

# A Bird's Song

*A video game about a bird*

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## Executive Summary

This capstone project proposes the creation of a 2.5D platformer game titled "A Bird's Song," designed to highlight the tragic and true story of the Kaua'i 'ō'ō bird, which went extinct due to human activities. The game will deliver an empathetic narrative, demonstrating the impact of colonization and environmental changes on native island species. Through interactive gameplay, players will experience the challenges faced by the Kaua'i 'ō'ō, emphasizing the importance of conservation and the urgency of protecting biodiversity.

Our primary goal is to use immersive gameplay and environmental storytelling to deliver our message. We aim to create a world that accurately depicts the natural habitat of the Kaua'i 'ō'ō, develop gameplay mechanics that reflect the bird's life challenges, and integrate real historical data (such as statistics, facts, and even sound bytes) to enhance the gameplay experience.

This project offers us, as computer science students, a unique opportunity to apply and expand our technical and creative skills. Using game development frameworks and programming languages, we will build and refine gameplay mechanics, enhancing our abilities in coding, problem-solving, and software architecture. Moreover, this project will enable the development of key skills in game design, art creation, music composition, and narrative storytelling, contributing to a well-rounded skill set in multimedia production.

This capstone project represents a unique opportunity to combine creative game design with a meaningful conservation message, showcasing how interactive media can be used to address critical global issues while providing an enriching educational experience.

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## **Part I: Introduction and Background**

### **Introduction**

#### **Project Name and Description**

This project, A Bird's Song, will be a short video game that shows the story of the Kaua'i 'ō'ō, a now extinct bird. It will follow this bird's struggle to nest and find a mate as the environment around it deteriorates. While there is not a specific client, this game is intended to bring awareness to the ecological destruction of the Hawaiian islands due to human impact and imperialism. Those who care about the environment, enjoy Hawaiian culture and its natural beauty, or anyone who enjoys independent games will enjoy this project. This story is important to tell as every year Hawaii is further impacted by tourism and remnants of colonization and imperialism.

#### **Problems and Issues in technology**

The primary issue to consider with a project of this nature is the decision for the best course of action for development. With game development, a game engine can expedite the development process with the assistance of a reliable user interface and helpful code libraries. The bar for entry is getting lower as popular game engines make tools easier to access for aspiring designers and small development teams. Considering this projects' window for development, an established game engine will be critical to the success of this task. To address this first issue, the

team will need to explore accessible game engines that will best align with our goals. Time, budget, and ease of use will be the most important factors in this decision.

Once a game engine has been established, the second issue to address will be the choice of code to be used for implementation. As game engines increase in popularity, so does their allowance for varieties of code to be used. Be that as it may, certain engines will only allow specific coding languages, and the issue here will be to choose a language with the lowest hurdle regarding the teams' coding experience. In addition to these larger issues, a variety of smaller issues will be encountered during development, considering that there are members of the team that do not have game development experience. These will include game logic, design, and art-related problems.

### **Proposed Solutions to Technological Problems and Issues**

As mentioned in the problem section, choosing a game engine for development of this project will be the blocker. To remedy this, the team will need to explore candidates for its chosen engine. Two popular engines currently being considered are Godot and Unity. Both products meet the team requirements in terms of budget and ease of access, and considering their popularity, there exists a large, supportive community that can help with addressing issues we'll encounter during development. The team will need to explore the facets of each engine and come to a decision for which is best to proceed with.

Once a choice of engine has been established, the team will be able to consider the next issue which is the choice of coding language to use. Both Godot and Unity work with specific languages, with both supporting C#. Though an investigation will need to take place to determine which will work best for the project, and which will work best within each members' abilities.

Regarding the miscellaneous issues that will come to follow during the development cycle, the team will look to members with game development experience for assistance. Some individuals on the team have gone through the development process before and will be able to assist with some potential issues that eventually occur during the development process. To increase the chances of success for this project, it will be imperative to make development choices that are best suited to an independent development team. This will allow for easier access to resources and information that would otherwise be difficult to find with tools that can be more particular.

### **Environmental Scan/Literature Review:**

The goal behind the development of “A Bird’s Song” is to deliver a concise and impactful message to players, emphasizing the importance of ecological preservation. This message will be conveyed through captivating gameplay, striking visuals, and environmental storytelling. By examining prior works that have successfully communicated environmental messages through artistic mediums, we can identify the methods and choices those artists made in their interpretations.

Several notable games in the industry have inspired the development of "A Bird’s Song" by using environmental storytelling to convey powerful messages. For example, games like BioShock (Irrational Games, 2007), Soma (Frictional Games, 2015), and Fallout (Bethesda Game Studios, 1997–present) use environmental storytelling to present bleak messages about innovation and progress turning dangerous and destructive. These games offer players a choice: either follow the dialogue and mandatory story beats or explore the environment to uncover

deeper narratives about how the game world reached its current state. Through set dressing, optional encounters, and narrative throughlines, these games provide a richer understanding of their worlds.

