

110100010100010101101010001  
110100010100010  
11010001010001010110101000  
000101000101011010100010101010010110101  
1101000101000101011010100010101  
110100010100010101101010001010101001

# HUMAN AND MACHINE

THE HUMANITIES TAKE THE  
DIGITAL REVOLUTION AND RUN

by SUSAN AHLBORN

110100010100010101101010001010101  
110100010100010101101  
11010001010001010110101000101010  
11010001010001010110101000101  
11010001010001010

010101001011010100010001  
0101101010001010101001011010100010001  
01010101001011010100010001  
00010001  
01001011010100010001  
011010100010001

Computer programs that can detect infinitesimal traces of color to show how Roman statues were painted 2,000 years ago. Data mining millions of pages of writing to discover word frequencies and patterns that couldn't be found before. Maps that show the movements of people across centuries.

Technology is literally changing the way we see—and hear—the humanities. “I wish there was smell,” says Professor of Religious Studies Justin McDaniel—but that may be coming. Right now we're at the beginning of the beginning.

The digital humanities are so new that no one can agree on a definition. The simplest and most inclusive is that they are the interface between the humanities and digital technology, creating new approaches, new knowledge—and ultimately new questions. “It's very important that digital humanities be understood as something that humanists are doing for humanities reasons, and not as some tech-y, isolated thing,” says James English, John Welsh Centennial Professor of English, director of the Penn Humanities Forum, and creator of the Digital Humanities Forum.

All such projects at Penn will soon have a home in the Price Lab for the Digital Humanities, thanks to Penn Arts and Sciences Overseer Michael Price, W'79, and his wife Vikki (see “Opening Up a Virtual World” in the Fall/Winter 2014 *Partners and Progress*). The lab will have all the technology and support that faculty and students need to stay on the leading edge of this transformational wave. In a field that is inherently collaborative, it will also provide a campus hub for interdisciplinary work by people across the University.

“We've all got our smartphones and our laptops. We're using these digital tools in various ways to conduct our research, but we don't call this digital humanities,” says English. “It will be the same with a lot of the things we are calling digital humanities right now; eventually they will be like using Microsoft Word.”

We talked to seven Penn Arts and Sciences faculty and students about the work they're already doing in the digital humanities.

001011010100010001  
010001010101001011010100010001  
01001011010100010001  
0101001011010100010001  
1101010001010101001011010100010001

# MAPPING MIGRATION

SIYEN FEI

What happens when a nation can't hold on to its people? The Ming Dynasty returned China to native rule after centuries of Mongol occupation. State rhetoric stressed that the power of Chinese civilization would maintain a homogeneous China, but Associate Professor of History Siyen Fei is making a digital map to show just how much was being lost across the borders.

The nation was under attack on its frontiers, by the Mongols on the north, pirates in the south, and tribal kingdoms in the southwest. China and its foes would each invade the other to get needed supplies, including workers: "People took money, took men, took women, took goods with them," says Fei. Kidnapped Chinese would often find they were treated better by their abductors than by their government. Many decided to stay, and others left China on their own.

Fei is mining court records and using geographic information systems (GIS) to map immigration and emigration rates throughout the dynasty. The visual representation of how, where, and when the rates changed will help her see in what ways the different flows of population and political dynamics affected what was once seen as an all-powerful imperium.



# DIGITAL MONASTERY

JUSTIN McDANIEL



Justin McDaniel's Thai Digital Monastery project opens the walls of a Buddhist monastery in Bangkok. In a panoramic, immersive walk-through of the Wat Ratchaorot, users can see rooms and rituals and hear from the people who live there. "I try to provide as little commentary as possible," the professor of religious studies says.

To create the site, McDaniel has worked with monks and nuns as well as technical experts and scholars in Thailand and around the world. He's now scanning Buddhist manuscripts, beginning with the collection at Penn Libraries. Eventually he plans to create hypertext editions where visitors can view the documents while seeing a running translation and listening to a monk or nun chant the words. "It will be a one-stop shop for the history of Thai Buddhism," he says.

McDaniel believes that pulling information together in this way will generate a world-wide knowledge community whose members will create new research initiatives, juxtapose previously disconnected concepts, and inspire and train others, whether their interest is academic, religious, or cultural. "That's what digital humanities are allowing us to do: maximize resources," he says. "I want to get information out to as many people as possible."

# SEEING THE SAINTS

ELIZABETH LASTRA

Liz Lastra's digital images of medieval churches in Spain let you zoom in until you can see the toes of the saints. They are Gigapans, created using photographs—sometimes hundreds—that are stitched together by computer into what are essentially very high-resolution pictures. She's also created 3D digital models so that you can look down into a 13<sup>th</sup>-century baptismal font.

