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How do we conserve and restore computer-based art in a changing technological environment?

The Guggenheim Museum and NYU crack the code for digital preservation

NEW YORK UNIVERSITY

Software- and computer-based works of art are fragile--not unlike their canvas counterparts--as their underlying technologies such as operating systems and programming languages change rapidly, placing these works at risk.

These include Shu Lea Cheang's Brandon (1998-99), Mark Napier's net.flag (2002), and John F. Simon Jr.'s Unfolding Object (2002), three online works recently conserved at the Solomon R. Guggenheim Museum, through a collaboration with New York University's Courant Institute of Mathematical Sciences.

Fortunately, just as conservators have developed methods to protect traditional artworks, computer scientists, in collaboration with time-based media conservators, have created means to safeguard computer- or time-based art by following the same preservation principles.

"The principles of art conservation for traditional works of art can be applied to decision-making in conservation of software- and computer-based works of art with respect to programming language selection, programming techniques, documentation, and other aspects of software remediation during restoration," explains Deena Engel, a professor of computer science at New York University's Courant Institute of Mathematical Sciences.

Since 2014, she has been working with the Guggenheim Museum's Conservation Department to analyze, document, and preserve computer-based artworks from the museum's permanent collection. In 2016, the Guggenheim took more formal steps to ensure the stature of these works by establishing Conserving Computer-Based Art (CCBA), a research and treatment initiative aimed at preserving software and computer-based artworks held by the museum.

"As part of conserving contemporary art, conservators are faced with new challenges as artists use current technology as media for their artworks," says Engel. "If you think of a word processing document that you wrote 10 years ago, can you still open it and read or print it? Software-based art can be very complex. Museums are tasked with conserving and exhibiting works of art in perpetuity. It is important that museums and collectors learn to care for these vulnerable and important works in contemporary art so that future generations can enjoy them."

Under this initiative, a team led by Engel and Joanna Phillips, former senior conservator of time-based media at the Guggenheim Museum, and including conservation fellow Jonathan Farbowitz and Lena Stringari, deputy director and chief conservator at the Guggenheim Museum, explore and implement both technical and theoretical approaches to the treatment and restoration of software-based art.

In doing so, they not only strive to maintain the functionality and appeal of the original works, but also follow the ethical principles that guide conservation of traditional artwork, such as sculptures and paintings. Specifically, Engel and Phillips adhere to the American Institute for Conservation of Historic and Artistic Works' Code of Ethics, Guidelines for Practice, and Commentaries, applying these standards to artistic creations that rely on software as a medium.

"For example, if we migrate a work of software-based art from an obsolete programming environment to a current one, our selection and programming decisions in the new programming language and environment are informed in part by evaluating the artistic goals of the medium first used," explains Engel. "We strive to maintain respect for the artist's coding style and approach in our restoration."

So far, Phillips and Engel have completed two restorations of on-line artworks at the museum: Cheang's Brandon (restored in 2016-2017) and Simon's Unfolding Object (restored in 2018).

Commissioned by the Guggenheim in 1998, Brandon was the first of three web artworks acquired by the museum. Many features of the work had begun to fail within the fast-evolving technological landscape of the Internet: specific pages were no longer accessible, text and image animations no longer displayed properly, and internal and external links were broken. Through changes implemented by CCBA, Brandon fully resumes its programmed, functional, and aesthetic behaviors. The newly restored artwork can again be accessed at http://brandon.guggenheim.org.

Unfolding Object enables visitors from across the globe to create their own individual artwork online by unfolding the pages of a virtual "object"--a two-dimensional rectangular form--click by click, creating a new, multifaceted shape. Users may also see traces left by others who have previously unfolded the same facets, represented by lines or hash marks. The colors of the object and the background change depending on the time of day, so that two simultaneous users in different time zones are looking at different colors. But because the Java technology used to develop this early Internet artwork is now obsolete, the work was no longer supported by contemporary web browsers and is not easily accessible online.

The CCBA team, in dialogue with the artist, analyzed and documented the artwork's original source code and aesthetic and functional behaviors before identifying a treatment strategy. The team determined that a migration from the obsolete Java applet code to the contemporary programming language JavaScript was necessary. In place of a complete rewriting of the code, a treatment that art conservators would deem invasive, the CCBA team developed a new migration strategy more in line with contemporary conservation ethics, "code resituation," which preserves as much of the original source code as possible.

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About the CCBA

A longtime pioneer in the field of contemporary art conservation, and one of the few institutions in the United States with dedicated staff and lab facilities for the conservation of time-based media art, the Guggenheim established the Conserving Computer-Based Art initiative in 2016. The first program dedicated to this subject at the museum, this multiyear project was created to research and develop better practices for the acquisition, preservation, maintenance, and display of computer-based art. By addressing the challenges of preserving digital artworks, including hardware failure, rapid obsolescence of operating systems, and artists' custom software, CCBA is tasked with the conservation of 22 computer-based artworks in the Guggenheim collection to ensure long-term storage and access to the public. The CCBA initiative is an opportunity for the Guggenheim to facilitate cross-institutional collaboration towards best-practice development, and CCBA integrates the museum's ongoing work with the faculty and students of the Department of Computer Science at NYU's Courant Institute for Mathematical Sciences.

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About the Solomon R. Guggenheim Foundation

The Solomon R. Guggenheim Foundation was established in 1937 and is dedicated to promoting the understanding and appreciation of modern and contemporary art through exhibitions, education programs, research initiatives, and publications. The Guggenheim international constellation of museums includes the Solomon R. Guggenheim Museum, New York; the Peggy Guggenheim Collection, Venice; the Guggenheim Museum Bilbao; and the future Guggenheim Abu Dhabi. In 2019, the Frank Lloyd Wright-designed Solomon R. Guggenheim Museum celebrates 60 years as an architectural icon and "temple of spirit" where radical art and architecture meet. To learn more about the museum and the Guggenheim's activities around the world, visit guggenheim.org.

About the Courant Institute of Mathematical Sciences

New York University's Courant Institute of Mathematical Sciences is a leading center for research and education in mathematics and computer science. The Institute has contributed to domestic and international science and engineering by promoting an integrated view of mathematics and computation. Faculty and students are engaged in a broad range of research activities, which include many areas of mathematics and computer science as well as the application of these disciplines to problems in the biological, physical, and economic sciences. The Courant Institute has played a central role in the development of applied mathematics, analysis, and computer science, and its faculty has received numerous national and international awards in recognition of their extraordinary research accomplishments. For more information, visit http://www.cims.nyu.edu/.

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