Some games, such as *Hyper Light Drifter* by Heart Machine (2016), tell their stories entirely through the environment without using dialogue. *Hyper Light Drifter* uses cutscenes to depict a tragedy that occurred before the game begins, with the playable character navigating a world fundamentally changed by that event. Alx Preston, the founder of Heart Machine, created the game as a way to communicate his experiences with congenital heart disease and the fear of an uncertain lifespan (Heart Machine, 2016).

Similarly, the story of the Kauaʻi ʻōʻō has been highlighted through visual media. In 2022, online creator Hanah Cincotta (Hanamation) produced a short film titled "Oʻo: The Last Voice of Kauai," which honors the bird and addresses the broader tragedy of biodiversity loss on island habitats. The film tells a linear story from the perspective of the Kauaʻi ʻōʻō birds, showing the arrival of settlers who introduce invasive species like rats, cats, and mosquitoes. These invasive species gradually encroach on the native fauna, pushing more species to endangerment or extinction, while the native flora is slowly deforested. The film uses intense imagery and recordings of the bird's mating call to personify the experience of colonization from the animals' perspective (Cincotta, 2022). Our game aims to take a similar approach, using environmental elements to communicate its message. However, video games have the unique ability to provide players with agency, fostering a more personal connection to the protagonist's plight.

## Stakeholders:

We have identified the following groups of users to be stakeholders for our capstone project, along with what they stand to gain or lose from it: Group 6 development team; CST 489/499 professors; a group of test users targeting fans of the independent game scene; a group of test users who might not be regular 'gamers' in favor of casual players who have a passion for the topic of environmentalism, biodiversity, and local ecology; a member of the Hawaiian community.

Because “A Bird’s Song” is the capstone project proposal for our team, Group 6’s team members have a high interest in doing well on this project, not only to pass this class, but to also showcase all the skills and knowledge we’ve gained from the CSUMB Online Computer Science program. Doing well on the project will help provide personal growth and experience for our potential careers in the future. However, doing poorly should be explored further for why we did poorly, so that we can identify areas for improvement.

The CST 489/499 professors also have an interest in our capstone project, as it provides a level of reflection on the CS program and its students. If the project does not meet the expected standards, perhaps a deep dive needs to be done to understand the factors that caused this (i.e. should the proposal not have been approved, should certain class content be changed, etc.). However, on the flip side, if our project meets or exceeds expectations, it may indicate that the program structure and content is doing well as is and the students were well prepared for this final project.



A group of testers who are already considered fans of independent games would have an interest in our project as it allows them to identify positive features and features to improve before and if our game is ever released beyond the scope of this class. Listening to the target audience who would actually invest in our product provides more available games that they want to be released, rather than games that they aren't actually interested in and wasting their money.

A group of testers who do not consider themselves “gamers”, but have an interest in one of the topics our game touches may find a new interest in gaming because they can relate to our game. Including them in our group of testers also allows them to provide feedback regarding positive and negative features that either keep them interested or turn them off.

Because “A Bird’s Song” is about the now-extinct species of Hawaiian bird, the Kaua‘i ‘ō‘ō, it is important that we consult with at least one member of the Hawaiian community to ensure that the culture is adequately represented, and appreciated as opposed to appropriated for the sake of the project. We absolutely want to ensure that anyone who plays our game doesn't walk away from it with a negative experience because we didn't do our due diligence.

### **Ethical Considerations:**

There are several ethical considerations to make with this project. The subject matter of this project must be handled with care and tact, as the ecological destruction of the Hawaiian islands continues to worsen. There are also considerations that must be made as to how we create this project- the use of artificial intelligence is still controversial, and how it is implemented must be

considered. A game that aims to bring awareness to a sensitive topic such as the extinction of a species and the destruction of islands that have been ravaged by imperialism must be crafted with these concerns in mind every step of the way- The exploitation of these islands and their natural resources needs to be represented without further exploitation.

Having a stakeholder who is a member of the Hawaiian community will be paramount to ensure that this project is handled with care and accuracy where it is important. While creative liberties will be taken for some aspects, such as game mechanics not exactly mirroring how the Kaua‘i ‘ō‘ō would build its nest, or how it flew, we will need to be careful to ensure that any references to Hawaiian culture are accurate and do not fall into stereotypes . The focus will be on nature and it is still to be determined if we will have any reference to human influence aside from the destruction caused by imperialism and tourism. We will need to make sure that we handle “gamifying” such sensitive subject matter in a way that we do not perpetuate stereotypes, and that we communicate the tragedy of the subject.