A doctoral candidate in art history, Lastra is examining three churches built at different times in Carrión de los Condes, a town on the Camino de Santiago pilgrimage route in Spain. She's comparing the churches to see what design elements may have been kept or lost over time. She's found "quotes" of earlier sculptures and repeated themes in the churches, suggesting that the town was self-conscious as it became a destination spot. "The urbanization of the town was being fueled by the pilgrimage economy," she says. "How do you express local identity while also trying to appeal to the pilgrimage audience?"

Lastra's parents are computer scientists, and one of her goals has been to join technology and the humanities. Her website of Romanesque churches in northern Spain brings other academics, her future students, and all who are interested with her to Carrión and beyond.



010100  
1101000101000  
1101000101000101010

# THE AERIAL ARCHEOLOGIST

LUCAS STEPHENS

Archeologists spend most of their time close to the ground, but Lucas Stephens is using 21st-century equipment to get a birds-eye view of Penn's Gordion excavation site in central Turkey.

The Phantom 2 Vision Plus Quadcopter flies at 100 meters, giving the doctoral candidate in art and archaeology of the Mediterranean world a unique way of mapping the ancient capital city of King Midas—considered one of the most important dig sites in the world. The copter's Global Positioning System (GPS) capabilities let him create models of the ancient landscape, as well as follow the progress of current excavations.

"I'm looking at how people moved around in the past, what routes they took, and how these relate to monuments and other sites in the landscape," says Stephens, who is working with C. Brian Rose, James B. Pritchard Professor of Archaeology and Professor of Classical Studies. "I've been using the copter to capture imagery of landscape features such as quarries, ancient road surfaces, burial mounds, occupation mounds, and rock-cut tombs, which can be turned into geo-referenced 3D models with photogrammetry software. The goal is to produce interactive maps and more videos highlighting specific routes and the ancient landscape features along them."



# AN ANCIENT LANGUAGE ONLINE

STEVE TINNEY

Thousands of pieces of clay marked with a cramped triangular script have been found in the area of the Middle East that was ancient Mesopotamia. They are the paperwork of that civilization: administrative records, religious and political material, mythology and narrative, and even writing exercises. Understanding Sumerian and Akkadian, the languages they use, gives us a wide window into that world.

Steve Tinney came to Penn in 1991 to help create a Sumerian dictionary based on the Museum's collection and research. His timing was fortunate. The emerging digital world offered speed and made possible a new kind of dictionary: one that was richly linked to the texts and that could be used by scholars everywhere.

The electronic Pennsylvania Sumerian Dictionary (ePSD) was released in 2006. Now Clark Research Associate Professor in Assyriology, Tinney and colleagues at Penn and around the world are working on the Open Richly Annotated Cuneiform Corpus (Oracc), which will encompass the ePSD and other work in Mesopotamian languages and scholarship. "We can reasonably aim to build a complete corpus where you can find every word—maybe not in my lifetime but in my students' lifetime," he says. "It's a matter of establishing very, very firm foundations for generations of research."



# THE WAY WE READ NOW

HEATHER LOVE

*Jane Eyre* may be a commentary on the history of empire, but it undeniably is the story of a woman making her way in the world. R. Jean Brownlee Term Associate Professor of English Heather Love has been working with Sharon Marcus of Columbia and Berkeley's Stephen Best on a project on surface or descriptive reading: a set of methods to let the reader look at the text, not through it. In a graduate seminar Love and Marcus taught last year, they practiced the approach while reading Herman Melville's *Benito Cereno*—a story in which the narrator himself seems to completely misread events—as a collaborative exercise in line-by-line reading.

Literary studies has always been a solitary field, but digital methods allow for “a collective reading process, not limited by the margin of the page,” says Love. They tried out software and tools that let readers comment on the text, respond to each other, investigate word frequency and other data, and more. The class even did a social networking analysis of the interactions in the book, which raised the question of what counted as an encounter: Did a memory? A court case that revisits the action? Love says, “A lot of the tools we used were as interesting for the problems and questions they raised as for the results.”



# A GIVEN NAME

TIMOTHY POWELL

Working with Penn undergraduates and the Native American community, Senior Lecturer in Religious Studies Timothy Powell is preserving languages and revitalizing cultures. Through his position as Director of the Center for Native American and Indigenous Research at the American Philosophical Society, he and his students digitized 3,000 hours of audio recording and 500 photographs of tribes in the U.S. and Canada, which they curated into digital exhibits.

Then Powell met Maria McKie, a Tuscarora tribe member and Mellon fellow working to promote digital knowledge-sharing. She found Charles A. Cooke's collection of Iroquois names in the Society's files and recognized its importance. Many traditional names of the Iroquois, or Haudenosaunee, were lost starting in the 1880s when native children were sent to boarding school and renamed. Powell and his undergraduates worked for three years to transcribe 6,000 names and their clans, along with a linguistic analysis and biography of the original person to hold the name.

“I think part of my work is to put the human back in the digital humanities,” says Powell. “We're really instilling in the students a sense of how valuable digital humanities can be, that it's not just an abstraction. Scholars in the humanities see digital technology as not just gigabytes and terabytes, but as an art form.”

