attention was given to learning Copilot Studio.

Overall, not enough attention or focus was put into these goals due to timing conflicts and schedule constraints. Since team members had a hard time finding time to work together, we are working on a new scheduling plan with the Notion and Notion Calendar apps and defining our roles more deliberately based on the Scrum Model. Furthermore, we will make greater efforts to communicate when we have delays so others may help.

What are the goals for next two weeks?

1. Integrate feedback from collected data to generate a requirements document.
2. Add a User Data Model to the Database (Backend)
3. Add a Profile Page to Demo to allow users to store their type of disability/disabilities (Front End)
4. Design Pages for each user type (Wheelchair user, Visually Impaired user, ADHD user)
5. Create an Azure AI Resource and verify connection between demo prompts and API
6. Decide which Map API to use for the Application (and decide if it is practical or feasible)
7. Add a Map Page to Demo with Markers on Mobile Disability Facilities
8. Consolidate details for markers onto Excel Files which can later be fed to the Copilot's Generative AI Plugins

How many hours were spent on each goal noted above in the past two weeks?

Goal Number	Completed Goal?	Adam Forte	Ameena Mohammed	James Ocampo	Myat Phone Thant Kyaw
1	Yes			1 hour	

2	Not yet			1.5 hour (research)	
3	Not yet				
4	Not yet				
5	Yes			1 hour	
6	Not yet			30 min (research)	
7	Not yet		30 mins	30 min (research)	
8	Yes			1 hour	1hr
9	Yes		30 mins	30 min	15min
10	Yes			1.5 hours	1.5hr
11	Yes		1 hr	30 min	30mins
12	Not yet	1.5	2 hours		
13	Not yet	1.5			
14	Not yet	0			

Status Report for Microsoft #2 for Week #_8_

What were the goals for this two-week period?

1. Integrate feedback from collected data to generate a requirements document.
2. Add a User Data Model to the Database (Backend)
3. Add a Profile Page to Demo to allow users to store their type of disability/disabilities (Front End)
4. Design Pages for each user type (Mobility, Visual, Auditory)
5. Decide which Map API to use for the application (and decide if it is practical or feasible)
6. Add a Map Page to Demo with Markers on Mobile Disability Facilities
7. Consolidate details for markers onto Excel Files which can later be fed to the Copilot's Generative AI Plugin

Additional Goals:

8. Complete Specification Document
9. Complete Test Plan
10. Create a functional Computer Vision Demo on Power Apps capable of inputting and processing images

What goals were accomplished in this two-week period?

1. Requirements reformatted and rewritten to conform to feedback from Chad and Dr. Christensen.
2. Integrated SharePoint into mobility maps feature to support data storage on the backend.
4. Implemented section on app for each disability group: mobility, blindness, and deafness.
5. Decided to use Power Apps map implementation.
6. Added points of interest for the engineering complex.

Reflect critically on any goals not accomplished.

Goal 3 we decided were not necessary for the application as all features will be available upon start up and we intend on adding tutorial screens to demonstrate how to use copilot tool.

Goal 7 we decided was too impractical given that we can use the Chatbot's Generative AI feature to web scrape the USF accessibility pages for office locations, addresses, and accommodation services on-campus.

What are the goals for the next two weeks?

1. Add accessible locations to Map Location List in SharePoint for the Map Feature
2. Fix the "Add Location" form to allow users to submit map pins and updates with an image attachment for verification
3. Implement Computer Vision Text extraction
4. Implement Computer Vision object detection
5. Create Demo for the Pre-Recorded Audio Transcription
6. Create Demo for the Live Audio Transcription
7. Begin work on auditory mode interface

How many hours were spent on each goal noted above in the past two weeks?

Goal Number	Completed Goal?	Ameena Mohammed	James Ocampo	Adam Forte	Myat Phone Thant Kyaw
1	Yes	3 hrs	3 hr	3hr	
2	No		3 hr		
3	No				
4	Yes		5 hr		7hrs
5	Yes		1.5 hr	0.5hr	
6	Yes		0.5 hr		
7	No		0.5 hr		
Other Goals					
8	Yes	2 hr	2 hr	3hr	0.5hr
9	No	1 hr		3hr	0.5hr
10	Yes	6 hr	2 hr		

Status Report for Microsoft #2 for Week #13

What were the goals for this two-week period?

(Note: Unfinished goals of previous weeks are added to the goals of the following week)

Week 12 Objective: Improve Project with MVP Feedback

Week 13 Objective: Transition to the new Microsoft Tenant

1. Improve the UI of the Map Feature with a Map Legend and reduced Screen Content
2. Incorporate Live Transcription via a Timer Component
3. Implement audio file upload -> transcription
4. Create Traffic Detection Feature
5. Create separate UI to cater to the different “disability” profiles (mobility, blind, and deaf)
6. Import Power Apps from old accounts to new tenant accounts (old subscription expired)
7. Recreate SharePoint Database for the Map Pins
8. Implement audio interface
9. Rework screens for audio interface

What goals were accomplished in this two-week period? (Week 16 is our final presentation and demo)

Now Completed **Still in Progress** **Not Started**

Week 12: Goal #1, Goal #2, Goal #3, Goal #4, Goal #5

Week 13: Goal #6, Goal #7, Goal #8, Goal #9

Reflect critically on any goals not accomplished.