Another consideration is the use of artificial intelligence. Generative AI use is extremely controversial as these models have been trained on data sets that the original creators did not consent to taking part in. We will work to only use generative image AI for quick mock ups and placeholder assets while in progress. The use of Microsoft Copilot has been discussed, and while there are ethical considerations to be made with how this model was trained, it is far less controversial than the pushback generated artwork has received.

This game also should be accessible to different comfort levels with gaming to reach a larger audience and spread this message. To ensure this is achievable, we will have play testers from different skill levels give feedback.

## **Legal Considerations:**

Legal considerations are paramount in the development of any software project, especially in the realm of video games where copyright issues can be particularly complex. Given the potential for legal repercussions, our team has taken a proactive approach to ensure compliance with copyright laws.

Copyright is a significant concern due to the potential for infringement when utilizing third-party assets or libraries in our project. To mitigate this risk, we have chosen to exclusively utilize assets and libraries licensed under permissive licenses such as MIT, Apache, and Creative Commons. These licenses provide clear guidelines for the use, modification, and distribution of the licensed material, thereby reducing the likelihood of legal disputes. By adhering strictly to these licenses, we aim to uphold the integrity of our project while respecting the intellectual property rights of others.

Additionally, to further minimize legal risks and maintain full control over our project's assets, we will develop resources and assets internally whenever possible. This approach not only ensures that we have the necessary rights to use and distribute the content but also allows for greater customization and optimization to meet the specific requirements of our game. Through

careful consideration of legal implications and proactive measures to comply with copyright laws, our team aims to create a successful and legally sound video game.

## Part II: Project Scope

### Project Goals and Objectives

| Goal  | Objective   |
|---|---|
| Become familiar with the Unity engine.                            | Watch a unity tutorial video each day, with increasing depth, as we approach the start of development.  |
| Develop an art style that is complementary to the game type.      | Research a desirable style and recreate it in Krita, measuring the difficulty and time to produce.  |
| Create an audio library that works with the source material.      | Research music from the area of the Kaua‘i ‘ō‘ō and try to recreate a sample in MidiEditor.   |
| Establish a resource for help, tutorial, and research assistance. | Create a universal document with links to documentation, tutorials, and research data for the chosen Unity, Krita, MidiEditor, and the subject of the game. |

### Final Deliverables

The final deliverable for this project will be a short, three level video game experience showcasing the plight of the Kaua‘i ‘ō‘ō. The playable character will have a robust and dynamic moveset which allows him to navigate the environment. This experience will start with a level showcasing the bird in its natural habitat. The next level will demonstrate the degradation of the

environment, and introduce more hostile entities. The last level will demonstrate a nearly barren forested environment, with even more hostile mobs. Accordingly, our deliverable will include hand-drawn assets for all three levels - lush, withering, and fully decayed. Additionally, the game will contain at least 10 unique mobs that will be introduced throughout the course of the experience. On top of visual design, the product will also include sound design to complement the gameplay experience, including at least one composed song and an assortment of sounds to make the environment feel alive. This project will include a trailer and specific screenshots and moments to showcase during our capstone festival presentation.

### **Approach/Methodology**

To ensure the successful development of our 2.5D platformer, we will employ an agile weekly iterative approach. Each week will be organized into a sprint, beginning with a planning meeting to define sprint goals and prioritize tasks. By breaking down the project into manageable weekly chunks, we can maintain a steady pace and ensure that all team members are aligned on immediate priorities. Use of Discord throughout the week will facilitate continuous communication, allowing team members to provide updates, share obstacles, and coordinate efficiently, ensuring that any issues are promptly addressed.

Our development process will be iterative, meaning we will continuously develop, test, and refine game features. At the end of each weekly sprint, we will hold a review meeting to showcase the work completed, gather feedback, and plan adjustments for the next sprint. Continuous testing and feedback will be integral throughout the process, with each sprint including time for playtesting the latest build. This approach ensures that bugs are identified

early, gameplay mechanics are refined, and the game meets our quality standards. A sprint dedicated to testing towards the end of the project will complement our continual internal testing, providing broader feedback to inform development decisions.

Finally, at the end of each Milestone, we will conduct a retrospective meeting to reflect on what went well, what didn't, and how we can improve our processes. This will foster a culture of continuous improvement, allowing us to enhance our efficiency and effectiveness over time. By using an agile weekly iterative approach, we can remain flexible, responsive, and collaborative, ultimately leading to the creation of a high-quality 2.5D platformer that delivers an engaging experience for players.

## **Milestone 0: Pre-Production**

### **Week 1: Concept & Planning**

- Create initial design documents, including level design and mob types.
- Set up development tools (e.g., Jira, GitHub, Visual Studio Code, Unity, Copilot, etc).

### **Week 2: Prototyping**

- Develop a basic prototype to test core mechanics and gameplay feel.
- Identify and address any major technical challenges.

