

Face-to-Face With History: Restoring Forgotten Voices through An Interactive Avatar of Elizabeth Jennings Graham for Museum Education

Margaret Jin¹, Lorenza Fechter², Paul St. Denis³, Tony Scarlatos¹

¹Department of Computer Science, ²Department of Creative Writing, Film and Television, ³Teaching and Learning Lab, Division of Information Technology

Introduction

- **Elizabeth Jennings Graham** was a 19th-century Black civil rights activist whose 1854 court case led to the desegregation of New York City’s public transportation, nearly a century before Rosa Parks. Despite this, her story remains largely absent from museum exhibitions and educational curricula.
- This project investigates how **artificial intelligence can be used as a tool for cultural restoration**, bringing overlooked historical figures back into public awareness.
- We present an **interactive, AI-driven avatar experience** that allows museum visitors to ask spoken questions and receive historically accurate, conversational responses.
- By transforming history into a **dialogue rather than a static display**, this work aims to increase engagement, accessibility, and historical empathy in museum settings.

System Design & Interaction Model



Figure 1 - Sketch of Elizabeth Jennings Graham from American Legacy magazine, Summer 2006 issue, Pg. 12

- The system is designed as a **controlled conversational experience**, prioritizing historical accuracy and reliability over open-ended generation.
- **Speech Input:** Visitor questions are captured using the browser-based Web Speech API for real-time transcription.
- **Keyword-Based Matching:**
 - User input is mapped to responses using a **curated word bank** (e.g., “job,” “interests,” “childhood”).
 - Each keyword triggers a predefined, historically verified response.
 - This ensures **consistency, interpretability, and factual control**, which are critical in educational contexts.
- **Multimodal Output:**
 - Responses are delivered through a **video-based avatar** with synchronized voice and facial animation.
 - Idle animations simulate presence when no interaction occurs, creating a more lifelike experience.
- This hybrid approach balances **interactivity with curatorial control**, avoiding hallucinations while maintaining engagement.

References

[1] Anderson, Beth. *Lizzie Demands a Seat!: Elizabeth Jennings Fights for Streetcar Rights*.
[2] Museum of the City of New York. “Elizabeth Jennings Graham.” <https://www.mcny.org/sites/default/files/2021-06/MCNYElizabethJenningsGraham.pdf>. Accessed March 2026.
[3] New York Transit Museum. “Elizabeth Jennings Graham.” <https://www.nytransitmuseum.org/elizabeth-jennings-graham/>. Accessed March 2026.
[4] New-York Historical Society. “Claudette Colvin, Rosa Parks, Elizabeth Jennings.” <https://www.nyhistory.org/blogs/claudette-colvin-rosa-parks-elizabeth-jennings>. Accessed March 2026.

Acknowledgements

Long Island Museum, CEAS, Stony Brook University

Prototype & Implementation

- A **React-based web prototype** was developed to simulate a museum installation using a **two-screen architecture** that separates avatar display from user interaction.
- **Player Window (Avatar Display):**
 - Runs in a **separate browser window**, representing a dedicated monitor.
 - Plays **pre-rendered response videos** and **idle animations** to simulate presence.
 - Uses a **double-buffered system** for smooth transitions between states.
- **Menu Screen (User Interface):**
 - Features a **three-column layout** of selectable “chat bubble” questions.
 - Includes **microphone input** via the Web Speech API for voice interaction.
 - A **dynamic center panel** provides additional context and expanded answers.
- **System Communication:**
 - Uses **BroadcastChannel** and **WebSocket** messaging for real-time synchronization across screens.
 - Includes fallback methods for cross-browser reliability.
- **UI/UX Design Process:**
 - Designed in **Figma** and implemented in React.
 - Prioritizes clarity, accessibility, and intuitive interaction through familiar conversational UI elements.
- **Deployment Context:**
 - Designed for a **museum kiosk setup**, with the Menu on an iPad and the avatar displayed on a larger monitor.
 - This separation enhances immersion by presenting the avatar as a distinct presence.



