TCU Computer Science

Bat Lab
Use Cases

Version 1.2

Revision History

Date	Version	Description	Author
26/Sep/2025	1.0	Determine initial list of use cases	GROUP
29/Sep/2025	1.1	Delegate Use Case List	GROUP
05/Apr/2026	1.2	Finalizing Use Cases	GROUP

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Use Cases

Use Case List

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Admin	UC 6: Admin updates database of existing bat calls UC 7: Admin adds new bat species to database UC 8: Admin adds new sound detector location to database

Use Case 1: Bat researcher submits collected sound file(s) for existing location/species

UC ID and Name:	UC-1: Submit collected sound file(s) for existing location and species		
Created By:	Stryder Schossberger	Date Created:	10/1/2025
Primary Actor:	Bat Researcher (User)	Secondary Actors:	N/A
Trigger:	The user submits a sound file(s) to the system for an existing location and species.		
Description:	The system depends on the user to upload a sound file(s) in order to process a classification query request. On success of a proper submission, the system can process the given file(s) upon a classification query. Otherwise, it rejects the submitted sound file(s) and concludes the action.		
Preconditions:	PRE-1. The user can submit a sound file(s) from a given medium (e.g., hard drive)		
Postconditions:	POST-1. The submitted sound file(s) becomes accessible by the system for a classification request		
Main Success Scenario:	1. The user submits a sound file(s) to the system for classification 2. The system reviews the submitted file(s); If the file type presents as incompatible, see 1E1. 3. The system accepts the submitted sound file(s) and remains ready for future queries to classify the data. 4. The system displays the title of the submitted sound file(s) to the user. 5. Use case ends.		
Extensions:	**1E. The user submits a sound file(s) of incompatible type:** **1E1.** The system throws an error message, alerting the user of the incompatible file(s) type and requests the user to submit a file(s) in appropriate format (e.g., .WAV).		
Priority:	High		
Frequency of Use:	Approximately two users; hourly use on a basis of the amount of recorded data available.		
Business Rules:			
Associated Information:	Limited Memory ● The submitted file(s) resides temporarily in the system ● Termination of the system will prevent access to the submitted sound file(s) as it discards it for memory ● Record of the file submission will be included in the comprehensive database		
Related Use Cases			
Assumptions:	A1. The user retains the required privileges to access the system and upload a sound file(s).		
Open Issues:			

Use Case 2: Bat researcher requests to classify species from uploaded sound files

The bat researcher can request to classify bat species from the uploaded sound files.

UC ID and Name:	UC-2: Bat researcher requests to classify species from uploaded sound files		
Created By:	Elijah Yoo	Date Created:	9/30/25
Primary Actor:	Bat Researcher	Secondary Actors:	N/A
Trigger:	The bat researcher selects one or more uploaded sound files and requests species classification.		
Description:	This use case describes how a bat researcher can upload ultrasonic sound recordings and request automated classification of bat species. The system uses a trained acoustic classification model to analyze the recordings and return predicted species labels with confidence scores.		
Preconditions:	**PRE-1.** The researcher has successfully uploaded valid sound files in supported formats (must be .wav). **PRE-2.** The system's classification model is available and trained with correctly labeled bat acoustic data (training set). **PRE-3.** Researchers have appropriate access rights and are able to perform classifications.		
Postconditions:	**POST-1.** The system provides classification results and species labels. **POST-2.** Results are stored for later retrieval and reporting.		
Main Success Scenario:	1. The bat researcher logs into the system. 2. The researcher selects uploaded sound files. 3. The researcher is given the option to classify all uploaded files or a subset. 4. The researcher requests species classification. 5. The system processes the files using the bat acoustic classification model. 6. The system labels the sound files with predicted species (if confidence threshold is met; only admins may adjust/change confidence threshold) and flags unknown files for human review. 7. The system automatically exports the results in a csv file. 8. The researcher views and optionally downloads the results.		
Extensions:	**4a. The Bat Researcher chooses to view the sonogram in more detail:** **4a1.** The System enlarges the sonogram into a new window and allows the user to zoom in on different sections of the sound. **5a. The uploaded file format is invalid:** **5a1.** The System notifies the researcher of the invalid format and prompts them to upload a supported file type (must be .wav). **5b. Classification confidence is low:** **5b1.** The System flags results below the confidence threshold as "unknown" and calls for human review. **5b2.** The System analyzes sonograms and provides possible reasons for why confidence is low. **5c. The classification service is unavailable:** **5c1.** The System displays an error message and logs the issue for system administrators.		
Priority:	High – the core functionality of the software		
Frequency of Use:	Daily to weekly, depending on the research data collection rate and how often the researcher performs classifications.		
Business Rules:	N/A		

