Investigating the requirements

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1. Identifying the events, and the input and output flows:

Business Event List

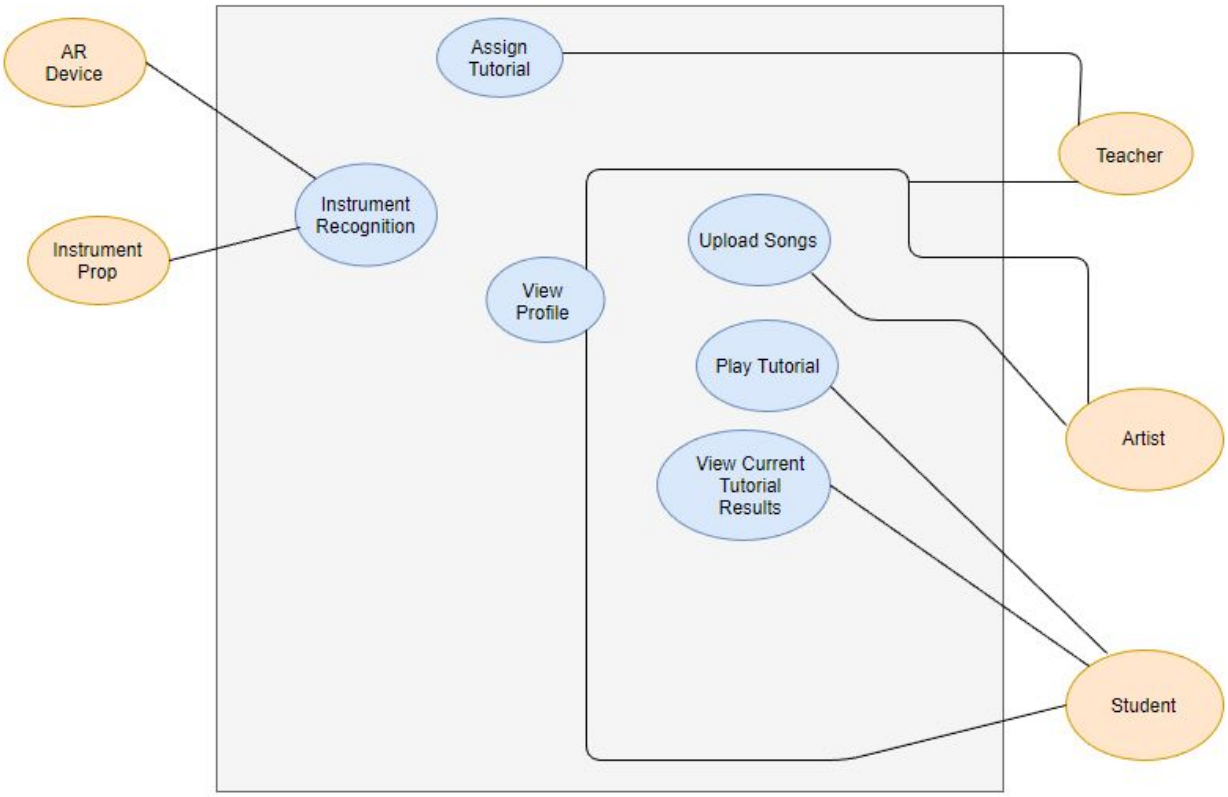
Event Name	Input and Output	Summary of BUC
1. Booting up System	**Input**: Press the start button on the instrument prop sensor. **Output**: The instructions on how to connect the instrument prop with our augmented reality device.	User will need to boot the system in order to start practicing the instrument. Also, if the system boot properly, it will show the instructions of how to connect to the sensor with the instrument prop.
2. Setting instrument sensor	**Input**: The user will need to enter the type of instrument. **Output**: If detected, show the signup/login page. Else, keep detecting instrument.	Once the sensor is turned on, the user will have to input the type of instrument. If it is connected properly, it will show the signup/login page.Otherwise, it will keep trying until successful detection.
3. Signing up/Login	**Input**: Enter user credentials. **Output**: If correct, sign in successful message. Else, improper credentials message.	User will need to signup/login and determine their type of user i.e. teacher/artist/student while signing up.
4. User Chooses a Difficulty level Setting (Only for students)	**Input**: Select the level of difficulty that the student wants to learn. **Output:** Display tutorials to be learned associated with whatever difficulty level that they chose as the input to this event.	Difficulty settings are updated by the user i.e. beginner, intermediate or expert. Teachers will be able to see the students preferred difficulty level and assign tutorial to be learned associated with that difficulty level.