## **Milestone 1: Asset Creation & Core Development**

### **Week 3-4: Art & Asset Creation**

- Create concept art for characters, mobs, and environments.

- Begin developing 2D/3D assets (sprites, backgrounds, animations).
- Design the layout for all 3 levels.

#### Week 3-4: Core Gameplay Development

- Implement basic player controls and physics.
- Start developing the core mechanics (jumping, attacking, etc.).

### **Milestone 2: Level Design & Basic AI**

#### Week 5: Level Design

- Create graybox versions of levels in Unity to test layouts and gameplay flow.

#### Week 5: AI Development

- Develop basic AI behaviors for mobs.
- Integrate AI with the game to ensure proper interaction with the player.

### **Milestone 3: Polish & Additional Features**

#### Week 6: Polishing Core Mechanics

- Refine player controls and physics based on playtesting feedback.
- Polish animations and ensure smooth transitions between actions.

#### Week 6: Sound & Music

- Develop sound effects for actions and the environment.
- Compose or source background music.



## **Milestone 4: Testing & Refinement**

### Week 7: Internal Testing

- Conduct internal playtesting to identify and fix bugs.
- Refine level design and difficulty based on feedback.

### Week 7: Additional Features

- Implement any additional features (e.g., power-ups, checkpoints).
- Polish UI elements (e.g., menus, HUD).

## **Milestone 5: Final Testing & Launch Preparation**

### Week 8: Beta Testing

- Release a beta version for external testing.
- Collect feedback and address any issues raised by testers.

## **Milestone 6: GO LIVE!**

### Week 9: Final Polish & Launch Prep

- Perform final optimizations and bug fixes.
- Release game to public

## **Platform**

This project will be built using the Unity game engine. This engine was chosen because two of our group members have experience making projects with this engine; one has worked professionally with Unity for years. We decided the volume of resources available for

development using this engine will help us, and this factor, along with our team members' experience, led us to choosing Unity over our initial choice of Godot. While Godot is open source and easy to use, there is less documentation available and many features are still being tested. For the assets, we will be using Krita for creation and editing. This tool not only is useful for drawing and editing sprites, but it is very easy to create simple animations in. We will be utilizing free or paid assets, but will need to edit them, and may create a more tailored visual experience if time allows. For sound design, we will be using MidiEditor, an open sourced utility available for most computing platforms. MidiEditor allows a wide selection of instruments to be simulated, and integrates with most standard midi boards.

## **Risks and Dependencies**

A project of this scope will be susceptible to certain risks, especially when considering the nature of the project and the experience of the team developing it. Considering the goals, the biggest risk will be a lack of familiarity with the tools needed to complete each branch of the project. With Unity as the chosen engine, those that have experience with the engine will need to brush up on any recent changes and those unfamiliar with the product will need to watch tutorial videos and explore new user tools to help with onboarding. Knowledge of Unity will be paramount to the success of the project as all future goals will share a dependency with Unity as it will be required for the implementation of art, audio, and programming.

Lack of knowledge also serves as another risk when considering the use of the chosen art and audio tools. The team members handling the art tasks are familiar with the program, but the program must be able to handle the chosen art style. For this reason, research into the art style must be completed to verify that the chosen art program can handle the required tasks. The same

holds true for the audio program; much of the game is focused on a bird, its song, and its surrounding environment. Understanding the audio required will allow the team to better understand the limitations of the program being used to generate the audio. To better help limit the downtime posed by these risks, as well as alleviate some dependencies resting on program experience, the establishing of a help doc for the team will serve as a resource to speed up identifying solutions to problems and blockers the team will encounter during development.

## Testing Plan

Several methods of testing will be utilized. An interactive experience such as a video game requires not only testing on the codebase using unit- and system testing, but testing of the experience itself using playtesters. For the codebase, Unity comes equipped with ‘Unity Test Runner’, a platform which will enable our development team to pre-program and automatically execute unit tests for each section of our code. For our playtesters, we will have two main groups: People who are familiar with games and will easily be able to pick it up, and those less familiar with games so we can ensure our game is intuitive and accessible to all skill levels. We feel that spreading the message of our game to a wider audience is important, even if it means keeping the gameplay loop somewhat simple; however, we would like to ensure that the mechanics are engaging and complex enough for avid gamers to enjoy the core gameplay loop.

## Team Members

Megan Aleman

Graphic Design, general programming, sprite/asset creation

Michelle Brown

Graphic Design, general programming, level design. gameplay testing

Anthony Broussard

QA, general programming, Unity SME

Brandon Pimentel

Security, general programming, gameplay testing

Charles Zieres

System Architecture, general programming, project management

## References

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## Appendix

- **Usability/evaluation test plan**
- **All pertinent documents**