Associated Information:	Notification: ● The system stores classification results in the database for future access. ● The system generates a notification to confirm that classification has successfully completed. ● The system logs metadata (file name, upload time, researcher ID) to ensure reproducibility and traceability.
Related Use Cases:	**UC-1:** Bat researcher submits collected sound files for existing location/species (classification relies on uploaded files). **UC-3:** Bat researcher requests to classify behaviour from uploaded sound files (alternative type of classification). **UC-4:** Bat researcher requests to audit unknown classification results (follow-up if UC-2 produces uncertain/flagged outcomes). **UC-5:** Bat researcher generates a report of classification results (post-processing/reporting of UC-2 output).
Assumptions:	N/A
Open Issues:	N/A

Use Case 3: Bat researcher trains subset model

UC ID and Name:	UC-4: Bat researcher train subset model		
Created By:	Zach Campbell	Date Created:	4/5/2026
Primary Actor:	Bat Researcher	Secondary Actors:	The System
Trigger:	The User indicates to train new subset model		
Description:	The User creates a new subset model that will train on specific call detector(s) and bat species that exist in the database. This subset model will allow the user to predict on specific locations or specific species alone for more detailed and condition specific research.		
Preconditions:	PRE-1. The User is running the System. PRE-2. The User selects detector and bats and trains model PRE-3. The Model goes to the database and selects all matching calls and trains on those calls		
Postconditions:	POST-1. A new model is created and can be used to classify calls from the user inputs.		
Main Success Scenario:	1. The System allows the User to select a detector then select bats at that detector. 2. The System will call the model creation and database and will create a new model that has trained based on User selection. 3. The System adds new models to possible models to classify calls on. 4. Use case ends.		
Extensions:	**2a. No detectors selected:** 2a1. The System alerts the User that no detectors are selected can not train		
Priority:	High		
Frequency of Use:	2 users, average of 7 usage per week.		
Business Rules:			
Associated Information:			
Related Use Cases:	UC-1: Submit collected sound file(s) for existing location and species		
Assumptions:	that the detectors and bat exist in the database		
Open Issues:			

Use Case 4: Bat researcher requests to audit unknown classification results

UC ID and Name:	UC-5: Bat researcher requests to audit unknown classification results		
Created By:	Riley Phan	Date Created:	09/30/2025
Primary Actor:	Bat researcher	Secondary Actors:	
Trigger:	The Bat Researcher indicates an audit request for unknown classification results.		
Description:	The Bat Researcher makes a request to audit unknown classification results returned by the model, so that they can manually identify the bat species from the relevant collected sound files.		
Preconditions:	PRE-1. The Bat Researcher views classification result		
Postconditions:	POST-1. The classification result is updated with “Number of Unknown” equals 0. POST-2. The sound files and classified species are updated in the call database.		
Main Success Scenario:	1. The Bat Researcher indicates an audit request for unknown classification results. 2. The System displays a list of sound files that were marked as “Unknown” by the classification model. 3. The Bat Researcher views and selects a sound file that they want to work on. 4. The System displays a window that contains: system reasoning for unknown tag, the location and sonogram for the sound file, the “Play sound” button, a list of bat species to choose from, and a submit button. 5. The Bat Researcher classifies the species they identified from the sound file and confirms their classification. 6. The System receives the manual result from the Bat Researcher and updates the call database with the classified species. 7. The System removes the sound file as “Unknown” from the classification reports. 8. The System prompts the Bat Researcher to continue with the next “Unknown” result. 9. The Bat Researcher either confirms to continue (return to step 4) or chooses to stop auditing (continues the normal flow). 10. The System takes the Bat Researcher back to the classification report page. 11. Use case ends.		
Extensions:	**4a. The Bat Researcher chooses to view the sonogram in more detail:** 4a1. The System enlarges the sonogram onto a new window and allows the user to zoom in on different sections of the sound. **4b. The Bat Researcher reviews system’s reasoning for unknown tag:** 4b1. The System provides a summary of top 3 reasons it marks the sound file as “Unknown”		
Priority:	High		
Frequency of Use:	2 users, average of 10 usage per week.		
Business Rules:	Security/access concerns.		
Associated Information:	Details: ● The system stores sound files for “Unknown” classification until confirmed as audited The Bat Researcher shall be able to cancel the auditing process at any time prior to confirming the manual classification result.		
Related Use Cases	This action may be performed after other use cases: ● UC-2: Bat researcher requests to classify species from uploaded sound files		