5. Uploading song (only Artist)	**Input:** Press upload button to upload songs. **Output**: Shows the status of uploading.	Once the artist is done making a song, artist will be able to upload song and screen will show the uploading status.
6. Assigning tutorial to students (only teachers)	**Input:** Select the songs to assign the student. **Output:** The tutorials that assigned to the student.	Assign the songs to the student based on their level of difficulty. Once the teacher finish the assigns, the screen will show the tutorial.
7. Selecting a song from tutorial (only Student)	**Input**: Select songs from the tutorials. **Output:** The AR device will display selected song by user.	Student can select a song from the tutorial that student is willing to practice. Once the song is selected, AR device will display that song with play button.
8. Student plays tutorial	**Input:** Press the play button. **Output:** Music will be played.	By pressing the play button from the screen, user can start practicing a song from tutorial that was assigned by the teacher.
9. Student pauses/exit tutorial	**Input:** Press the pauses/exit button. **Output:** Music will be stopped.	Student can stop the tutorial during the practice by pressing the pause button or exit button if they are willing to quit.
10. Student resumes tutorial	**Input:**.Press the resume button. **Output:** Music will be resumed from the place it was paused.	Must have paused before. Student can resume from the place where it was stopped to continue.
11. Student views their profile	**Input:** Press the profile button. **Ouput:** lesson(n) results.	Can access to the profile from the navigation bar. Student can view the progress, and songs assigned to them.
12. Teacher views their profile	**Input:** Press the profile button.	Can access to the profile from the navigation bar. Teacher

	Output: Student(n) result.	can see how many students the teacher has, the tutorials assigned to the student, and each student's progress.
13. Artist views their profile	**Input:** Press the profile button. **Output:** Song(n) result.	Can access to the profile from the navigation bar. Artist can view the list of songs the user made.
14. Signing out / Turning off system	**Input**: Press sign out button or turn off button **Output:** Cannot login after.	Once the practice is done student, songs are uploaded by artist and tutorials are assigned by the teacher, they all can shut down or sign out when needed.

*For input: We have underlined a word that gives an input to the product.

2. **Partitioning the work to determine the best product to build**



3. **Deriving Scenarios (from the Product Use Cases)**
a and b)

Business Event Name: Configuration of Instrument prop through sensor and AR device.
Business Use Case Name and Number: Setting a sensor that way we can detect the device.
Trigger: Needs to turn the system on.
Precondition: The instrument prop must send a signal that is detectable by the AR device.
Interested Stakeholder: Sensor, system, AR Device.
Active StakeHolder: Student, teacher, artist, system.
Normal Case Step:

Step 1: Turn the system on in order to get the sensor started.
Step 2: Once the system is started it starts searching for a signal.
Step 3: System detects a valid signal from an instrument prop.
Step 4: System allows the user to use the application's other functionalities.
Step 5: User signs out.
Step 6: Turn system off.

Alternatives for:

Step 3.1: If the system does not detect a valid signal from the prop, offer the option to reboot the system and try connecting again or shut down.
Step 5.1: User could sign back in as a different user with different credentials.

Exceptions: If the user keeps trying and doesn't get connected to the instrument, user can quit by

shutting the system off.

Outcome: They can then start practicing and view their profile after the booting is done and the sensor is detected. When they are done using the application, they can sign out and either turn the system off or sign in as another user.

Business Event Name: Artist decides to upload new songs.
Business Use Case Name and Number: Upload a song to the database as an Artist user.
Trigger: Artist starts recording and then uploads for the teacher to view them.
Preconditions: The artist must have signed up in our system before uploading songs.
Interested Stakeholders: Teacher, Artist, system, instrument prop, sensor, AR Device.
Active Stakeholders: Artist, system, instrument prop, sensor.
Normal case steps:

Step 1: Login into the system.
Step 2: Start recording input.
Step 3: Stop recording input.
Step 4: Input song information (name, difficulty)
Step 5: Confirm submission to database.
Step 6: Start recording new song (step 2)

Alternatives for:

Step 2.1: Options to pause and resume recording of input.
Step 3.1: Resume recording of input.
Step 4.1: Cancel this step and return to recording (step 3)
Step 5.1: Cancel submission and return to recording (step 3)
Step 5.2: Cancel submission and trash the recorded song.

Exceptions:

If uploading the song fails because of connection issues or file corruption, the user can keep our application open and try again later or quit by shutting the system off.

Outcome:

Once an artist has submitted their song, teachers will be able to access it to add it to tutorials. Artists will be able to see how popular their song is through their profile page.

Business Event Name: Teacher allocated tutorials to students.

Business Use Case Name and Number: Assign tutorials to the students based on their level of difficulty.

Trigger: Teacher must make tutorials for the students according to their level of difficulty.

Precondition: Artist must have songs uploaded to our system.

Interested Stakeholder: Teacher, student, system.

Active StakeHolder: Instrument prop, teacher, student, system.

Normal Case Step:

Step 1: Login into the system and get access to the system.

Step 2: Access the songs from the database uploaded by the artist.