Figure 2 - Still of AI Avatar Elizabeth Jennings Graham

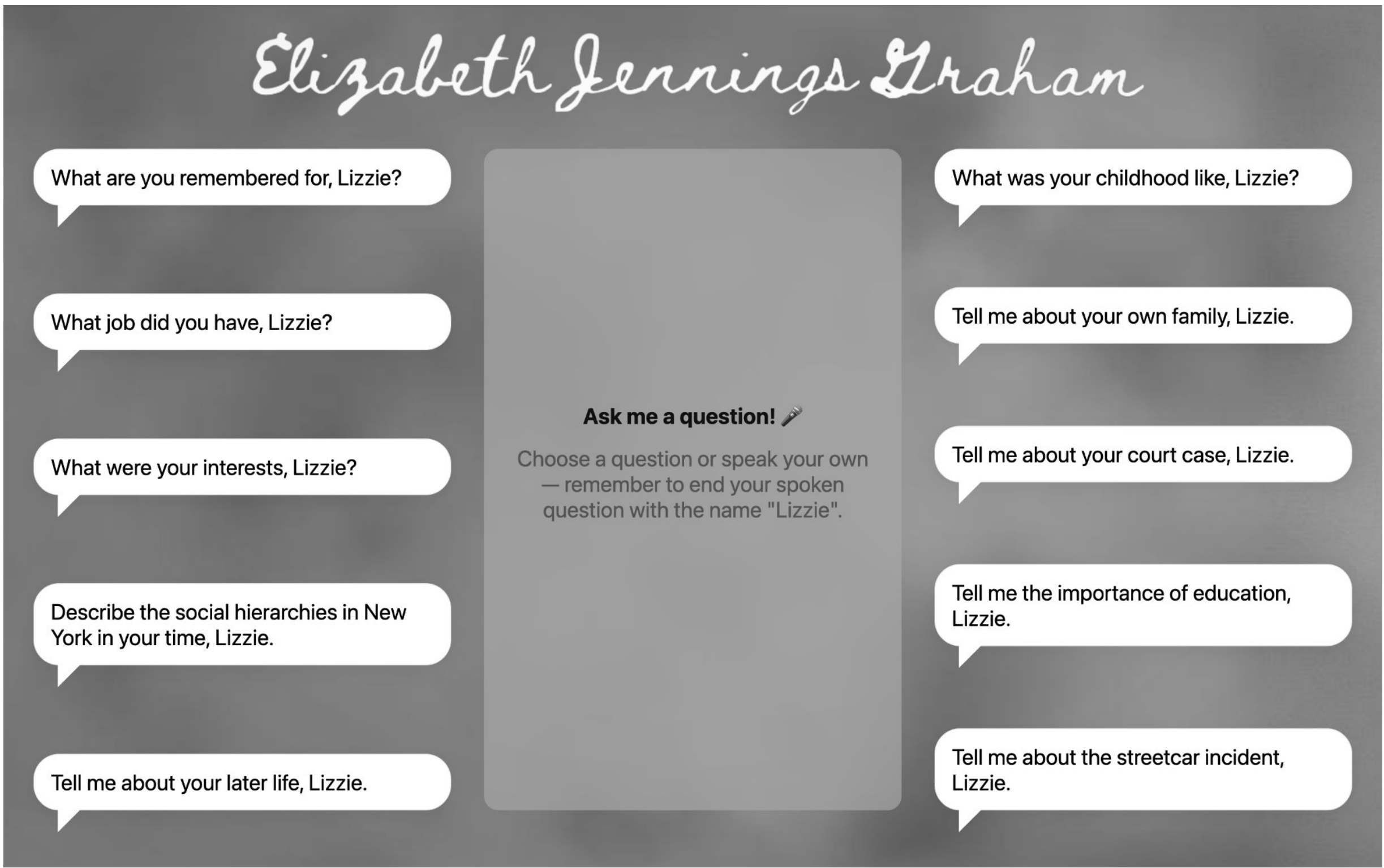


Figure 3 - Menu Screen Landing Page

Evaluation & Impact

- **Current Results:**
 - Fully functional prototype with **speech input, keyword-based interaction, and avatar playback** in real time
 - Successful integration of **UI, interaction logic, and video-based responses** across the full system
- **Evaluation Plan:**
 - Testing with **museum staff, students, and general visitors** in controlled and public settings
 - Metrics: engagement (interactions), learning outcomes, and user experience (clarity, realism, emotional connection)
- **Broader Impact:**
 - Encourages **historical empathy** through interaction rather than passive viewing in museum environments
 - Provides a **low-cost, scalable framework** for museums with limited technical and financial resources
 - Can be adapted to represent other **overlooked historical figures** across diverse museum collections
 - Bridges **technology and humanities** by combining AI with historical storytelling and museum education practices
 - Demonstrates how controlled AI systems can maintain **accuracy** while still delivering **engaging, human-centered experiences**