	● UC-6: Bat researcher generates a report of classification results
Assumptions:	
Open Issues:	

Use Case 5: Bat researcher download a report of classification results

UC ID and Name:	UC 6: Bat researcher generates a report of classification results		
Created By:	Rachel Rajamoney	Date Created:	10/2/25
Primary Actor:	Bat Researcher	Secondary Actors:	
Trigger:	The User indicates to download a file of the classification results		
Description:	The User wants to generate bat call parameters, including the call structure, minimum frequency, maximum frequency, characteristic frequency, frequency at the 'knee', frequency at/with maximum energy, bandwidth, duration, shape, and presence of harmonics described for each species, from audio recordings uploaded by the User. The User is able to export a report of classification results containing these, allowing for further bat research.		
Preconditions:	PRE-1. The User is running the System. PRE-2. The User inputs an audio file and runs the model. PRE-3. The Model reads and classifies data from these audio recordings.		
Postconditions:	POST-1. A CSV file is generated containing bat call parameters, including the call structure, minimum frequency, maximum frequency, characteristic frequency, frequency at the 'knee', frequency at/with maximum energy, bandwidth, duration, shape, and presence of harmonics described for each species.		
Main Success Scenario:	5. The System allows User to export a .CSV file. 6. The Output file report contains bat call parameters, including the call structure, minimum frequency, maximum frequency, characteristic frequency, frequency at the 'knee', frequency at/with maximum energy, bandwidth, duration, shape, and presence of harmonics described for each species. 7. The Output file report contains data for both Unknown and Classified bats. 8. Use case ends.		
Extensions:	**4a. No matching requests are found:** 4a1. The System alerts the User that the file cannot be generated. 4a2. The User must input audio recordings. **5a. The User needs to cancel the export of data:** 5a1. The System displays that it is exporting data and allows an exit feature for User. 5a2. The User selects they would like to cancel the request to generate a report of classification results. 5a3. The System terminates the request to generate a report of classification results.		
Priority:	High		
Frequency of Use:	2 users, average of 7 usage per week.		
Business Rules:	Security/access concerns.		
Associated Information:			
Related Use Cases:	UC-5: Bat researcher requests to audit unknown classification results **4a. The Bat Researcher chooses to view the sonogram in more detail:** 4a1. The System enlarges the sonogram onto a new window and allows the user to zoom in on different sections of the sound.		
Assumptions:	The audio recordings are uploaded and run through the model.		
Open Issues:	Decision upon a button only appearing once recordings are uploaded and run.		