Step 3: Once the teacher can access the songs from the database, the teacher can make tutorials using the songs based on students level of difficulty.

Step 4: Teacher assigns tutorial to student, teachers can see a student's progress on teacher's profile page.

Step 5: Start assigning more songs when the student is done with the song that was assigned before.

Alternatives for:

Step 2.1: If there are no songs in the database, she cannot assign to the student.

Step 5.1: Teacher cannot assign more than one tutorial to the student at once.

Exceptions: Before assigning the tutorials to student, teacher might want to look at the student's progress again in order to assign proper songs to practice for a student. In this case, the teachers can return to their own profile at any time.

Outcome:

Once a teacher has assigned a tutorial to a student, the student should be able view what tutorials have been assigned to them and begin a tutorial. The teacher will be able to see what tutorials they have assigned to specific students, and results of the students doing the tutorials.

Business Event Name: Student decides to play a song from the list of tutorial songs.
Business Use Case Name and Number: Play a tutorial as a student user.
Trigger: A user presses play tutorial button in order to start off the practice.
Preconditions: The user must have our device and sign up in our system.
Interested Stakeholders: Teacher, Artist, Student, system, instrument prop, sensor, AR Device.
Active Stakeholders: Student, system, instrument prop, sensor, AR Device.
Normal case steps:

Step 1: Login into the system
Step 2: Setting the level of difficulty
Step 3: Select the tutorial provided by the teacher in order to practice a song
Step 4: System will show tutorial interface through an AR Device.
Step 5: Student will then be able to select a song from the tutorial by pressing the play button from the navigation bar.
Step 6: Complete the tutorial.
Step 7: After completion of a tutorial, students can immediately view the current tutorial results.
Step 8: If the student wants to practice again, they can go back to step 3 to 7.

Alternatives for:

Step 5.1: Student have an alternative option to either pause, exit or resume from wherever they stopped during the practice.
Step 5.2: If the student miss a node that was prompted to them on the AR Device, they will be warned with an error on their screen.
Step 6.1: Student can change their level of difficulty if they think the tutorial that was provided by the teacher is too easy or hard.
Step 7.1: If the user don't want to view the grade, they can choose to exit out of the system.
Step 8.1: If they don't wish to practice more, they may exit out of the system.

Exceptions:

If the user want to quit at any point after the tutorial has begun, they can either quit or exit out of the system anytime.

Outcome:

Once they finish the tutorial, their results will be saved that way it can be accessed by either students or teachers.

Business Event Name: User wants to access their profile.
Business Use Case Name and Number: Access user's profile.
Trigger: A user presses their profile page button.
Preconditions: User must be logged in as a Student, Teacher, or Artist, and their must be a connection to the system.
Interested Stakeholders: Teacher, Artist, Student, system, AR Device.
Active Stakeholders: Teacher, Artist, Student, system, AR Device.
Normal case steps:

Step 1: Login to the system.
Step 2: Select profile page icon.
Step 3: System determines what type of user is attempting to access information.
Step 4: System fetches appropriate information from database based on user's type and ID.
Step 5: AR device displays the information for the user.
Step 6: User browses profile page information.

Alternatives for:

Step 6.1: Close profile page.
Step 6.2: Refresh profile page.

Exceptions:

If accessing profile information fails because of a bad connection or other error, provide summary of the error and offer an option to attempt a reconnection or exit the system by shutting down.

Outcome:

When a user selects their profile page it will display the information based on the type of users (Student, Teacher, or Artist). Student should see only their results of the tutorials that they have completed. Teachers should see a list of all students that they have assigned tutorials to and their results. Artists should see a list of the songs that they have Uploaded and information about how popular their songs are.

4. **Glossary:**

AR device: This is our actual visual augmented device such as goggles, that we will be using for this project. It will have a display, camera and sound system. It will interact with our system as well as instrument prop with sensor.

Artist: User type. This type of user can record and upload songs, as well as view how many times their songs has been used by teachers and students.

Instrument Prop: Simple shape that the user will hold and the AR device will project displays onto. AR device will project things like: textures that look similar to a real instrument, tips for how to play a song, notes of current song, progress through current song.

Sensor: Pressure sensors that are placed on the instrument prop. The user will select what type of instrument they want to play through the AR device. The sensors will report user input to our application which will provide the display and audio appropriate for the selected instrument.

Song: Composition that has been uploaded by an artist can be accessed by other users. Songs can be compiled into tutorials by teachers. Artists can play and record the song using our AR device.

Student: User type. This user take tutorials that Teachers have assigned them. Students can view their tutorial results on their profile page, which would include % of notes hit, ect.

Teacher: User type. This user takes songs that an Artist has uploaded and assigned to students. Teachers can view, through their profile page, the tutorial results of all students that they have assigned tutorials to.

Tutorial: Collection of songs that have been selected by the teacher. These are then assigned by teachers to students.