Goal #2 – Live Transcription MVP was bound to a button presses that toggles when to listen to the conversation and when to transcribe the audio. This is impractical as conversations do not typically have time to start and stop by this method of transcription.

Goal #3 – Incorporation of the Timer lacks the functionality to interact with the microphone, thus preventing us from automatically cycling when the copilot is listening and when a transcription is attempted. This eliminates the use of a Timer as a solution.

Goal #4 – Pushed to next week

What are the goals for the next two weeks?

Week 14 Objective: Start final deliverables and attempt *harder* requirements

1. Create the Poster
2. Create the Press Release
3. Implement traffic detection
4. Implement Audio output interface (prompts, feedback and tutorial)
5. Attempt Audio File Transcription
6. Attempt Live Transcription

Week 15 Objective: Create final adjustments before Final Presentation and Demo

7. Create the Final Presentation
8. Create the Final Demo Video

How many hours were spent on each goal noted above in the past two weeks?

Goal Number	Completed Goal?	Ameena Mohammed	James Ocampo	Adam Forte	Myat Phone Thant Kyaw
1	Yes		4 hrs		
2	No		1 hr		3hr
3	No				3hr
4	No				
5	Yes		3 hrs		
6	Yes	1.5 hr	1 hr	3 hr	
7	Yes		1 hr		
8	Yes	7 hr		4 hr	
9	Yes			4 hr	

Status Report for Microsoft #2 for Week #15

What were the goals for this two-week period?

1. Create the Poster
2. Create the Press Release
3. Implement traffic detection
4. Implement Audio output interface (prompts, feedback and tutorial)
5. Attempt Audio File Transcription
6. Attempt Live Transcription
7. Complete the Final Presentation
8. Complete the Final Demo Video

What goals were accomplished in this two-week period?

Now Completed **Still in Progress** **Not Started**

Goal #1, Goal #2, Goal #3, Goal #4, Goal #5, Goal #6, Goal #7, Goal #8

Reflect critically on any goals not accomplished.

Goal #1 and #8 – Unfinished Features left uncertainty on what to include regarding completed functions.

Goal #5 – Lack of communication from the member responsible for the feature and issues with the Power Automate Audio File Transcription function delayed development.

Development was also impeded by the lack of responses from Microsoft Representatives, Chad and Brad, to fix Azure's Translator Resource used for Text to Speech.

What are the goals for the next two weeks?

1. Complete the Poster
2. Attempt Combining Computer Vision Features onto 1 screen.
3. Finish Creating Tutorial pages
4. Attempt Audio File Transcription
5. Complete the Final Presentation
6. Complete the Final Demo Video

How many hours were spent on each goal noted above in the past two weeks?

Goal Number	Completed Goal?	Ameena Mohammed	James Ocampo	Adam Forte	Myat Phone Thant Kyaw
1	No		0.5 hr		
2	Yes		1 hr		
3	Yes		1 hr		
4	Yes	0.5 hr		10 hrs	
5	No		2 hrs		4 hrs
6	No		3 hrs		
7	Yes	3.5 hrs	0.5 hr		
8	No		5 hrs		

New Knowledge

Among the Azure Services:

Azure Maps - Explored but not used due to complications with budget management replaced by **Power App's Map Component** which also has geo-sensing capabilities.

Azure Computer Vision API - Used for the Final Vision Features due to their ease in implementation and prebuilt object and text recognition models.

Azure Blob Storage - Simple backend service which allows for triggers like "when an item is created" to run Power Automate Flows.

Azure Speech Service and Batch Speech to Text Service - Used for the transcription feature, used inside of our custom Power Automate Function.

Power Platform Services:

Power Automate - This allows us to create functions that can run API calls and interact with different elements of the Power Platform as well as external services.

Power Apps - This is an awesome mobile development tool that works for simple mobile app creation and can reference microsoft services and external services. We used many of the built in components to create the features quickly. This uses a different programming language similar to C but more complex in some ways.

SharePoint - Allows for a simple backend for the Power Apps since the data can be easily fetched onto the front end with a Data Connection to the necessary sharepoint list.

External API Services:

VoiceRSS - Used for the Text to Speech Service after a bug created issues with the **Azure Microsoft Translator**.

OpenAI Whisper Model - Used for the Speech to Text for the Computer Vision Features, relatively simple to use but also required learning how to create custom API connectors in Power Automate to ensure it was set up correctly.

How we learned them:

The majority of the learning process was hands-on and testing the limitations of the power apps platform with each idea of a feature us to Youtube Tutorial videos rather than the Power Apps Community Documentation since most of their content was either outdated or not well written. We also consulted Chad Hage and Brad Lawrence (our Microsoft Supervisors) for help on how to troubleshoot certain features, however most of the learning process was clicking around inside of the Power Apps Environment to learn what features are available. Once we learned how to create API connectors, the documentation improved slightly.