Use Case 6: Admin updates database of existing bat calls

UC ID and Name:	UC-8: Admin updates database of existing bat calls		
Created By:	Zach Campbell	Date Created:	9/30/2025
Primary Actor:	Administrator	Secondary Actors:	
Trigger:	The Administrator indicates they want to add new calls to known bats		
Description:	The Administrator wants to add more known calls for a species of bats in a known location in order to train the model more accurately.		
Preconditions:	PRE-1. the Location already exist PRE-2. The Bat already exists in the location. PRE-3. The User has the “admin” privilege.		
Postconditions:	POST-1. The bat information is updated in system with new calls		
Main Success Scenario:	1. The Administrator indicates they want to add new calls to known bats. 2. The system prompts the administrator for the location where the known calls were taken from 3. The administrator provides the location and confirms it 4. The system checks the database for the location provided 5. The System prompts the administrator to indicate what bat it wants to add known calls 6. The administrator selects from known bats in the location 7. The administrator provided the calls to the system 8. the system update the known calls for that species in that location 9. The System notifies administrator that the calls have been added to the correct bat 10. Use case ends.		
Extensions:	**4a. Location does not exist in database:** 4a1. The System alerts the administrator that the location input does not exist in the database. 4a2. The administrator creates a location and adds at least one known bat in that location. 4a3. return to step 3 on the normal flow **6a. Bat does not exist:** 6a1. The System alerts the administrator that the bat that was input is not found in that location's database. 6a2. The administrator creates the bat and connects to that location and returns to step 6 of the normal flow. **7a. Input validation rule violation:** 7a1. The System alerts the Administrator that an input validation rule is violated and displays the nature of the error. 7a2. The Spirit Director corrects the mistake and returns to step 7 of the normal flow.		
Priority:	High		
Frequency of Use:	Approximately 1 user, average of 3-4 usages per week.		
Business Rules:			
Associated Information:			
Related Use Cases:	UC 9 UC 10		
Assumptions:			
Open Issues:			

Use Case 7: Admin adds new bat species to database

UC ID and Name:	UC-9: Admin adds new bat species to database		
Created By:	Zach Campbell	Date Created:	9/30/2025
Primary Actor:	Administrator		
Trigger:	The Administrator indicates to add a bat species to the database		
Description:	The administrator want to add a new bat species to the database to keep track of what bats they have		
Preconditions:	PRE-1. The bat does not already exist in the database		
Postconditions:	POST-1. The bat is now added to the database		
Main Success Scenario:	1. The Administrator indicates to add a bat species to database. 2. The System asks the Administrator to provide specific details by prompting a form/request for information. 3. The Administrator enters the species information and confirms that they have finished adding it. 4. The system updates the database indicating a new species has been added 5. The System informs the Administrator that the species has been added to the database 6. Use case ends.		
Extensions:	**4a. The species already exists in database:** **4a1.** The System alerts the Administrator that this species is already in the database. **4a2.** The Administrator may select another species or cancel. **4a3.** Use case resumes at Step 3.		
Priority:	High		
Frequency of Use:	Approximately 1 user, average of 1-2 usage per week.		
Business Rules:			
Associated Information:			
Related Use Cases:	UC8 and UC 10		
Assumptions:			
Open Issues:			

Use Case 8: Admin adds new sound detector location to database

UC ID and Name:	UC-10: Admin adds new sound detector location to database		
Created By:	Ally Schmidt	Date Created:	10/01/2025
Primary Actor:	Administrator	Secondary Actors:	System
Trigger:	The Administrator indicates to add a new sound detector location to the database		
Description:	The Administrator wants to register a new sound detector location so it is able to be used for classification and reports.		
Preconditions:	PRE-1. The User has the “admin” privilege.		
Postconditions:	POST-1. The new sound detector location is stored in the database. POST-2. The System confirms the location has been added. POST-3. The new location is available for selection and reporting.		
Main Success Scenario:	1. The Administrator indicates to add a new sound detector location. 2. The System prompts the Administrator to enter details about the location. 3. The Administrator enters the required location information. 4. The System validates the location information. 5. The Administrator confirms the entered details are correct. 6. The System stores the new sound detector location in the database. 7. The System confirms that the new location has been successfully added. 8. The use case ends.		
Extensions:	**4a. The location information is invalid:** 4a1. The System alerts the Administrator that the entered location information is invalid. 4a2. The System prompts the Administrator to correct the information. 4a3. The use case returns to Step 3. **5a. The Administrator decides to cancel the process:** 5a1. The Administrator cancels the operation. 5a2. The System discards any entered information. 5a3. The use case terminates.		
Priority:	Medium		
Frequency of Use:	Average of 1-2 uses per month.		
Business Rules:			
Associated Information:	Location information includes, but is not limited to, name, coordinates, features (such as a water source nearby, open field, dense forest, etc).		
Related Use Cases:			
Assumptions:			
Open Issues:			